FORMAL PUBLIC DRAFT

Butte Regional CONSERVATION PLAN

BALANCING GROWTH AND CONSERVATION

leidos

NOVEMBER 2015

buttehcp.com

FORMAL PUBLIC DRAFT

Butte Regional
CONSERVATION PLAN
BALANCING GROWTH AND CONSERVATION

PREPARED FOR

BUTTE COUNTY ASSOCIATION OF GOVERNMENTS

PREPARED BY

leidos

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ACRONYMS AND ABBREVIATIONS

ºC	degrees Celsius
ºF	degrees Fahrenheit
AMM	Avoidance and Minimization Measure
APN	Assessor's Parcel Number
ARP	Aquatic Resources Program
BBS	Breeding Bird Survey
BCAG	Butte County Association of Governments
BCM	Butte County meadowfoam
BGEPA	Bald Eagle and Golden Eagle Protection Act
BMP	Best Management Practices
BO	biological opinion
BRCP	Butte Regional Conservation Plan
CALFED	CALFED Bay-Delta Program
Caltrans	California Department of Transportation
CAZ	Conservation Acquisition Zones
CBCMP	Chico Butte County Meadowfoam Preserve
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	*Code of Federal Regulations*
CIP	Consumer Price Index
CM	Conservation Measure
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society
CSA	County Service Area
CSU	California State University
CVRWQCB	Central Valley Regional Water Quality Control Board
CWA	Clean Water Act
CWHR	California Wildlife Habitat Relationships System
DFG	Department of Fish and Game
DPS	Distinct Population Segment
DWR	Department of Water Resources
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
ESA	Endangered Species Act
FERC	Federal Energy Regulatory Commission
FR	*Federal Register*
FRAP	Fire and Resource Assessment Program
FHWA	Federal Highway Administration
FTE	Full-time equivalent
GIC	Geographic Information Center
GIS	Geographic Information Systems
HCP	Habitat Conservation Plan
JPA	Joint Powers Authority

MBTA	Migratory Bird Treaty Act
MMU	minimum mapping unit
MOA	Memoranda of Agreement
MOU	Memoranda of Understanding
NAIP	National Agriculture Imagery Program
NCCP	Natural Community Conservation Plan
NCCPA	Natural Community Conservation Planning Act
NEPA	National Environmental Policy Act
NHD	National Hydrography Dataset
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resources Conservation Service
NWR	National Wildlife Refuge
PCE	primary constituent elements
PEHL	public and easement habitat lands
RGP	Regional General Permit
RHJV	Riparian Habitat Joint Venture
ROW	right-of-way
RWQCB	Regional Water Quality Control Board
SB	State Bill
SOD	Sudden Oak Death
SPCC	Spill Prevention, Control, and Counter Measure Plan
SR	State Route
SSC	species of special concern
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
SWRI	Southwest Research Institute
TMDL	total maximum daily loads
UC	University of California
UPA	urban permit area
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USDA	U.S. Department of Agriculture
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
WCWD	Western Canal Water District
WWECP	Wet Weather Erosion Control Plan
WWTP	Wastewater Treatment Plant

CHAPTER 1. INTRODUCTION

1.1 OVERVIEW

The Butte Regional Conservation Plan (BRCP) is intended to establish and implement a comprehensive, coordinated, and efficient program to conserve ecologically important resources in the lowland and foothill region of Butte County (the "Plan Area"), including endangered, threatened, and other at-risk species and their habitats; natural communities and the ecological processes that support them; biodiversity; streams and ponds and the watersheds that support them; wetlands and riparian habitats; and ecological corridors. Important to the success of the BRCP is the continued ecological and economic function of working landscapes, including certain farming and ranching practices, and the preservation of open space. The BRCP addresses regulatory compliance with state and federal laws that protect species, wetlands, and streams for Butte County, cities within the Plan Area, water/irrigation districts within the Plan Area, the Butte County Association of Governments (BCAG),[1] the California Department of Transportation (Caltrans), and the BRCP Implementing Entity (collectively, the "Permit Applicants" prior to permit issuance or "Permittees" following permit issuance) for activities and projects in the Plan Area that they conduct or approve. As described in Chapter 9, *Implementation Structure*, BCAG will serve as the BRCP Implementing Entity.[2] The BRCP provides a more efficient, consistent, and effective alternative to mitigation planning and permitting on a project-by-project basis. Relative to the BRCP, the project-by-project approach is generally more costly and time-consuming for applicants and often results in uncoordinated and biologically inferior mitigation for biological resources. The BRCP offers a simpler process for mitigation of biological resources impacts and provides an additional conservation component for biological resources above the mitigation component.

Permit Applicants for permits under section 10 of the federal Endangered Species Act (ESA) and section 2835 of the California Natural Community Conservation Planning Act (NCCPA) are:

- County of Butte (County)
- City of Oroville
- City of Chico
- City of Biggs
- City of Gridley
- BCAG

[1] BCAG is a joint powers authority formed pursuant to the Joint Exercise of Powers Act, California Government Code sections 6500 et seq.

[2] The BRCP Implementing Entity will be established to implement the Plan and will consist of a joint powers authority (JPA) created by the local agency permittees. BCAG will serve as the BRCP Implementing Entity at the direction of the BRCP JPA.

- California Department of Transportation (Caltrans)
- Western Canal Water District (WCWD)
- Biggs-West Gridley Water District
- Butte Water District
- Richvale Irrigation District

The BRCP ensures that all impacts on biological resources resulting from land development and other activities covered by the plan are fully mitigated. The BRCP also provides for additional measures beneficial to species occurrences and habitat to ensure the conservation of species in the Plan Area and an orderly development of a system of conservation lands based on the principles of conservation biology that will eventually total more than 90,000 acres (see Chapter 5, *Conservation Strategy*).

The BRCP's implementation by BCAG as a centralized Implementing Entity able to authorize use of the permits, collect fees, and implement conservation measures, monitoring, and adaptive management allows for a more effective and efficient process both for orderly growth and development and for the conservation of species and natural communities (see Chapter 8, *Implementation Plan*).

The BRCP offers a simple impact fee system for project proponents to comply with federal and state endangered species regulations (see Chapter 10, *Implementation Cost and Funding Sources*).

A parallel process was conducted with the BRCP development to develop a regional program for compliance with section 404 of the Clean Water Act regulation of wetlands and other waters of the United States and section 1602 of the California Fish and Game Code regulation of streams and riparian habitat.

1.1.1 Background

In 2007, the BRCP Planning Agreement ("Planning Agreement") was entered into by and among the "Local Agencies" (i.e., the County of Butte, the City of Oroville, the City of Chico, the City of Biggs, and the City of Gridley), the California Department of Fish and Wildlife (CDFW[3]), the U.S. Fish and Wildlife Service (USFWS), and the National Marine Fisheries Service (NMFS) (Appendix H, *Butte Regional Conservation Plan Planning Agreement*). The Planning Agreement identifies the initial planning scope, goals, and preparation process for the BRCP. In 2010, WCWD, Biggs-West Gridley Water District, Butte Water District, Richvale Irrigation District and Caltrans became signatories to the Planning Agreement.

[3] In 2013, during the development of the BRCP, "California Department of Fish and Wildlife" (CDFW) become the new name for the California Department of Fish and Game (DFG). Some use of the term DFG may be found in the BRCP chapters and appendices and these refer to CDFW. Publications that were published under the name DFG are cited with the DFG name.

An organizational structure was created to develop the BRCP efficiently and with substantial opportunity for input from stakeholders and the general public. This structure included a Steering Committee composed of the Permit Applicants; a Stakeholder Committee composed of parties with a broad range of interests in the Plan Area including concerns for biological resources, agriculture, land use and development, education, transportation, resource management, water delivery, and others; and an Agency Technical Committee comprised of the federal and state regulatory agencies (USFWS, CDFW, NMFS, U.S. Army Corps of Engineers [USACE], U.S. Environmental Protection Agency [EPA], and Central Valley Regional Water Quality Control Board [CVRWQCB]). BCAG served as the lead in coordination of the committee process and preparation of the BRCP, including contracting the lead consultant, Leidos, Inc., and other professionals to support drafting of the BRCP. The federal and state permitting agencies, USFWS, NMFS, CDFW, and USACE, provided input throughout the BRCP development and participated in Steering Committee and Stakeholder Committee meetings as well as separate Agency Technical Committee meetings with BCAG and consultants. Public involvement was encouraged through various means, including publicly open Stakeholder Committee meetings; several public workshops, newsletters, and a regularly updated website[4] (see Section 1.4.2.2, *Public Outreach* for more details).

The BRCP was developed in coordination with the development of general plans for the County, Chico, Oroville, Gridley, and Biggs with feedback loops between the BRCP and general plan development processes.[5] These feedback loops identified opportunities and constraints and allowed for improvements in the general plans regarding the avoidance and minimization of impacts on biological resources and the development of open space and conservation elements that dovetail with the BRCP (for a discussion of the interplay between general plan and BRCP development see Chapter 11, *Alternatives to Take*).

Compliance with the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA) was conducted through the preparation of the BRCP Environmental Impact Report / Environmental Impact Statement (EIR/EIS). USFWS is the federal NEPA lead agency and BCAG is the CEQA lead agency. The BRCP EIR/EIS evaluates the environmental effects of implementation of the BRCP and provides for a public review process.

1.1.2 Purpose

The BRCP's Conservation Strategy provides a regional approach for the long-term conservation of covered species (see Section 1.3.3, *Covered Species*) and natural communities (including wetlands and streams) within the Plan Area while allowing for compatible future land use and development under county and city general plan updates and the regional transportation plans and programs.

[4] http://www.buttehcp.com/

[5] General plans are required under the California Government Code Section 65300 et seq. "Each planning agency shall prepare and the legislative body of each county and city shall adopt a comprehensive, long-term general plan for the physical development of the county or city, and of any land outside its boundaries which in the planning agency's judgment bears relation to its planning." (section 65300)

The BRCP identifies and addresses the covered activities carried out by the Permittees and third parties authorized by the Permittees that may result in take of covered species within the Plan Area. Covered activities include those existing, planned and proposed land uses over which the Permittees have land use authority; state and local transportation projects; maintenance of water delivery systems (e.g., WCWD canals and similar delivery systems); habitat restoration, enhancement, and management actions; and adaptive management and monitoring activities. The permits issued under the BRCP will allow covered activities in the Plan Area to be carried out in compliance with the NCCPA, the California Endangered Species Act (CESA), and ESA. The BRCP also supports permitting under the Clean Water Act (CWA) section 404 for placement of dredged or fill material into waters of the United States, including wetlands, and authorization under California Fish and Game Code section 1602 for alteration of the beds and banks of streams and lakes.

The BRCP satisfies the requirements for a Habitat Conservation Plan (HCP) under section 10(a)(1)(B) of ESA, and a Natural Community Conservation Plan (NCCP) under the NCCPA, and serves as the basis for take authorizations under both Acts. Section 2835 of the California Fish and Game Code provides that after the approval of an NCCP, CDFW may permit the taking of any covered species, both CESA-listed and nonlisted, whose conservation and management are provided for in the NCCP. ESA provides that after the approval of an HCP, USFWS and NMFS may permit the taking of covered species (both ESA-listed and nonlisted) if the HCP meets the requirements of section 10(a)(2)(A) of ESA.

The regional approach to planning and development of the BRCP as a joint HCP/NCCP, in conjunction with general plan updates developed by the Local Agencies, provides significant benefits to biological resources conservation and regional growth and development over existing processes of planning and compliance. Conservation planning and implementation at a regional scale allows for more efficient and effective establishment of a system of conservation lands to meet the needs of species covered by the BRCP than the existing ad hoc project-by-project process. The BRCP allows for the integration of habitat conservation with the long-term general plan implementation to balance the need for growth of the built environment with species protection and to make future development compliance with endangered species regulations more predictable and certain. The regional BRCP also addresses the integration of species conservation into the existing agricultural working landscape and allows for compatible multiple uses within specific areas important for habitat conservation.

1.1.3 Overall Planning Goals and Conservation Objectives

As described in the Planning Agreement, the BRCP planning goals include the following:

- Provide for the conservation and management of covered species within the Plan Area;
- Preserve aquatic and terrestrial resources through conservation partnerships with the Local Agencies;

- Allow for appropriate and compatible growth and development consistent with applicable laws;
- Balance open space, habitat, agriculture and urban development;
- Protect the rights of property owners;
- Provide a means to implement covered activities in a manner that complies with applicable state and federal fish and wildlife protection laws, including CESA (through the NCCPA) and ESA, CWA sections 404/401, and other environmental laws, including CEQA and NEPA;
- Provide a basis for permits necessary to lawfully take covered species;
- Provide a comprehensive means to coordinate and standardize mitigation and compensation requirements of ESA, NCCPA, CEQA, NEPA, and CWA within the Plan Area; and
- Provide a less costly, equitable, more efficient project review process that results in greater conservation values than project-by-project, species-by-species review.

The BRCP's goal to "provide for the conservation and management of covered species" means that the BRCP will ensure the implementation of measures that will contribute to the recovery of covered species, taking into consideration the scope of the Plan Area in relation to the geographic range of the covered species, and the effect of covered activities on these species in relation to other activities not addressed by the BRCP.

As further described in the Planning Agreement, the conservation objectives intended to be achieved through the BRCP are as follows:

- Provide for the protection of species, natural communities, and ecosystems on a landscape level;
- Preserve the diversity of plant and animal communities throughout the Plan Area;
- Protect threatened, endangered or other special-status plant and animal species, and minimize and mitigate the take or loss of covered species;
- Identify and designate biologically sensitive habitat areas;
- Preserve habitat and contribute to the recovery of covered species;
- Reduce the need to list additional species;
- Set forth species-specific goals and objectives;
- Set forth specific habitat-based goals and objectives expressed in terms of amount, quality, and connectivity of habitat; and

- Implement an adaptive management and monitoring program to respond to changing ecological conditions.

1.2 REGULATORY CONTEXT

The BRCP operates within and assists in achieving the requirements of numerous applicable federal and state laws and regulations. This section describes the applicable federal and state laws and regulations with which the BRCP is intended to comply and other federal and state laws and regulations with which the BRCP implementation may need to comply.

1.2.1 Federal Endangered Species Act

The ESA has three major components relevant to the BRCP: the section 9 prohibition against the "taking" of listed species; the section 10 provisions for the permitting of nonfederal entities (the Permittees) for the incidental take of listed species; and the section 7 requirement that federal agencies (in this case, USFWS and NMFS by issuance of ESA section 10 permits) ensure, in consultation with the federal fish and wildlife agencies (USFWS and NFMS conduct intra-agency consultations), that their actions are not likely to jeopardize the continued existence of species or result in modification or destruction of critical habitat.

Section 9(a)(1)(B) of the ESA prohibits the take by any person of any endangered fish or wildlife species; take of threatened fish or wildlife species is prohibited by regulation. The ESA prohibits the take of any listed threatened fish or wildlife species in violation of any regulation promulgated by the USFWS or NMFS. "Take" is defined broadly to mean harass, harm, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct.[6] "Harm" is defined by regulation to mean an act which actually kills or injures wildlife, including those activities that cause significant habitat modification or degradation resulting in the killing or injuring of wildlife by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering.[7] The take prohibitions of the ESA apply unless take is otherwise specifically authorized or permitted pursuant to the provisions of section 7 or section 10 of the ESA. The protections for listed plant species under the ESA are more limited than for fish and wildlife.[8]

[6] 16 U.S.C § 1532(19).

[7] 50 CFR § 17.3. NMFS has a similar definition that adds the concepts of spawning and migrating to examples of injury. NMFS defines "harm" as "an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavioral patterns, including, breeding, spawning, rearing, migrating, feeding or sheltering" (50 CFR § 222.102).

[8] Protection for threatened plant species is limited to areas under federal jurisdiction. Section 9(a)(2)(B) of the ESA prohibits removal, possession, or malicious damage or destruction of endangered plants in areas under federal jurisdiction, as well as actions that remove, cut, dig up, damage, or destroy endangered plants in areas outside of federal jurisdiction in violation of any state law or regulation, including state criminal trespass law (16 United States Code [U.S.C.] § 1538(a)(2)(B)). The ESA section 7(a)(2) prohibition against jeopardy applies to plants, wildlife, and fish equally, and USFWS and NMFS may not issue a section 10(a)(1)(B) permit if the issuance of that permit would result in jeopardy to any listed species (16 U.S.C. § 1536(a)(2)).

Section 10 of the ESA specifically addresses the authorization for take by nonfederal entities through the development of an HCP. For those actions for which no federal nexus exists (i.e., not authorized, funded, or carried out by a federal agency), private individuals, corporations, state and local government agencies, and other nonfederal entities who wish to conduct otherwise lawful activities that may incidentally result in take of a listed species must first obtain a section 10 incidental take permit from USFWS or NMFS. The nonfederal entity is required to develop an HCP as part of the permit application process. The BRCP is intended serve as a HCP and to meet all regulatory requirements necessary for USFWS and NMFS to issue section 10 permits to allow incidental take of all covered species as a result of covered activities undertaken by the permitted entities. Before issuing a section 10(a)(1)(B) incidental take permit, the USFWS and NMFS must make the following findings:

- The taking is incidental to an otherwise lawful activity;
- Impacts are monitored, minimized, and mitigated to the maximum extent practicable;
- Procedures are provided to deal with unforeseen circumstances;
- Adequate funds exist to implement the HCP; and
- The taking will not appreciably reduce the likelihood of the survival and recovery of the species in the wild.[9]

In June 2000, the USFWS and NMFS adopted the "Five-Point Policy" designed to clarify elements of the habitat conservation planning program as they relate to biological goals and objectives, adaptive management, monitoring, permit duration, and public participation.[10] The Five-Point Policy directs that the following elements be addressed in the development of habitat conservation plans:

- **Biological Goals and Objectives**. HCPs are required to define biological goals and objectives the plan is intended to achieve. Biological goals and objectives clarify the purpose and direction of the plan's conservation program. The BRCP sets out biological goals and objectives, including specific measurable targets that the Plan is intended to meet. These targets are based on the best available scientific information and have been used as parameters and benchmarks to guide the conservation strategies for the species and natural communities covered by the Plan. The biological objectives of the BRCP are described in Chapter 5, *Conservation Strategy*.
- **Adaptive Management**. The Five-Point Policy encourages the inclusion of adaptive management strategies in HCPs in appropriate circumstances to address uncertainty related to species covered by a plan. The policy describes adaptive management as a "method for examining alternative strategies for meeting measurable biological goals and

[9] 16 U.S.C. § 1539(a)(2)(B)
[10] Final Addendum to the Handbook for Habitat Conservation Planning and Incidental Take Permitting, 65 *Federal Register* (FR) 106, June 1, 2000 (referred to as the "Five-Point Policy").

objectives, and then, if necessary, adjusting future conservation management actions according to what is learned."[11] The BRCP incorporates an adaptive management process designed to facilitate and improve decision-making during the implementation of the BRCP and identify adjustments and modifications to the Conservation Strategy, as defined in the BRCP, as new information becomes available over time. The framework for the BRCP adaptive management program is set out in Section 7.2, *Adaptive Management Plan*.

- **Monitoring**. HCPs are required to include provisions for monitoring to gauge the effectiveness of the plan in meeting the biological goals and objectives and to verify that the terms and conditions of the plan are being properly implemented. The monitoring provisions of the BRCP are found in Section 7.1, *Monitoring Program.*
- **Permit Duration**. Consistent with the Five-Point Policy, the USFWS and NMFS consider several factors in determining the term of an incidental take permit. The agencies, for instance, take into account the expected duration of the activities proposed for coverage and the anticipated positive and negative effects on covered species that will likely occur during the course of plan implementation. The agencies also factor in the level of scientific and commercial data underlying the proposed operating conservation program, the length of time necessary to implement and achieve the benefits of the operating conservation program, and the extent to which the program incorporates adaptive management strategies. The duration of the permits to be issued pursuant to the BRCP is anticipated to be 50 years and is discussed in more detail in Section 1.3, *Scope of the BRCP*.
- **Public Participation**. Under the Five-Point Policy, the federal fish and wildlife agencies have sought to increase public participation in the HCP process, including greater opportunity for the public to assess, review, and analyze HCPs and associated NEPA documentation. As part of this effort, the agencies have expanded the public review process for most HCPs, particularly those with regional scopes. As described in Section 1.4, *Overview of the BRCP Development Process*, the BRCP process afforded extensive opportunities for public involvement and input throughout the development of the BRCP as well as under the joint CEQA/NEPA process.

Section 7 of the ESA requires that all federal agencies (including USFWS and NMFS when they issue ESA section 10 permits) must ensure, in consultation with USFWS and/or NMFS, that any actions authorized, funded, or carried out by the agency are not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of areas determined to be critical habitat.[12] Section 7 requires federal agencies to engage in formal consultation with the USFWS and NMFS for any proposed actions that are likely to adversely affect listed species. A biological opinion (BO) is issued by the USFWS and NMFS at the completion of formal consultation. The BO may conclude that the project as

[11] 65 FR 35242.
[12] 16 U.S.C. § 1536(a)(2).

proposed (in this case the BRCP covered activities and Conservation Strategy) is either likely or not likely to jeopardize the continued existence of the species. If the BO concludes that the proposed action would jeopardize the continued existence of a listed species or adversely modify its critical habitat, the opinion must suggest "reasonable and prudent alternatives" that would avoid that result. If the BO concludes that the project as proposed would involve take of a listed species, but not to an extent that would jeopardize the species' continued existence, it must include an "incidental take statement." The incidental take statement specifies an amount of take that may occur as a result of the action and may include "reasonable and prudent measures" to minimize the impact of the take. If the action complies with the BO and incidental take statement, it may be implemented without violation of the ESA, even if incidental take occurs.

It is expected that, during BRCP implementation, covered activities with a federal nexus to federal agencies other than USFWS and NMFS will use the conservation measures described in the BRCP as conservation actions under future section 7 consultation processes. Unless otherwise required by law or regulation, USFWS and NMFS will ensure that the activities and conservation measures for the specific proposed project are consistent with the BRCP and the BO issued for the BRCP. For example, projects in the Plan Area that require a permit from the USACE under section 404 of the CWA have a federal nexus. The USACE, as the authorizing agency under CWA, must consult with USFWS or NMFS on the effects of their action on federally listed species. Similarly, projects in the Plan Area which are provided funding by the Federal Highway Administration (FHWA) should also be eligible to proceed with reliance on the BRCP conservation measures.

1.2.2 Natural Community Conservation Planning Act

The NCCPA provides a mechanism for compliance with state endangered species regulatory requirements through the development of comprehensive, broad-scale conservation plans that focus on the needs of natural communities and the range of species that inhabit them.[13] The NCCP program has provided the basis for successful collaborations throughout California between state and federal agencies, local governments, community groups, and private interests that have resulted in long-term, habitat-based protections for regional biodiversity and related ecosystems. It has also proved to be an effective tool in achieving these protections while reducing conflicts between conservation goals and the reasonable use of natural resources and lands for economic development. The BRCP adopts the approaches set out in the NCCPA and incorporates those elements necessary to meet regulatory requirements of the NCCPA.

Specifically, the BRCP has been developed in a manner consistent with the process identified in its Planning Agreement, including processes to ensure ample public participation and engagement throughout Plan development and review, input from independent scientists, and coordination with federal fish and wildlife agencies with respect to ESA requirements. Consistent with the requirements of the NCCPA, the BRCP further provides a comprehensive

[13] Fish and Game Code § 2800 et seq.

approach to the conservation and management of covered species and their habitats, incorporating a Conservation Strategy that provides for the protection of habitat, natural communities, and species diversity on an ecosystem level; establishes conservation measures, including measures sufficient to mitigate the effects of covered activities; integrates adaptive management strategies that can be modified based on new information developed through monitoring and research; and sets out an implementation program, including provisions that ensure adequate funding to carry out the BRCP.

The BRCP addresses all of the requirements of the NCCPA for covered species of fish, wildlife, and plants and natural communities in the Plan Area. On that basis, CDFW may issue a permit under section 2835 of the NCCCPA for the taking of the BRCP covered species including species listed as threatened and endangered under CESA, species fully protected under California Fish and Game Codes (see discussion in Section 1.2.8, *California Fully Protected Species*, and nonlisted species).[14]

1.2.3 California Endangered Species Act

CESA prohibits the take of state-listed threatened and endangered species of fish, wildlife, and plants.[15] CESA also prohibits the take of candidate species.[16] "Take" is defined under CESA as "to hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill." The CESA definition of "take" does not include the ESA's concepts of "harm" or "harass."[17] Take authorizations may be obtained under CESA, provided the permit applicant minimizes and "fully mitigates" the take that will be caused by the covered activities.[18] The NCCPA offers a separate means for authorization of take of CESA-listed species through development of a NCCP and take authorization under NCCPA section 2835.

Although the BRCP has been designed to comply with the NCCPA, and take authorizations are being sought under NCCPA section 2835, the Plan's provisions have also been developed to be consistent with the regulatory standards of CESA. Specifically, the BRCP Conservation Strategy incorporates measures that adequately minimize and fully mitigate the effects of covered activities on state-listed species and includes other measures as required by CESA. As such, the actions set out in the BRCP are expected to be sufficient to allow for findings to be made by CDFW to support the issuance of incidental take authorizations under CESA, if necessary.

1.2.4 The National Environmental Policy Act

The purpose of NEPA is to ensure that federal agencies consider the environmental impacts of their actions and decisions.[19] NEPA requires that the federal government use all practicable

[14] Fish and Game Code § 2835.
[15] Fish and Game Code § 2080.
[16] Fish and Game Code § 2085.
[17] Fish and Game Code § 86.
[18] Fish and Game Code § 2081(b)(2).
[19] 42 U.S.C § 4321 et seq.

means and measures to protect environmental values and makes environmental protection a part of the mandate of every federal agency and department. To accomplish this goal, NEPA establishes a process and approach to analyze and determine the environmental impacts associated with proposed federal actions that significantly affect the quality of the human environment.

The permitting and implementation of the BRCP involve several federal actions and decisions that constitute a major federal action and are subject to review under NEPA. USFWS and NMFS will make decisions regarding the issuance of incidental take permits under section 10(a)(1)(B) of the ESA. USFWS is the lead federal agency under NEPA; NMFS, USACE, and EPA are cooperating agencies; and BCAG is the CEQA lead agency for the preparation of the BRCP EIR/EIS to satisfy CEQA and NEPA concurrently.

1.2.5 The California Environmental Quality Act

CEQA serves to inform governmental decision-makers and the public about the potential, significant environmental effects of proposed activities and to identify the ways that environmental damage can be avoided or significantly reduced.[20] CEQA applies to all discretionary activities proposed to be carried out or approved by California public agencies. CEQA requires state and local agencies to identify significant environmental impacts of their actions and to take all feasible steps to avoid or mitigate those impacts. CEQA sets forth both procedural and substantive requirements, and its procedures are intended to ensure adequate public participation and input into the decision making process.

The BRCP is a project subject to CEQA, as are numerous BRCP-related actions that will be implemented over the term of the Plan.[21] BCAG is the CEQA lead agency for the preparation of the EIR/EIS on the BRCP, which will include analyses of the proposed adoption of the Plan. CDFW is participating in the preparation of the EIR/EIS as both a CEQA responsible and trustee agency. The EIR/EIS will also serve as the CEQA document for the purpose of regulatory permits issued by CDFW pursuant to the BRCP. USFWS and NMFS are joint federal lead agencies and BCAG is the CEQA lead agency for the preparation of the BRCP EIR/EIS to satisfy CEQA and NEPA concurrently.

1.2.6 Sections 404 and 401 of the Clean Water Act

In 1972, Congress passed the Federal Water Pollution Control Act, commonly known as the CWA, with the goal of "restor[ing] and maintain[ing] the chemical, physical, and biological integrity of the Nation's waters."[22] In furtherance of this goal, the CWA prohibits the discharge of any pollutants into navigable waters, except as allowed by permit issued under certain sections

[20] Section 15002 General Concepts, Title 14. California Code of Regulations Chapter 3. Guidelines for Implementation of the California Environmental Quality Act
[21] California Public Resources Code section 21000 et seq. and CEQA Guidelines, 14 Code of California Regulations (CCR) 15000 et seq.
[22] 33 U.S.C § 1251(a).

of the CWA.[23] Specifically, section 404 authorizes the USACE to issue permits for and regulate the discharge of dredged or fill materials into "waters of the United States." Under the CWA and its implementing regulations, "waters of the United States" are broadly defined to consist of rivers, creeks, streams, and lakes extending to their headwaters, including adjacent wetlands.[24]

Many of the actions that will be implemented under the BRCP may result in the discharge of dredged or fill materials into waters of the United States and will need to be authorized by the USACE. These BRCP actions may receive such authorizations through General Permits or Standard Permits (also referred to as "Individual Permits"). Typically, General Permits apply to specific classes of activities that have been determined to cause no more than minimal impact to the aquatic environment (e.g., construction of road crossings, installation of utility lines, and operations and maintenance activities).[25] Standard Permits are designed for activities that have the potential to have more than a minimal effect on jurisdictional waters or that otherwise do not qualify under the conditions of a General Permit. Substantively, the USACE must evaluate applications for Standard Permits to determine their consistency with the requirements of the section 404(b)(1) guidelines[26] and the USACE regulations.[27]

All permits issued under section 404 of the CWA must include a certification under section 401 of the CWA that water quality standards will be met by the activities permitted.[28] In the Plan Area, section 401 water quality certifications are provided by the CVRWQCB. The CVRWQB also regulates waters in the Plan Area under the Porter-Cologne Water Quality Control Act (see Section 1.2.14, *Porter-Cologne Water Quality Control Act*).

A CWA permitting process was conducted by BCAG with USACE, EPA, and CVRWQCB in parallel with the development of the BRCP. BCAG is applying to USACE to issue a Regional General Permit (RGP) such that CWA compliance of implementing the BRCP covered activities (see Section 1.3.5, *Covered Activities*) is streamlined. In addition to the avoidance, minimization, and mitigation measures to address impacts on wetlands and other waters, the BRCP provides for measures to the conserve wetlands, streams, and other waters and the watersheds that support them in the Plan Area. The Section 404 permitting process will also include a request for certification of the RGP by the CVRWQCB under CWA section 401.

1.2.7 California Fish and Game Code Section 1600 et seq.

Section 1602 of the California Fish and Game Code requires any person, state or local governmental agency to provide advance written notification to CDFW prior to initiating any activity that would (1) divert or obstruct the natural flow of, or substantially change or remove material from the bed, channel, or bank of any river, stream, or lake; or (2) result in the disposal

[23] See 33 U.S.C §§ 1311, 1342, and 1344.
[24] 33 CFR § 328.3(a)(3).
[25] 33 CFR § 325.5(c).
[26] 40 CFR Part 230.
[27] 33 CFR Part 325.
[28] 33 USC 1341.

or deposition of debris, waste, or other material into any river, stream, or lake.[29] The State definition of "lakes, rivers, and streams" includes all rivers or streams that flow at least periodically or permanently through a bed or channel with banks that support fish or other aquatic life, and watercourses with surface or subsurface flows that support or have supported riparian vegetation.[30]

Certain actions that will be implemented under the BRCP may require Streambed Alteration Agreements under section 1602. The BRCP and Aquatic Resources Program (ARP) include measures to avoid, minimize, and compensate for impacts on streams, ponds, wetlands, and riparian habitats that may be regulated under section 1602. BCAG is working with CDFW to develop a Master Streambed Alteration Agreement to address specific activities within the Plan Area that would adversely affect these resources and streamline the process of compliance with California Fish and Game Code Section 1600 et seq.

1.2.8 California Fully Protected Species

In the 1960s, before the CESA was enacted, the California Legislature identified species for specific protection under the California Fish and Game Code. These "fully protected species" may not be taken or possessed at any time, and no licenses or permits may be issued for their take except for collecting these species for necessary scientific research and relocation of the bird species for the protection of livestock. Fully protected species are described in sections 3511 (birds), 4700 (mammals), 5050 (reptiles and amphibians), and 5515 (fish) of the California Fish and Game Code. These protections state that "…no provision of this code or any other law shall be construed to authorize the issuance of permits or licenses to take any fully protected [bird], [mammal], [reptile or amphibian], [fish]."

The BRCP includes specific measures to avoid take as defined under section 86 of the California Fish and Game Code and to provide for the conservation and management of fully protected species to comply with the specific sections of the California Fish and Game Code that protect these species. On October 8, 2011 California Senate Bill 618 (SB618) was signed into law. The bill revises the definition of "covered species" under the NCCPA to include fully protected species. As a result of SB618, the "taking" of fully protected species can now be authorized in cases where the take is incidental and the fully protected species is being conserved and managed under a NCCP approved by the CDFW. The BRCP seeks take authorization for the following fully protected species: greater sandhill crane, California black rail, American peregrine falcon, white-tailed kite, and bald eagle.

1.2.9 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) of 1918 implements four international treaties for the conservation and management of bird species that may migrate through more than one country.[31]

[29] Fish and Game Code §1602.
[30] 14 CCR § 1.72.
[31] 16 U.S.C § 703 et seq.

The MBTA makes it unlawful to take, possess, buy, sell, purchase, or barter any migratory bird listed in 50 *Code of Federal Regulations* (CFR) Part 10, including feathers or other parts, nests, eggs, or products, except as allowed by implementing regulations.[32] For federally listed migratory bird species covered under the BRCP for which an ESA section 10(a) permit has been issued, the Permit Applicants may also obtain an MBTA Special Purpose Permit for those species. Measures set forth in the BRCP Conservation Strategy to minimize and mitigate impacts to covered species will provide a significant "benefit to the migratory bird resource" as required by the MBTA regulations to obtain a Special Purpose Permit.[33] Therefore, if any of the covered birds become listed under the ESA during the permit term, the ESA permit would also constitute an MBTA Special Purpose Permit for that species for a three-year term as specified under 50 CFR section 21.27 of the regulations, subject to renewal by the Permittees. Until a covered bird species is listed under the ESA, however, it will be the responsibility of individual project applicants to fully comply with the MBTA.

1.2.10 Bald Eagle and Golden Eagle Protection Act

The Bald Eagle and Golden Eagle Protection Act (BGEPA) prohibits the taking or possession of and commerce in bald and golden eagles, with limited exceptions. Under the Act, it is a violation to "…take, possess, sell, purchase, barter, offer to sell, transport, export or import, at any time or in any manner, any bald eagle commonly known as the American eagle, or golden eagle, alive or dead, or any part, nest, or egg, thereof…" Take is defined to include pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, and disturb. The BRCP includes specific measures to avoid take of eagles to comply with provisions of the BGEPA.

1.2.11 California Fish and Game Code 3503 (Bird Nests)

Section 3503 of the California Fish and Game Code makes it unlawful to take, possess or needlessly destroy the nests or eggs of any bird, unless otherwise authorized under the Fish and Game Code or regulations. The BRCP includes conservation measures to avoid and minimize take of covered species and specifically nests and eggs that serve as the basis for compliance with section 3503. The section 2835 permit under the NCCPA will serve as CDFW's authorization for take of nests or eggs of birds under the BRCP.

1.2.12 California Fish and Game Code 3503.5 (Birds of Prey)

Section 3503.5 of the California Fish and Game Code prohibits the take, possession or destruction of any birds of prey or their nests or eggs, unless otherwise authorized under the Fish and Game Code or regulations. The CDFW may issue permits authorizing take pursuant to CESA or NCCPA. The BRCP includes conservation measures to avoid and minimize such take and will serve as a basis for compliance with section 3503.5. The section 2835 permit under the

[32] 50 CFR § 21.

[33] Likewise, migratory birds that are not specifically covered by the BRCP will benefit from seasonal restrictions on construction and other conservation measures described in this Plan.

NCCPA will serve as CDFW's authorization for take of birds of prey or their nests or eggs under the BRCP.

1.2.13 National Historic Preservation Act

Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended,[34] requires federal agencies to take into account the effects of their actions on properties eligible for inclusion in the National Register of Historic Places. The issuance of incidental take permits by the USFWS and NMFS are actions subject to Section 106 of the NHPA. Therefore, compliance with the NHPA is required as part of the BRCP environmental review process. The BRCP EIR/EIS describes the potential effects on resources subject to the NHPA that could result from implementing the BRCP and includes programmatic section 106 NHPA compliance process.

1.2.14 Porter-Cologne Water Quality Control Act

Section 13000 of the California Water Code (the Porter-Cologne Water Quality Control Act, or "Porter-Cologne Act") outlines the State's interest in the "conservation, control, and utilization of the water resources of the state" and the protection of the quality of all the waters of the state "for use and enjoyment by the people of the state." The law controls all "waters of the state" which are defined as "any surface water or groundwater, including saline waters, within the boundaries of the state" (Section 13050[e]). The overall responsibility for water rights and water quality protection is assigned to the State Water Resources Control Board (SWRCB), which in turn delegates its authority to nine geographically discrete, semi-autonomous Regional Water Quality Control Boards (RWQCB) to develop and enforce water quality standards within their boundaries. The CVRWQCB covers nearly one-fifth of the state, including the BRCP Plan Area.

RWQCBs are required by the Porter-Cologne Act to prepare and adopt water quality control plan, known as "basin plans," that include water quality objectives and an implementation program. The CVRWQCB Basin Plan for the Sacramento River and San Joaquin River Basins was last revised in 2011.[35] The BRCP and ARP address the objectives of and are consistent with the CVRWQCB Basin Plan.

In addition to basin planning, the SWRCB and RWQCBs have been delegated the following federal responsibilities:

- Administration of National Pollutant Discharge Elimination System (NPDES) permits described in section 402 of the CWA; and
- Water quality certification of section 404 permits issued by the USACE to place fill in waters under federal jurisdiction (which includes some but not all waters of the state), pursuant to section 401 of the CWA (discussed in Section 1.2.6, *Sections 404 and 401 of the Clean Water Act*).

[34] 16 U.S.C 470 et seq.
[35] Fourth Edition of the Water Quality Control Plan (Basin Plan) for the Sacramento River and San Joaquin River Basins. California Regional Water Quality Control Board Central Valley Region, 15 September 1998, as revised October 2011.

1.3 SCOPE OF THE BRCP

This section identifies and describes the boundaries and rationale for the geographic scope of the BRCP, defined as the Plan Area; the list of and rationale for the natural communities addressed in the BRCP; the covered species selection process and selected covered species; the activities to be covered under the BRCP; and the anticipated permit duration and rationale for that duration.

1.3.1 Geographic Scope

The BRCP Plan Area is shown in Figure 1-1, *Plan Area for the Butte Regional Conservation Plan* (see separate file), and encompasses 564,203 acres (228,352 hectares) of land. The Plan Area includes the western lowlands and foothills of Butte County bounded on the west by county boundaries with Tehama, Glenn, and Colusa counties; bounded on the south by boundaries with Sutter and Yuba counties; bounded on the north by the boundary with Tehama County; and bounded on the east by the upper extent of landscape dominated by oak woodland natural communities. The eastern oak woodland boundary is defined by a line below which land cover types dominated by oak trees comprise more than one-half of the land cover present (referred to hereafter as the oak woodland zone) plus a small portion of the City of Chico that extends above the oak woodland zone. The upper elevation range of the oak woodland zone varies from about 800 to 1,500 feet above mean sea level. Typically, oak tree-dominated land cover types are replaced with either chaparral or conifer-dominated land cover types at higher elevations.

Although the Plan Area includes portions of the Sacramento River within Butte County, the BRCP does not address activities that could affect listed fish species in the Sacramento River; such activities are addressed under other regional conservation planning efforts for the Sacramento River (e.g., the USFWS Anadromous Fish Restoration Program). The Sacramento River floodplain within Butte County is included in the BRCP for implementing conservation measures for covered species and natural communities that would not have adverse effects on fish. Similarly, the Plan Area includes portions of the Feather River within Butte County below Oroville Dam, but the BRCP does not address the activities of the California Department of Water Resources (DWR) or other federal or state agencies involved in the operations of Oroville Dam and Reservoir, Thermalito Forebay, Thermalito Afterbay, and all appurtenant facilities (known as the "Oroville-Thermalito Complex") for operating the system along the Feather River or activities affecting the levees along Feather River.

The Plan Area was designed to encompass the area within which covered activities would be implemented and to provide sufficient land and resources to implement measures to provide for the conservation of covered species and habitats impacted by the covered activities.

1.3.2 Natural Communities

The natural communities addressed under the BRCP include oak woodland and savanna, grassland, riparian, wetland, aquatic, and agriculture (although agriculture is not a natural community, it provides important habitat for a number of covered species and so is included

here). Each of the natural communities is comprised of certain land cover types. The classification, description, and mapping procedures for natural communities and land cover types, listed below, are provided in Chapter 3, *Ecological Baseline Conditions.*

- Oak Woodland and Savanna
  - Blue oak savanna
  - Blue oak woodland
  - Interior live oak woodland
  - Mixed oak woodland
- Grassland (primarily the working Rangeland landscape)
  - Grassland
  - Grassland with vernal swale complex
- Riparian
  - Cottonwood-willow riparian forest
  - Valley oak riparian forest
  - Willow scrub
  - Herbaceous riparian and river bar
  - Dredger tailings with riparian forest/scrub
- Wetland
  - Emergent wetland
  - Managed wetland
  - Managed seasonal wetland
- Aquatic
  - Streams and channels
  - Open water
  - Major canal
  - Pond
- Agriculture
  - Rice
  - Cropland
  - Irrigated pasture
  - Orchard/vineyard
  - Nonnative woodland

The urban (e.g., residential, commercial, and industrial development) and disturbed land cover types (e.g., recently graded development land, mining sites, and landfills) are not considered natural communities because they typically provide low-value habitat for native species and are subject to ongoing human disturbances.[36] Chaparral and conifer forests are natural communities not addressed in the Plan, as the BRCP is focused on the conservation of lowland natural communities. Chaparral and conifer forests are higher elevation communities distributed primarily outside of the Plan Area and are found in the Plan Area only as relatively small inclusions within the oak woodland–dominated landscape.

1.3.3 Covered Species

Species identified for coverage under the BRCP ("covered species") are those for which incidental take authorizations may be required under the ESA and NCCPA to implement the covered activities over the term of the BRCP. The evaluation process used to select the covered species is described in Section 3.6, *Proposed Covered Species* and Appendix B, *Evaluation of Species Considered for Coverage*. Species considered for coverage were special-status species that could be present in the BRCP Plan Area. Consideration for coverage of nonlisted species was limited to special-status species because, by definition, they are recognized by federal and state wildlife agencies as declining, and therefore are more likely than other nonlisted species to become listed at some time during implementation of the covered activities. Special-status species are defined as species that are:

- Listed as threatened or endangered under ESA;
- Proposed or candidates for listing under ESA;
- Listed as threatened or endangered under CESA;
- Candidates for listing under CESA;
- Fully protected species under California Fish and Game Code;
- California species of special concern (SSC) as identified by CDFW;[37]
- Plants listed as rare under the California Native Plant Protection Act; or
- Plants included in the CNPS California Rare Plant Rank 1A, 1B, or 2.

Sources of information used to identify the special-status species that could be present in the Plan Area are as follows:

- CDFW's California Natural Diversity Database (CNDDB),[38]
- USFWS list of endangered and threatened species that occur in or may be affected by projects in Butte County,[39]

[36] Although the urban and disturbed land cover types are not included as natural communities, some lands supporting these land cover types are suitable for restoration of covered species' habitats and may be acquired for this purpose.
[37] http://www.dfg.ca.gov/wildlife/nongame/ssc/
[38] Source: CNDDB RareFind 3 database (2006) and http://imaps.dfg.ca.gov/viewers/cnddb_quickviewer.

- Butte County General Plan Background Report, and
- Recorded observations of special-status species provided by local resource experts.

A total of 108 special-status species (61 animals and 47 plants) were identified as being present or having the potential to be present in the Plan Area based on the sources of information described above (see Chapter 3, *Ecological Baseline Conditions* and Appendix B).

Four criteria (listed below) were used to evaluate the species identified as special-status species. All four of the criteria had to be met for the species to be covered under the BRCP.

1. **Occurrence in the Plan Area**. Species is known to occur in the Plan Area or could occur based on presence of habitat in the Plan Area and known occupied habitat near the Plan Area.
2. **Potential for Listing**. The species is listed as threatened or endangered under ESA or CESA or is reasonably likely to become listed under these laws during the term of the permit, or is fully protected under the California Fish and Game Code.
3. **Potential to be Affected.** The species or its habitats could be affected by the types of activities anticipated to be covered under the BRCP.
4. **Sufficient Information**. Sufficient scientific information and data are available to determine the likely impacts of the covered activities on the species and to formulate conservation measures that could effectively mitigate impacts and conserve the species.

A total of 38 species met all four of the selection criteria and constitute the covered species under the BRCP. The covered species are provided in Table 1–1 *BRCP Covered Species* below.

[39] Source: http://www.fws.gov/sacramento/es/spp_lists/auto_list.cfm.

Table 1-1. BRCP Covered Species

	Common Name	*Scientific Name*	*Status*[1] *(Federal/State/CNPS)*
		Birds	
1	Tricolored blackbird	*Agelaius tricolor*	-/SSC/-
2	Yellow-breasted chat	*Icteria virens*	-/SSC/-
3	Bank swallow	*Riparia riparia*	-/T/-
4	Western burrowing owl	*Athene cunicularia hypugea*	-/SSC/-
5	Western yellow-billed cuckoo	*Coccyzus americanus occidentalis*	T/E/-
6	Greater sandhill crane	*Grus canadensis tabida*	-/T,FP/-
7	California black rail	*Laterallus jamaicensis coturniculus*	-/T,FP/-
8	American peregrine falcon	*Falco peregrinus anatum*	D/D,FP/-
9	Swainson's hawk	*Buteo swainsoni*	-/T/-
10	White-tailed kite	*Elanus leucurus*	-/FP/-
11	Bald eagle	*Haliaeetus leucocephalus*	D/E,FP/-
		Reptiles	
12	Giant garter snake	*Thamnophis gigas*	T/T/-
13	Blainville's horned lizard	*Phrynosoma blainvillii*[40]	-/SSC/-
14	Western pond turtle	*Actinemys marmorata*	-/SSC/-
		Amphibians	
15	Foothill yellow-legged frog	*Rana boylii*	-/SSC/-
16	Western spadefoot toad	*Spea hammondii*	-/SSC/-
		Fish	
17	Central Valley steelhead	*Oncorhynchus mykiss*	T/-/-
18	Central Valley spring-run Chinook salmon	*Oncorhynchus tshawytscha*	T/T/-
19	Central Valley fall/late fall-run Chinook salmon	*Oncorhynchus tshawytscha*	-/SSC/-
20	Green sturgeon	*Acipenser medirostris*	T/SSC/-
		Invertebrates	
21	Valley elderberry longhorn beetle [2]	*Desmocerus californicus dimorphus*	T/-/-
22	Vernal pool tadpole shrimp	*Lepidurus packardi*	E/-/-
23	Conservancy fairy shrimp	*Branchinecta conservatio*	E/-/-
24	Vernal pool fairy shrimp	*Branchinecta lynchi*	T/-/-
		Plants	
25	Ferris' milkvetch	*Astragalus tener* var. *ferrisiae*	-/-/1B
26	Lesser saltscale	*Atriplex minuscula*	-/-/1B
27	Hoover's spurge	*Chamaesyce hooveri*	T/-/1B
28	Ahart's dwarf rush	*Juncus leiospermus* var. *ahartii*	-/-/1B
29	Red Bluff dwarf rush	*Juncus leiospermus* var. *leiospermus*	-/-/1B
30	Butte County meadowfoam	*Limnanthes floccosa* ssp. *californica*	E/E/1B
31	Veiny Monardella	*Monardella douglasii* ssp. *venosa*	-/-/1B
32	Hairy Orcutt grass	*Orcuttia pilosa*	E/E/1B
33	Slender Orcutt grass	*Orcuttia tenuis*	T/E/1B
34	Ahart's paronychia	*Paronychia ahartii*	-/-/1B
35	California beaked-rush	*Rhynchospora californica*	-/-/1B
36	Butte County checkerbloom	*Sidalcea robusta*	-/-/1B

[40] Formerly California horned lizard (*Phrynosoma coronatum frontale).*

Table 1-1. BRCP Covered Species (continued)

	Common Name	*Scientific Name*	*Status*[1] *(Federal/State/CNPS)*
37	Butte County golden clover	*Trifolium jokerstii*	-/-/1B
38	Greene's tuctoria	*Tuctoria greenei*	E/R/1B

[1] Status:

Federal
E = Listed as endangered under ESA
T = Listed as threatened under ESA
C = Candidate for listing under ESA
D = Delisted under ESA

California Native Plant Society (CNPS) California Rare Plant Rank
1B = rare or endangered in California and elsewhere

State
E = Listed as endangered under CESA
T = Listed as threatened under CESA
D = Delisted under CESA
R = Listed as rare under the California Native Plant Protection Act
SSC = California species of special concern
FP = Fully protected under the California Fish and Game Code

[2] Valley elderberry longhorn beetle was proposed for de-listing by USFWS in October 2006. If it is removed from federal protection status, it may no longer meet the criteria for coverage under the BRCP.

1.3.4 Local Concern Species

In addition to the species selected as covered species, the Stakeholder Committee identified species they desire to be conserved within the Plan Area. These species were identified as "Local Concern Species" (Table 1-2, *Local Concern Species*) and each of these species is evaluated in the BRCP for the expected conservation outcome with implementation of the Conservation Strategy.

Table 1-2. Local Concern Species

	Common Name	*Scientific Name*	*Status*[1] *(Federal/State)*
		Birds	
1	Yellow warbler	*Dendroica petechia*	-/SSC
2	California thrasher	*Toxostoma redivivum*	-/-
3	Purple martin	*Progne subis*	-/SSC
4	California horned lark	*Eremophila alpestris actia*	-/-
5	Yellow-billed magpie	*Pica nuttalli*	-/-
6	Loggerhead shrike	*Lanius ludovicianus*	-/SSC
7	Willow flycatcher[2]	*Empidonax traillii*	-/E
8	Short-eared owl	*Asio flammeus*	-/SSC
9	Long-eared owl	*Asio otus*	-/SSC
10	Greater roadrunner	*Geococcyx californianus*	-/-
11	Golden eagle[3]	*Aquila chrysaetos*	-/FP
12	Northern harrier	*Circus cyaneus*	-/SSC
13	Merlin	*Falco columbarius*	-/-
14	Prairie falcon	*Falco mexicanus*	-/-
		Fish	
15	Tule perch	*Hysterocarpus traski*	-/-
16	Hitch	*Lavinia exilicauda*	-/-
17	Hardhead	*Mylopharodon conocephalus*	-/SSC

[1] Status:
State
E = Listed as endangered under CESA
SSC = California species of special concern
FP = Fully protected under the California Fish and Game Code
[2] Although listed, this species was not included as a covered species because the species only occurs as a migrant in the Plan Area and will not be affected by the covered activities.
[3] Although a CDFW-designated fully protected species, this species was not included as covered because it is not expected to become listed over the term of the BRCP and is not expected to be adversely affected by covered activities.

1.3.5 Covered Activities

The types of covered activities within the Plan Area of the BRCP for which incidental take permit coverage is requested from USFWS, NMFS, and CDFW in compliance with the ESA and the NCCPA are summarized below and described in more detail in Chapter 2, *Covered Activities*. The covered activities are grouped by geographic location within the Plan Area:

- **Within urban permit areas (UPAs)**. UPAs are those mapped locations in the Plan Area within which the cities and county anticipate concentrated urban and infrastructure development under their respective general plan updates. The UPAs are discussed in more detail in Chapter 2, *Covered Activities*.
- **Outside UPAs**. This designation includes all areas of the County within the Plan Area but outside of the UPAs. It includes covered activities such as linear utilities, transportation construction and maintenance projects, and agricultural services; it does not include areas that become part of the BRCP conservation land system.
- **Within conservation lands**. This area includes new conservation lands established under the BRCP. It includes conservation actions within conservation lands such as habitat restoration, enhancement, and management.

The covered activities include the construction and maintenance of public and private facilities and infrastructure that are consistent with local general plans, transportation plans, and local, state, and federal laws. The covered activities are divided into activities that result in permanent development and activities involving maintenance measures that happen periodically over the duration of the permit. The reason for these two categories is that the impacts on covered species and natural communities resulting from such activities and the conservation measures used to address such impacts tend to differ based on the permanence or ongoing nature of the activity.

1.3.6 Permit Duration

The Permittees are seeking permits from USFWS, NMFS, and CDFW to implement the BRCP covered activities and retain incidental take coverage under those permits for a term of 50 years. This timeframe provides necessary and sufficient duration for the implementation of covered activities (Chapter 2, *Covered Activities*), mitigation actions to address the covered activities, and conservation actions that contribute to the recovery of covered species (Chapter 5, *Conservation Strategy*). This timeframe takes into account the expected time necessary to implement proposed

land development under the cities and county general plans and the regional transportation plan. The general plans for the County, City of Chico, City of Oroville, and City of Gridley have planning horizons to 2030. Biggs' draft general plan also has a planning horizon to 2030. The BCAG Regional Transportation Plan is a four-year plan with projections and planning policies aimed through 2035. The permit duration also provides the time necessary to assess the impacts of covered activities on the covered species and natural communities and to implement measures to mitigate those impacts.

The BRCP includes a large conservation component that will provide for the conservation of natural communities and contribute to the recovery of covered species in the Plan Area (Chapter 5, *Conservation Strategy*). The BRCP Conservation Strategy requires the orderly creation of a landscape-level system of conservation lands with ecological connectivity through the acquisition (easement and fee title) and management of land. The Conservation Strategy includes habitat protection, enhancement, and restoration; impact minimization and avoidance measures; and the implementation of monitoring and adaptive management to ensure success in the achievement of biological goals and objectives. Due to the scale of the program, including acquisition of over 90,000 acres of land, the 50-year duration is necessary to provide for sufficient time to accumulate the funds and find the willing sellers needed to implement the Conservation Strategy and achieve its biological goals and objectives. In addition, time is needed to build an endowment during the permit term to provide funding for management of conservation lands after the 50-year permit term. See Chapter 8, *Plan Implementation*, for the implementation schedule for conservation measures and Chapter 10, *Implementation Cost and Funding Sources*, for the necessary amount and timing of funding over the permit term.

1.4 OVERVIEW OF THE BRCP DEVELOPMENT PROCESS

This section describes the composition of the Steering Committee and Stakeholder Committee and the role of these committees in developing the BRCP; the participation of CDFW, USFWS, and NMFS as technical advisors to the planning process; public involvement and outreach (e.g., website, public newsletters, and public informational workshops); and the integration of science to inform the development of the BRCP.

1.4.1 Organizational Structure for Planning

1.4.1.1 Stakeholder Committee

The Stakeholder Committee was responsible for reviewing draft sections of the BRCP and providing comments and recommendations for BRCP development to BCAG and the Steering Committee. The role of the Stakeholder Committee's members included representing the interests of their organizations at meetings and reporting on development of the BRCP to other members of their organizations on a regular basis.

The member organizations of the Stakeholder Committee are listed below.

- Butte County Builders Association
- Butte County Farm Bureau
- Ducks Unlimited
- Butte Environmental Council
- Altacal Audubon Society
- Sierra Club
- CSU Chico
- Butte Glenn Community College District
- Butte County Agricultural Commissioner's Office
- The Nature Conservancy
- California Native Plant Society (CNPS)
- Butte County Resource Conservation District
- Caltrans
- WCWD
- Biggs-West Gridley Water District
- Butte Water District
- Richvale Irrigation District

The names of members and alternates of the Stakeholder Committee over the time of BRCP development are provided in Chapter 13, *List of Preparers*.

Between 2007 and 2013, the Stakeholder Committee met 45 times to discuss the preparation of the BRCP. All such meetings were open to the public and provided for public participation in addition to input from Stakeholder Committee members. The Stakeholder Committee provided oral and written comments on multiple working drafts of all chapters of the BRCP prepared between 2008 and 2012 and on the full Preliminary Public Draft BRCP released in November 2012.

1.4.1.2 Steering Committee

The Steering Committee served in an administrative capacity and was responsible for the preparation of the BRCP. Responsibilities of the Steering Committee include the following:

- Managing the consultants and working with the consultants to establish timelines, work products and outreach processes;

- Reviewing key BRCP elements (e.g., covered species, Plan Area, covered activities, Conservation Strategy, impact assessment, implementing entity, implementation plan, costs and funding sources);
- Providing guidance as requested by other committees;
- Monitoring the BRCP development budgets;
- Providing oversight of the BRCP development;
- Communicating BRCP progress and issues to the County and City Administrators Committee, Stakeholder Committee, and Planning Directors Group;
- Providing for public participation and outreach;
- Reviewing the BRCP scopes of work, budgets, and scope modifications of the Consultants.

Membership of the Steering Committee over the course of BRCP development included the following:

- Butte County, Supervisor District 1
- Butte County, Supervisor District 2
- Butte County, Supervisor District 4
- City of Chico, Mayor
- City of Oroville, Mayor or City Council Member
- Caltrans District 3, Director
- Western Canal Water District, District Manager
- BCAG, Executive Director

The names of members and alternates of the Steering Committee over the time of BRCP development are provided in Chapter 13, *List of Preparers*.

1.4.2 Coordination with Agencies and Public Outreach

1.4.2.1 Agency Coordination

Regular technical agency meetings with USFWS, CDFW, NMFS, USACE, EPA, and CVRWQCB were held to discuss specific agency concerns related to administrative draft document sections. These agencies provided technical input on the baseline data, covered species list, covered species accounts, existing ecological conditions report, covered activities, impact analysis, Conservation Strategy, implementation plan, and implementation costs and funding sources.

1.4.2.2 Public Outreach

The NCCPA requires the establishment of a process for public participation and outreach throughout the development of a plan. Similarly, policies governing the ESA emphasize the importance of public involvement in the development of large-scale HCPs and encourage plan participants to facilitate the engagement of the public. Under the Five-Point Policy, USFWS and NMFS have sought to increase public participation in the HCP process, including greater opportunity for the public to assess, review, and analyze HCPs and associated NEPA documentation.

Beginning at the initial stage of the BRCP planning process, the public has been afforded a wide range of opportunities to learn about the various elements of the BRCP and provide input during the course of its development. In addition to the public involvement associated with the Stakeholder Committee meetings discussed above, other public outreach and involvement has occurred throughout the development of the Plan. A pair of public workshops were held early in the BRCP development process on September 5, 2007 in Chico, and September 12, 2007 in Oroville. A series of public workshops were held following the release of the Preliminary Public Draft BRCP on January 15, 2013 in Oroville, January 15, 2013 in Gridley, and January 16, 2013 in Chico. The purposes of the workshops were to do the following:

- Educate and involve the public in the BRCP development process including project scope, timing, and objectives;
- Answer community questions regarding the process;
- Provide an opportunity for the public to understand and participate in the BRCP development process;
- Secure support for the BRCP through education, interaction, and sharing of ideas and materials; and
- Update the community on BRCP developments and share community feedback with the Steering Committee.

BRCP Newsletters were made available to the public regularly to keep interested parties up-to-date with the latest information on the development of the Plan. The following newsletters were released: Summer/Fall 2007, Winter 2008, Summer 2008, Spring 2009, Fall 2009, Spring 2010, Winter 2011, Winter 2012, and Winter 2013. An informational brochure describing the major elements and objectives of the BRCP was released in fall of 2007. Two subsequent brochures describing the BRCP and highlighting benefits of the BRCP for the participating cities and the County will be released following release of the Public Draft BRCP.

To further facilitate the dissemination of information, the BRCP maintained a project website (www.buttehcp.com) that provided access to administrative draft chapters of the BRCP and other documents, information about Stakeholder and Steering Committee meetings, background and benefits of the BRCP, information on public workshops, access to newsletters and detailed

informational brochures, contact information and links to other important websites, and other relevant information associated with the BRCP. The Preliminary Public Draft BRCP was posted on the website in December 2012 and the Public Draft BRCP will be posted on the website following its anticipated release in June 2015.

Additionally, an "interested parties" email distribution list containing 50 to 75 individuals, including landowners, environmentalists, agriculturalists, developers, hunting advocates, members of academia, and others, was maintained to provide these individuals with the same information the Stakeholder Committee received.

As part of the CEQA/NEPA public process, BCAG and USFWS prepared and released a Notice of Preparation and Notice of Intent.[41] These documents underwent a required 45-day public review period between December 14, 2012 and January 30, 2013 to receive input from the general public. Public scoping meetings were held on January 9, 2013 in Oroville and Chico to disseminate information about the BRCP and BRCP EIR/EIS development process and to take public input. A public scoping report was prepared BCAG and USFWS and included additional information pertinent to public scoping process that was undertaken.

1.4.3 Integration of Science

Use of the best available science is a priority for the BRCP. To ensure the best scientific information was being used, the Steering Committee and Stakeholder Committee, in 2007, coordinated to assemble an independent science advisors group composed of experts in conservation ecology and the specific biological resources in the Plan Area. A science advisor facilitator was hired to assist in the formation of and to coordinate with the Science Advisory Group. A draft of the science advisory report was provided to the Steering Committee and Stakeholder Committee in September of 2007, and the final science advisory report on the BRCP was released in January 2008 (Appendix G, *Independent Science Advisors Reports*).

The Independent Science Advisors Reports summarize recommendations from the group of independent science advisors for the BRCP. This NCCPA-required scientific input was provided early in the planning process, before preparation of the draft conservation strategy, to help ensure that the BRCP was developed using the best available science. To ensure objectivity, the advisors operated independent of the Permit Applicants and stakeholders, their consultants, and other entities involved in the BRCP development. The advisors reviewed information prepared by the BRCP consultants, attended a workshop, completed subsequent information searches, and engaged in discussions. The science advisors met in June of 2007 to review information gathered for the BRCP planning process, hear the concerns of Plan participants, tour portions of the Plan Area, and begin formulating recommendations for BRCP development and implementation. The advisors were encouraged to seek expert input from other scientists. Recommendations were provided in the report related to the Draft Ecological Baseline Report,

[41] Notice of Intent was made available online in the Federal Register at http://www.gpo.gov/fdsys/pkg/FR-2012-12-14/pdf/2012-30182.pdf

the scope of the BRCP, information gaps, the conservation design, the conservation analyses, and the adaptive management and monitoring. Refer to Appendix G for additional details.

In May 2011, the Independent Science Advisors were again assembled to review a draft of the BRCP Conservation Strategy (including biological goals and objectives, conservation measures, monitoring program, and adaptive management program) and to respond to specific questions regarding the proposed approach for conserving the covered species and natural communities. In July 2011, The Independent Science Advisors published the *Report of Independent Science Advisors for Butte County Habitat Conservation Plan / Natural Community Conservation Plan (HCP/NCCP)* (Appendix G). This report provided recommendations for improving the Conservation Strategy and provided responses to specific questions regarding assumptions and uncertainties associated with the proposed conservation measures. The Independent Science Advisors, in their responses to the questions regarding key assumptions used and uncertainties considered in the development of the Conservation Strategy, generally concurred with the overall conservation approach. Some components of the Conservation Strategy were revised to address input from the Independent Science Advisors.

More detail on the 2007-2008 and 2011 processes and input from the Independent Science Advisors is provided in Chapter 12, *Independent Science Advisory Process*.

1.5 ORGANIZATION OF THE BRCP

This section provides a brief overview of the contents of the BRCP document chapters and appendices. Clear and consistent use of terminology is important, and a glossary of terms as defined in this document is included in the appendices. Specifically, the document includes the following components:

- Chapter 1, *Introduction* provides the context for the development of the BRCP, including the background, purpose, goals and objectives; regulatory context; scope of the Plan; the process that guided the development of the BRCP; and an overview of the document contents and organization.

- Chapter 2, *Covered Activities* describes the activities identified for regulatory coverage in the Plan Area, including activities within and outside of the UPAs, and activities within habitat preserves.

- Chapter 3, *Ecological Baseline Conditions* describes the existing environmental conditions within the Plan Area, providing the context in which the BRCP and its various elements have been developed.

- Chapter 4, *Impact Assessment and Estimated Level of Take* includes an analysis of the beneficial and adverse effects of the covered activities and conservation measures on covered natural communities and covered species within the Plan Area. The chapter also

describes the cumulative and indirect effects resulting from the implementation of the BRCP Conservation Strategy and the covered activities.

- Chapter 5, *Conservation Strategy* sets out the BRCP Conservation Strategy, including the biological goals and objectives of the BRCP, approach to conservation adopted by the BRCP, and the range of conservation measures for terrestrial and aquatic species and habitats.

- Chapter 6, *Conditions on Covered Activities*, describes survey requirements and the avoidance and minimization measures that must be implemented by project proponents as a condition of receiving a take authorization under the BRCP for implementing covered activities.

- Chapter 7, *Monitoring and Adaptive Management Program*, describes the monitoring requirements for lands conserved under the BRCP and the adaptive management decision making process.

- Chapter 8, *Plan Implementation* addresses matters relating to the implementation of the BRCP including the schedule for the implementation of conservation actions; the monitoring and reporting process to ensure compliance; regulatory assurances anticipated by the entities seeking authorizations; the description of changed circumstances and remedial actions; the approach to unforeseen circumstances; a section discussing permit duration, amendment, renewal and enforcement; the process for implementing the BRCP including applications by project proponents; allowable activities within BRCP conservation lands; and the neighboring landowner assurance program.

- Chapter 9, *Implementation Structure* describes the implementing entity, structure and decision-making process.

- Chapter 10, *Implementation Costs and Funding Sources* estimates the costs of BRCP implementation and describes the sources of funding that will be relied on by the BRCP participants.

- Chapter 11, *Alternatives to Take* sets out the alternatives to take of covered species that were developed and considered and the reasons why they were not adopted including an overview of the relationship between the development of the Local Agencies' general plans and the BRCP.

- Chapter 12, *Independent Science Advisory Process* describes BRCP coordination with the BRCP independent science advisors and other science bodies that provided input during BRCP development.

- Chapter 13, *List of Preparers* lists the preparers of the BRCP.

- Chapter 14, *References* lists the printed references and personal communications cited in the BRCP.

- The following appendices are also included:
  - Appendix A, *Covered Species Accounts*
  - Appendix B, *Evaluation of Species Considered for Coverage*
  - Appendix C, *Common and Scientific Names of Species Mentioned in the Text*
  - Appendix D, *Native Species Supported by BRCP Natural Communities*
  - Appendix E, *Survey Protocols*
  - Appendix F, *Implementation Cost Supporting Materials*
  - Appendix G, *Independent Science Advisors Reports*
  - Appendix H, *Butte Regional Conservation Plan Planning Agreement*
  - Appendix I, *Vernal Pool and Other Seasonal Wetland Mapping Methods*
  - Appendix J, *Biological Constraints Analysis*
  - Appendix K, *Temporary Direct and Permanent Indirect Effects of Covered Activities*
  - Appendix L, *Implementing Agreement*
  - Appendix M, *Conservation Easement Template*
  - Appendix N, *Benefits of Conservation Measures for Local Concern Species*
  - Appendix O, *Conservation Outcome Figures*
  - Appendix P, *Glossary of Term*

CHAPTER 2. COVERED ACTIVITIES

2.1 INTRODUCTION

This chapter describes the permanent development projects and recurring maintenance activities within the Plan Area of the Butte Regional Conservation Plan (BRCP) for which the Permit Applicants (see Section 1.1, *Overview*) are seeking incidental take permit coverage from the U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), and the California Department of Fish and Wildlife (CDFW) in compliance with the federal Endangered Species Act (ESA) and the Natural Community Conservation Planning Act (NCCPA). These permanent development projects[1] and recurring maintenance activities are the *covered activities* for which incidental take authorization will be obtained. These covered activities could adversely affect covered species and natural communities, including incidental take of species (see Chapter 4, *Impact Assessment and Estimated Level of Take*). The BRCP also covers incidental take associated with activities on qualifying lands that are adjacent to BRCP conservation lands through neighboring landowner agreements (see Section 8.9, *Neighboring Landowner Assurances*, for a description of the neighboring landowner assurances process). The BRCP Conservation Strategy provides avoidance and minimization measures and mitigation for all adverse effects of these covered activities on covered species and covered natural communities (see Chapter 5, *Conservation Strategy*). An analysis of effects, including assumptions used in the analysis, of the covered activities described in this chapter is provided in Chapter 4, *Impact Assessment and Estimated Level of Take*.

Permanent development projects include well-defined actions that occur once in a specific location and permanently remove all existing habitat at the project site location. These include many types of land development projects, such as housing, commercial, retail and industrial development projects; transportation facility projects, pipeline, utility and wastewater management projects; and flood control and stormwater management projects. A complete description of the covered activities is presented in Section 2.2, *Covered Activities within UPAs,* through Section 2.5, *Covered Activities within Conservation Lands*.

Recurring maintenance activities are actions that occur repeatedly over time in the same location. Recurring maintenance activities result in temporary removal of existing habitat from the site location that reestablishes between maintenance intervals. An example of a recurring maintenance activity is periodically mowing vegetation from a roadside to maintain visibility and reduce fire hazard.

Covered activities described in Section 2.2.1, *Permanent Development Projects within UPAs* through Section 2.3.2, *Recurring Maintenance Activities outside UPAs* will be implemented by the California Department of Transportation (Caltrans) District 3, the Butte County Association

[1] The terms "projects" and "activities" are used interchangeably in this document in reference to various types of covered activities.

of Governments (BCAG), and the Local Agencies (see Section 1.1.1, *Background*) and private entities subject to the jurisdiction of the Local Agencies. Covered activities described in Section 2.4, *Covered Activities within Water and Irrigation Districts*, will be implemented by Western Canal Water District (WCWD), Biggs-West Gridley Water District, Butte Water District, and Richvale Irrigation District. Covered activities described in Section 2.5 are associated with implementation of the Conservation Strategy and will be implemented by BCAG as the Implementing Entity or by other entities through agreements with BCAG.

Sections 2.2 through 2.5 describe the following four groups of covered activities.

1. **Covered Activities Within Urban Permit Areas.** Covered activities that will be implemented in Urban Permit Areas (UPAs) are described in Section 2.2. UPAs are those mapped locations in the Plan Area within which the Local Agencies anticipate urban development will occur under their respective general plans. The 15 Plan Area UPAs are listed below and located as indicated in Figure 2–1, *BRCP Urban Permit Areas (UPA) and Conservation Acquisition Zones (CAZ)* (see separate file).

   - Nord UPA
   - Chico Wastewater Treatment Plant UPA
   - Gridley Wastewater Treatment Plan UPA
   - Neal Road Recycling and Waste Facility UPA
   - Honcut UPA
   - State Route 99 UPA
   - Nelson UPA
   - Richvale UPA
   - Gridley-Biggs UPA
   - Durham UPA
   - Bangor UPA
   - Oroville UPA
   - Chico UPA
   - Foothill Area UPA
   - Dayton UPA

2. **Covered Activities outside Urban Permit Areas.** This group includes all covered activities, described in Section 2.3, *Covered Activities outside UPAs*, that will be implemented in Plan Area locations outside of the UPAs, except for those that will be implemented on BRCP conservation lands (see Section 2.5) and those activities of irrigation and water districts (see Section 2.4). This category of covered activities primarily includes activities related to linear utilities and transportation construction projects, agricultural support services projects, and recurring maintenance activities.

3. **Covered Activities within Irrigation and Water Districts.** This group includes all covered activities implemented by the four participating districts within portions of their service areas that are located in the Plan Area. These service area boundaries overlap the UPA boundaries.[2] These covered activities are described in Section 2.4 and include recurring maintenance activities such as canal and ditch maintenance, and limited permanent development projects such as canal rerouting projects.

4. **Covered Activities within Conservation Lands.** This group includes conservation actions that will be implemented on BRCP conservation lands as described in Chapter 5, *Conservation Strategy*, and summarized in Section 2.5. These covered activities include actions to enhance, restore, and manage protected habitat, monitoring activities, and

[2] In Chapter 4footprint impacts of this category of covered activities are assessed for the portion of the service areas that are within and outside of the UPAs and are not reported by district service areas.

recurring maintenance activities, including maintaining conservation land infrastructure and other facilities present on conservation lands (e.g., access roads and fences). BRCP conservation lands may be located both within and outside of the UPAs.

The covered activities include the construction and maintenance of facilities and infrastructure, both public and private, that are consistent with local general plans and local, state, and federal laws. The covered activities are divided into two categories: 1) permanent development projects and 2) recurring maintenance activities involving maintenance of existing or new facilities that happens periodically over the duration of the permit. The reason for these two categories is that the impacts resulting from such activities and the conservation measures used to address such activities tend to differ based on the permanence or recurring nature of the activity.

Based on the four groups and two categories of covered activities, the description of covered activities in Sections 2.2 through 2.5 are organized as follows.

- Permanent development projects within UPAs
- Recurring maintenance activities within UPAs
- Permanent development projects outside UPAs
- Recurring maintenance activities outside UPAs
- Permanent development projects within districts
- Recurring maintenance activities within districts
- Covered activities within BRCP conservation lands

2.1.1 Implementation of Covered Activities

All parties seeking coverage for permanent development projects and recurring maintenance activities under the BRCP must obtain approval from the Permittee (see Section 1.1) with jurisdiction over the permanent development project or recurring maintenance activity. The Permittees will have the ability to use or grant the use of their incidental take permits (e.g., through a certificate of inclusion) for implementing the covered activities that are under their purview.

All covered activities must incorporate the relevant conditions on covered activities described in Chapter 6, *Conditions on Covered Activities* to avoid and minimize impacts on covered species and natural communities. Avoidance and minimization measures include requirements for conducting biological resource surveys, establishment of activity exclusion zones, incorporating construction and project design measures, incorporating urban-habitat interface design measures, implementing species-specific avoidance and minimization measures, and implementing best management practices for transportation and urban development-related covered activities. Covered activities are limited by the total amount of impact on and take of covered species and

impact on natural communities identified in Chapter 4, *Impact Assessment and Estimated Level of Take*, and Chapter 5, *Conservation Strategy*.

Part of the approval process for parties seeking coverage under the BRCP is demonstrating that all applicable avoidance and minimization measures have been incorporated or will be incorporated properly into proposed permanent development projects or recurring maintenance activities (see Chapter 8, *Plan Implementation*). The descriptions of covered activities in this chapter have been written to be as consistent as possible with the conditions in Chapter 6, *Conditions on Covered Activities*. If any inconsistencies remain, the condition (described in Chapter 6, *Conditions on Covered Activities*) takes precedence over the description in this chapter.

Permanent development projects and recurring maintenance activities that are submitted for coverage to the Permittees that are not consistent with the covered activities as described in this chapter will be evaluated on a case-by-case basis to determine if they qualify for coverage under the BRCP. If BCAG determines that a specific type of permanent development project or recurring maintenance activity is not included within the descriptions in this chapter, then the project/activity will not receive coverage under the BRCP and will apply for incidental take permits via the existing ESA and DFW permitting processes. Any uncertainties regarding whether a type of project or activity can receive coverage under the BRCP will be resolved by BCAG. A permanent development project or recurring maintenance project will be covered under the BRCP if it meets the following criteria:

- The activity does not preclude achieving the biological goals and objectives of the BRCP (see Chapter 5, *Conservation Strategy*);
- The activity is conducted by or is subject to the jurisdiction of one of the Permittees (see Chapter 1, *Introduction*);
- The activity or project results in a type of impact evaluated in Chapter 4, *Impact Assessment and Level of Take*; and
- Adequate take coverage under the permits remains available for the activity.

The description of covered activities provided in Sections 2.2 through 2.5 broadly defines all of the different types of activities covered by the BRCP. In some cases, specific projects are identified to provide examples that illustrate the general category. However, if a given project meets the guidelines for covered activities as described in this section, then that project is a covered activity.

Over the 50-year permit term of BRCP implementation, it is expected that the Permittees will develop additional types of permanent development projects and recurring maintenance activities. To the extent that these additional activities and projects are generally and qualitatively described below, meet the criteria listed above, are not expressly limited by this

chapter, and are adequately evaluated in Chapter 4, *Impact Assessment and Estimated Level of Take*, these future activities will also be covered by the BRCP.

The descriptions of covered activities in this chapter are primarily qualitative because the design of many of the individual activities has not yet been developed. Consequently, for the purpose of determining the extent of incidental take authorized under the BRCP, it was necessary to develop quantitative assumptions regarding the extent of impacts that could be incurred by those covered activities (e.g., location, extent of project footprints). These assumptions used to conduct the impact assessment are described in Section 4.2, *Impact Assessment Approach*.

2.1.2 Urban Permit Areas

The UPAs (Figure 2–1 and Figure 2–2, Generalized BRCP Land Use Designation Categories Derived from County and City General Plans [see separate file]) were developed primarily to define the locations within the Plan Area where impacts of future urban development as described in Section 2.2 are expected to be incurred based on the Local Agency general plans. Because the intent of the BRCP is to cover all land use designations from all Local Agency general plans that could impact covered species and covered natural communities, the UPAs encompass all such land use designations from the Local Agencies' general plans (except for several isolated parcels designated by Butte County as "agricultural services," which occur outside UPAs). The types of permanent development activities that may be implemented within agricultural services parcels are described in Section 2.3.1.3, *Agricultural Services Permanent Development Activities outside of UPAs*.

Land use designations vary across the Local Agency general plans (81 different designations combined from the five general plans). To conduct the impact assessment described in Chapter 4, *Impact Assessment and Estimated Level of Take*, the various land uses designations were simplified and combined into the following six BRCP land use categories:

- Residential
- Commercial
- Industrial
- Agricultural
- Resource Management
- Public

The distribution of these BRCP land use categories is depicted in Figure 2-1. Table 2-1, *General Plan Land Use Designations Corresponding to BRCP Land Use Categories* crosswalks each of the Local Agency general plan land use designations to the simplified BRCP land use designation categories.

Creating these six general categories for land use provides the ability to view similar types of land use designations across all UPAs. UPA boundaries were developed to encompass BRCP

land use categories that will result in impacts on biological resources (i.e., residential, commercial, and industrial) and also to include existing city limits and spheres of influence. The following provides a brief description of the UPAs.

- The Chico, Oroville and Gridley-Biggs UPAs all include not only residential, commercial, and industrial land use designations associated with these municipalities, but also Butte County land use designations that accommodate future growth.
- The Foothill Area, Bangor and Honcut UPAs are unincorporated areas of Butte County that primarily include foothill area residential land use designations allowing for land subdivisions of 1 to 40 acres per dwelling unit.
- The Nord, Durham, Dayton, Nelson, and Richvale UPAs are small unincorporated farming communities that provide important residential areas and agriculture-related services for the agricultural community.
- The Chico and Gridley Wastewater Treatment Plant (WWTP) UPAs encompass the boundaries of existing and planned facilities associated with the City of Chico and City of Gridley WWTPs. Both municipalities have plans to expand these facilities in the future and these UPAs encompass the area of expected impacts.
- The Neal Road Recycling and Waste Facility UPA includes the existing recycling and waste facility, as well as a 250-foot buffer around the entire site where future expansion is anticipated.
- The State Route (SR) 99 UPA encompasses the boundaries of existing and planned industrial land uses adjacent to the Highway 99/Durham-Pentz Road Interchange.

Table 2-1. General Plan Land Use Designations Corresponding to BRCP Land Use Categories

City of Oroville	City of Biggs	City of Gridley	City of Chico	Butte County
BRCP Land Use Category: Residential				
• Very Low Density Residential • Low Density Residential • Medium Low Density Residential • Medium Density Residential • Medium High Density Residential • High Density Residential • Mixed Use Residential • Rural Residential • Special Planning Area-Oro Bay • Special Planning Area-South Orphir • Special Planning Area-Rio D'Oro	• Low Density Residential • Medium Density Residential • High Density Residential	• Residential, High Density • Residential Low Density • Residential Medium Density • Residential Suburban	• Very Low Density Residential • Low Density Residential • Medium Density Residential • Medium High Density Residential • Residential Mixed Use • High Density Residential • Special Mixed Use • Special Planning Area	• Rural Residential • Very Low Density Residential • Low Density Residential • Medium Density Residential • Medium High Density Residential • High Density Residential • Planned Urban Development • Foothill Residential
BRCP Land Use Category: Commercial				
• Airport Business Park • Mixed Used Commercial • Office Commercial • Retail and Business Services	• Agriculture -Commercial • Commercial • Downtown Mixed Use • Mixed Use	• Commercial • Downtown Mixed Use	• Commercial Mixed Use • Commercial Services • Neighborhood Commercial • Regional Commercial	• Agriculture Services • Research and Business Park • Recreation Commercial • Retail and Office • Sports and Entertainment • Mixed Use
BRCP Land Use Category: Industrial				
• Industrial	• Agriculture-Industrial • Heavy Industrial • Light Industrial • Railroad	• Manufacturing	• Industrial Office Mixed Use • Manufacturing/ Warehousing • Office Mixed Use	• Industrial

Table 2–1. General Plan Land Use Designations Corresponding to BRCP Land Use Categories (continued)

BRCP Land Use Category: Agricultural				
None	• Agriculture	• Agriculture	None	• Agriculture
City of Oroville	**City of Biggs**	**City of Gridley**	**City of Chico**	**Butte County**
BRCP Land Use Category: Resource Management				
• Environmental Conservation/Safety • Resource Management	None	• Open Space	• Primary Open Space • Secondary Open Space	• Resource Conservation • Timber Mountain
BRCP Land Use Category: Public				
• Parks and Recreational Facilities • Public/Quasi-Public • Other Open Space	• Public	• Park • Public	• Public Facilities and Services	• Public

2.2 COVERED ACTIVITIES WITHIN UPAS

This section describes the types of activities within UPAs that are covered under the BRCP. Covered activities implemented within the 15 UPAs include all new public and private sector construction, improvements to existing facilities, and maintenance of existing and new facilities consistent with local general plans and local, state, and federal laws. The list of covered activities provided in this section is not exhaustive, but provides an overview of the types of development activities and actions that the Permit Applicants expect to implement or authorize within the UPAs over the term of the BRCP. They are intended to be as inclusive as possible to accommodate urban growth and all ground-disturbing activities within the 15 UPAs.

All categories of activities listed below are covered activities under the BRCP. The activities described in this section will be implemented under the jurisdiction of the Cities of Biggs, Chico, Gridley and Oroville, the County of Butte, BCAG and Caltrans District 3.

2.2.1 Permanent Development Projects within UPAs

This section describes permanent development projects, including new construction and improvements and expansions to existing facilities within UPAs, that are covered activities under the BRCP. Figure 2–2 depicts some of the land use designation categories within UPAs from the Local Agency general plans that are covered activities under the BRCP. These generally include all land use designations from all Local Agency general plans that could potentially impact covered species and natural communities. Covered permanent development projects within UPAs also include numerous additional urban-related projects, such as transportation and recreation projects, waste and wastewater management facility projects, and flood control and stormwater management projects.

2.2.1.1 Residential, Commercial, Public, and Industrial Facility Permanent Development Projects within UPAs

Table 2-1 lists the residential, commercial, industrial, and public land use designations from Local Agency general plans that are covered activities under the BRCP. These land use designation naming conventions may change as general plans are updated over the 50-year term of the BRCP. All future development under residential, commercial, public, and industrial land use designations are also covered activities under the BRCP.

Covered residential permanent development projects include any new construction, expansion, and repair/restoration of residential units (e.g., single family, multifamily, mixed-use, and mobile homes) and appurtenant infrastructure (e.g., roads, sidewalks, utilities, sewer lines, water lines, stormdrain pipelines, stormwater retention basins), and staging areas. The appurtenant infrastructure primarily includes actions to access, survey, excavate, and construct such infrastructure and connect them to existing mainline electric, gas, sewer, water, storm drain line, and other infrastructure.

Commercial permanent development projects include any new construction, expansion, and repair/restoration of commercial structures (e.g., retail and office buildings) and any appurtenant infrastructure (e.g., utilities, roads, sidewalks, parking lots, sewer lines, water lines, storm drain pipelines, stormwater retention basins). The appurtenant infrastructure primarily includes actions to access, survey, excavate, and construct such infrastructure and connect them to existing mainline electric, gas, sewer, water, storm drain line infrastructure, and other infrastructure.

Covered industrial permanent development projects include any new construction, expansion, and repair/restoration of industrial structures (e.g., warehouses, factories, industrial business parks and manufacturing facilities) and appurtenant infrastructure. Also included are agricultural processing facilities, agricultural byproduct processing facilities (rendering facilities, rice straw processing facilities, etc.), agricultural byproduct energy-generating facilities, biofuel facilities, solar energy–generating facilities, wind energy–generating facilities, and appurtenant infrastructure. The footprint effects of any wind energy–generating facility would be covered, but not the operation of the wind turbines, which results in a different type of impact on species that is not permitted under the BRCP. Ground-disturbing activities resulting from a wind energy project can be covered under the BRCP only after the wind energy project has completed ESA and California ESA compliance for operation and maintenance of such a facility.

Covered public facility permanent development projects include any new construction, expansion, and repair/restoration of public building structures (e.g., government buildings, schools, hospitals, libraries, churches, recreation centers, police/fire stations, military buildings, and cemeteries) and any appurtenant infrastructure (e.g., utilities, roads, sidewalk, parking lots, sewer lines, water lines, storm drain pipelines, and stormwater retention basins). The appurtenant infrastructure primarily includes actions to access, survey, excavate, and construct such infrastructure and connect them to existing mainline electric, gas, sewer, water, storm drain line infrastructure, and other infrastructure.

Covered activities also include all appurtenant infrastructure projects (e.g., utilities, roads, sidewalk, parking lots, sewer lines, water lines, storm drain pipelines, and stormwater retention basins) necessary to support urban development. The appurtenant infrastructure primarily includes actions to access, survey, excavate, and construct such infrastructure and connect them to existing mainline electric, gas, sewer, water, storm drain line infrastructure, and other infrastructure. With the exception of culverts placed in small intermittent drainages along roads within the footprint of permanent development facilities, activities associated with the construction of residential, commercial, public and industrial facility permanent development projects are not expected to include development of in-water structures.

2.2.1.2 Recreation Facility Permanent Development Projects within UPAs

Covered recreation facility permanent development projects include construction of trails and associated pedestrian/bike bridges, interpretive trails, new parks, playgrounds, sport complexes,

golf courses, ball fields, bike paths, restrooms, parking areas, fences, trailheads, racetracks, campgrounds, equestrian facilities, whitewater parks, stormwater detention facilities, and recreational facilities associated with education and interpretation such as nature centers, indoor/outdoor classrooms, amphitheaters, and kiosks. This category also includes appurtenant infrastructure such as utilities and pipelines (sewer/water) for education and interpretation recreational infrastructure, and staging areas. Recreation facility permanent development projects that may require actions within stream channels include the construction of new or replacement pedestrian bridges within designated recreation lands and providing access to white water park facilities. Construction of these facilities may include placement of bridge abutments, removal of vegetation from and armoring of channel banks, and removing debris from channels. Table 2-1 lists the resource management and public land use designations from Local Agency general plans that are covered activities under the BRCP and encompass recreation facility permanent development projects. These land use designation naming conventions may change as general plans are updated over the 50-year term of the BRCP. All future development under recreation/resource management land use designations are also covered activities under the BRCP.

2.2.1.3 Transportation Facility Permanent Development Projects within UPAs

Covered transportation facility permanent development projects include construction of new roadways and bridges and associated infrastructure; road and bridge widening and capacity improvements; freeway interchange improvements; roadway safety improvements; bike lane and bike path projects; park-and-ride lots; transit facilities (e.g., transit stops, shelters, signs, transit centers, transit maintenance yards, transit vehicle refueling stations); rail and light rail facilities; airport expansions; charging stations for electric vehicles; and other such components of transportation infrastructure. Construction of these facilities could include activities such as grading, excavation, placement of fill material, and establishment of staging areas. This category includes projects undertaken by Caltrans, BCAG, and the Local Agencies.

Covered transportation facility permanent development projects that require implementing actions within streams, canals, and other water bodies include roadway and bridge construction and replacement projects that involve constructing new or replacing existing bridges and associated supports, and increasing bridge widths, coupled with guardrail and drainage improvements. In most cases, reconstructed bridges will be wider than the bridges they replace in compliance with ongoing changes in applicable regulations. Some bridges may be widened to accommodate growth in vehicular traffic, bicycles and pedestrians. Road widening will require adding imported borrow and new asphalt, concrete, and aggregate base for pavement. Where structurally and financially feasible, bridges will be constructed as free-span bridges. Where free-span bridges are not feasible, bridges will be built on pile foundation, cast-in-drilled-hole pile, or spread footing foundations. Cofferdams and excavation for foundation construction may be required. Slope paving may be included in the scope of work to protect/improve channel slopes at the bridge. Major bridge repair and rehabilitation may be similar to bridge replacement in scope, often requiring roadway widening, new deck support structures and seismic retrofitting.

2.2.1.4 Pipeline Facility Permanent Development Projects within UPAs

Covered pipeline facility permanent development projects include all activities associated with accessing, surveying, excavating, trenching, constructing underground pipeline infrastructure, backfilling and compaction and any windrowing or storage of overburden material, and restoration of the construction site, and establishment of staging areas. Examples of new pipeline construction covered activities include underground mainline water and sewer lines and storm drainage lines to serve urban development. Additionally, pipeline testing may occur prior to operation which may include filling with water, checking for leakage, testing at an identified surge pressure, and discharging of the uncontaminated water into local storm drains or drainages in a manner that complies with local, state and federal water quality regulations. At stream crossings, new pipelines are expected to be bored under or placed above stream channels and thus are not expected to require implementing actions within stream channels.

2.2.1.5 Utility Services Facility Permanent Development Projects within UPAs

Covered utility services facility permanent development projects include activities associated with construction (including accessing, surveying, excavating/trenching and removing/storing of overburden materials, establishment of staging areas) and installation of the following:

- Electric utilities, including above- and below-ground electric transmission and distribution lines and mainlines, and any improvements or expansions made to these facilities;
- Above- and below-ground telecommunication lines, wireless facilities (e.g., cell towers and associated facilities), and any improvements or expansions made to these facilities; and
- Underground natural gas transmission and distribution mainlines, and any improvements or expansions made to these facilities.

At stream crossings, new utility lines are expected to be bored under or placed above stream channels and thus are not expected to require implementing actions within stream channels.

2.2.1.6 Waste and Wastewater Management Facility Permanent Development Projects within UPAs

Covered waste management facility permanent development projects include construction and expansion of waste management facilities, including landfills, transfer stations, recycling centers, and recycling facilities, and all related appurtenances, and establishment of staging areas. These covered activities are associated with development of the Neal Road Recycling and Waste Facility UPA, including a planned landfill expansion project that will expand the landfill at 1023 Neal Road, and could include such activities as covering, capping, cell development, lining, and access road construction, as well as the construction and expansion of recycling facilities.

Covered wastewater management facility permanent development projects include construction or expansion of WWTPs, temporary WWTPs, pre-treatment wastewater facilities, water recycling facilities, and pump stations. They also include construction (including accessing, surveying, excavating/trenching and removing/storing of overburden materials) and installation of force mains, effluent lines, sewer lines, discharge lines, reclamation lines, and mainlines, and all appurtenant infrastructure. These covered activities are associated with but not limited to the Chico, Gridley, Biggs and Oroville wastewater management facilities.

With the exception of culverts placed in small intermittent drainages along roads within the project footprint of new facilities, activities associated with the construction of waste and wastewater management facility permanent development projects are not expected to include development of in-water structures (e.g., at stream crossings new sewer lines are expected to be bored under or placed above stream channels and thus are not expected to require implementing actions within stream channels).

2.2.1.7 Flood Control and Stormwater Management Facility Permanent Development Projects within UPAs

Covered flood control and stormwater management facility permanent development projects include the construction of new channels, levees/dikes, flood walls, retention/detention basin construction, stormwater channel lining, and water quality control facilities, including associated staging areas, for mitigating stormwater runoff (e.g., sediment barriers, filters, berms) to provide flood control and stormwater management for new development projects within the 15 UPAs.

This covered activity does not include levees or other flood control facilities that may be constructed by the California Department of Water Resources (DWR). DWR is not a permit applicant and its activities are not covered under the BRCP.

Activities associated with the construction of flood control and stormwater management facility permanent development projects are not expected to include development of in-water structures in natural channels.

2.2.2 Recurring Maintenance Activities within UPAs

This section describes recurring maintenance activities involving existing and new facilities that are covered activities within the 15 UPAs. The description of activities provided in this section is not exhaustive but provides an overview of the types of recurring maintenance activities that are expected to occur and be covered under the BRCP. Covered recurring maintenance activities are intended to be as inclusive as possible to accommodate all ground-disturbing maintenance activities that are likely to occur within the UPAs over the term of the BRCP.

2.2.2.1 Recreation Facility Recurring Maintenance Activities within UPAs

Covered recreation facility recurring maintenance activities include maintenance of trails and associated pedestrian/bike bridges, interpretive trails, new parks, playgrounds, sport complexes, golf courses, ball fields, bike paths, restrooms, parking areas, fences, trailheads, racetracks, campgrounds, equestrian facilities, whitewater parks, stormwater detention facilities, and recreational facilities associated with education and interpretation such as nature centers, indoor/outdoor classrooms, amphitheaters, kiosks, and recreational infrastructure associated with sports, education and interpretation. In addition, the cleaning of Sycamore Pool in Big Chico Creek, involving removing silt and debris from the pool and maintenance of the associated bladder dam at Bidwell Park, is a covered activity.

Sycamore Pool is a concrete-lined swimming pool (approximately 100 feet wide by 550 feet long and from 1 to 6 feet deep) within Big Chico Creek in Bidwell Park that is filled from the waters of Big Chico Creek by operation of an air-filled bladder dam that is annually raised from Memorial Day through Labor Day. Maintenance and operation of Sycamore Pool is a covered activity under the BRCP. The dam is operated to be lowered during the winter to allow gravel to clear the pool and to minimize impacts on migrating fish. Recurring maintenance of Sycamore Pool includes annual operation of equipment to remove accumulated silt, gravel and debris from the concrete floor of the pool, and weekly cleaning of the pool. In late May, the pool area is prepared for summer swimming. The pool is drained by diverting water under the pool and the silt, gravel and debris are removed via loader and dump truck. Weekly cleanings of Sycamore Pool, conducted from Memorial Day to Labor Day, require draining the water from the pool, scrubbing any accumulated mud and silt from the concrete pool bottom, and washing off the algae.

2.2.2.2 Transportation Facility Recurring Maintenance Activities within UPAs

There are approximately 158 miles of roadways within the UPAs.[3] Covered transportation facility recurring maintenance activities include rehabilitation and minor improvement (i.e., within the footprint of existing roadways and facilities) of bridges, highways, freeways, interstates, public and private roadways, roadside parking and viewing facilities, transit facilities and rail facilities, as well as all ancillary drainage systems within UPAs. Covered recurring maintenance activities include, but are not limited to, patching, striping, and guardrail and shoulder repair; cleaning of curbs, gutters, ditches, and sidewalks; grading and mowing of existing roadway shoulders and borders; bridge and culvert repair; and erosion and dust control.

Recurring maintenance of bridges and associated drainage structures includes in-stream operation of equipment to repair and prevent scour of the streambed beneath and adjacent to bridge structures; debris and woody debris removal from bridge piers and pilings; vegetation management beneath and adjacent to bridge structures; and erosion/sediment control for bridges and drainage infrastructure beneath and adjacent to bridge structures.

[3] As calculated from the BRCP GIS roadway data layer.

2.2.2.3 Pipeline Facility Recurring Maintenance Activities within UPAs

Covered pipeline facility recurring maintenance activities include all maintenance activities associated with the monitoring, accessing, surveying, excavation/trenching, and installation of replacement underground pipeline infrastructure (e.g., water lines, natural gas lines, sewer lines, main lines, storm drainage lines), and any storage of overburden material and restoration of disturbed ground at the maintenance sites. Recurring maintenance activities associated with pipeline facilities are not expected to include in-water maintenance activities.

2.2.2.4 Utility Service Facilities Recurring Maintenance Activities within UPAs

Covered utility service facility recurring maintenance activities include the maintenance of utilities above and below ground; electric transmission and distribution lines and mainlines; above and below ground telecommunication lines; underground natural gas transmission and distribution lines and mainlines; and wireless transmission facilities (cell towers and associated facilities). Maintenance activities include surveying, excavation and trenching, replacement of above and below ground infrastructure, reconductoring, storage of overburden material, and restoration of disturbed ground at maintenance sites. Recurring maintenance activities associated with utility service facilities are not expected to include in-water maintenance activities.

2.2.2.5 Waste and Wastewater Management Facility Recurring Maintenance Activities within UPAs

Covered waste and wastewater recurring maintenance activities include maintenance of the following: landfills, transfer stations, and recycling stations; existing and new WWTPs, temporary WWTPs, pre-treatment wastewater facilities, and water recycling facilities; force mains and effluent, sewer, discharge, and reclamation lines; pump stations; and sewerage ponds. These covered activities are associated with but not limited to all such activities associated with the Chico, Gridley, Biggs and Oroville Wastewater Management Facilities and the Neal Road Recycling and Waste Facility. Recurring maintenance activities associated with waste and wastewater management facilities are not expected to include in-water maintenance activities.

2.2.2.6 Flood Control and Stormwater Management Recurring Maintenance Activities within UPAs

Covered flood control and stormwater management recurring maintenance activities include the following:

- Maintenance activities on channels, levees, dikes, and retention/detention basins;
- Removal of vegetation and debris from streambeds, channels, storm drainages, flood control facilities, retention/detention basins, ponds, culverts, and associated structures (e.g., inlets, outlets, pipes, trash racks);

- Repair and installation of replacement culverts, stormwater conveyance facilities and outfall structures, local detention/retention facilities, and erosion, sediment control, and bank stabilization structures; and
- Maintenance of water retention facilities, floodplain enhancement, ditch cleaning, culvert replacements, and vegetation control.

Recurring maintenance to remove vegetation and debris from streambeds, channels, ponds, flood control facilities, retention basins, and detention basins includes, but is not limited to, the in-water operation of equipment to do the following:

- Maintain the levees, ditches, canals, drains and service/access roads in the Shasta Union Drainage Area District system (County Service Area [CSA] 23);
- Maintain the levees, ditches, canals, drains and service/access roads in the Pleasant Valley Drainage System (CSA 23);
- Maintain all the detention and retention ponds in CSAs 76, 165, 101, 128, 158, 135, 102, 176, 174, 172, 97, 169, 180 and 183; and
- Maintain the sewerage ponds in CSAs 21 and 82.

Vegetation removal and maintenance of stormwater conveyance canals occurs annually and requires the in-water operation of equipment to mechanically remove emergent and aquatic vegetation and trim trees in channels and canals that transport stormwater runoff from urban areas throughout portions of the City of Chico and other Local Agency jurisdictions. Also included are periodic resloping, grading, scour repair and scour prevention of drainage canals, and regrading and regraveling of service/access roads.

This covered activity does not include levees or other flood control facilities that may be maintained by DWR. DWR is not a permit applicant and its activities are not covered under the BRCP.

2.2.2.7 Vegetation Management Recurring Maintenance Activities within UPAs

Covered vegetation management recurring maintenance activities include vegetation clearing for fire control/fuel breaks, and the trimming and removal of trees, if necessary, to maintain the existing and new permanent development and the infrastructure and other facilities described above that are within UPA's and that are not associated with recurring transportation facility (see Section 2.2.2.2, *Transportation Facility Recurring Maintenance Activities within UPAs*) and flood control and stormwater management maintenance activities (see Section 2.2.2.6, *Flood Control and Stormwater Management Recurring Maintenance Activities within UPAs*).

2.3 COVERED ACTIVITIES OUTSIDE UPAS

This section provides lists and describes the types of activities that will occur outside of the UPAs that are covered under the BRCP. Covered activities implemented outside the UPAs include permanent development projects and recurring maintenance activities of primarily linear infrastructure projects that cross undeveloped lands between urban areas.

2.3.1 Permanent Development Projects outside UPAs

This section describes permanent development projects, including new construction and improvements to existing facilities outside of UPAs that are covered activities under the BRCP.

2.3.1.1 Wastewater Management Facility Permanent Development Activities outside UPAs

Covered wastewater management facility permanent development projects include force main and effluent line construction, discharge and reclamation line installation, and trunk sewer line construction, including the establishment of staging areas. This could include up to 5 miles of new trunk sewer line associated with the Chico WWTP and up to 3 miles of new mainline from Gridley to the Gridley WWTP (see Figure 2–3, *Transportation and Sewerline Projects and Agricultural Services Areas Outside of Urban Permit Areas* [separate file]). The new trunk sewer line and new mainline are assumed to include a 100-foot-wide right-of-way (ROW).

With the exception of culverts placed in small intermittent drainages along roads within the ROW of new facilities, activities associated with the construction of waste and wastewater management facility permanent development projects are not expected to include development of in-water structures (e.g., at stream crossings new sewer lines are expected to be bored under or placed above stream channels and thus are not expected to require implementing actions within stream channels.

2.3.1.2 Transportation Facility Permanent Development Activities outside UPAs

Covered transportation facility permanent development projects outside the UPAs include construction of new roads and bridges; widening and capacity improvements on existing roads and bridges; construction of new roadside parking and viewing facilities, transit facilities, and rail facilities; and safety improvements on existing transportation facilities. Planned transportation facility permanent development projects for which the specific location and type of project are currently known are described below and depicted in Figure 2–3. Covered transportation facility permanent development projects that require implementing actions within streams, canals, and other water bodies are the same as described for transportation facility projects within UPAs in Section 2.2.1.3, *Transportation Facility Permanent Development Projects within UPAs*.

2.3.1.2.1 BCAG and Caltrans Transportation Facility Projects

This section describes specific covered state transportation projects, including establishment and use of borrow sites and staging areas, that will be undertaken by BCAG or Caltrans (see Figure 2–3). These projects include passing lane improvements along SR 70 and improvements to SR 99. The width of new road ROWs on which all construction activity will occur is assumed to average 150 feet. These projects are assumed to require the establishment of four 20-acre borrow sites located within one mile of these road projects.

- **SR 70 Corridor Passing Lane Projects.** Corridor passing lane projects along SR 70 include four segments[4] that will produce a five-lane facility (four lanes with a center turn lane).
- **SR 70 Passing Lane – Segment #1**. Construction of passing lanes from 0.7 mile south of East Gridley Road to 0.4 mile north of Cox Lane (approximately 2.5 miles in length). This project will entail widening the existing two-lane roadway to add additional northbound and southbound lanes as well as a center left-turn lane, resulting in an improved roadway with a total of five lanes.
- **SR 70 Passing Lane – Segment #2**. Construction of passing lanes 0.1 mile south of Palermo Road south to terminus of Segment 1, (approximately 3.25 miles in length). This project will entail widening the existing two-lane roadway to add additional northbound and southbound lanes as well as a center left-turn lane, resulting in an improved roadway with a total of five lanes.
- **SR 70 Passing Lane – Segment #3**. Construction of passing lanes from southerly terminus of SR 70 Passing Lane Segment #2 to the Yuba County line (approximately 3.25 miles in length). This project will entail widening the existing two-lane roadway to add additional northbound and southbound lanes as well as a center left-turn lane, resulting in an improved roadway with a total of five lanes. This project includes new bridges at Honcut Creek on the Butte/Yuba County boundary which will involve widening the existing two-lane bridge into a four-lane bridge, or construction of a separate adjacent two-lane bridge. Center left-turn lane is not anticipated to be required on this bridge structure.
- **SR 99 Improvement Projects**. Planned improvements to SR 99 include intersection improvements and traffic capacity enhancements.
- **SR 99/Neal Road Intersection**. Upgrade existing at-grade intersection to full urban interchange including overcrossing and on/off ramps to address safety issues associated with this intersection. The interchange construction footprint is assumed to be 45 acres.

[4] Only the segments that include areas outside the UPAs are included in this section. Segments of these projects within the UPAs are included in Section 2.2.1.3, *Transportation Facility Permanent Development Projects within UPAs*.

- **SR 99 Capacity Enhancements North**. Widen existing two-lane SR 99 into four-lane expressway north of Chico from Esplanade to Tehama County Line (approximately 7.5 miles in length).
- **SR 99 Capacity Enhancements South**. Widen existing two-lane SR 99 to five lanes from Butte County/Sutter County line to West Liberty Road at the south end of the City of Gridley (approximately 3.5 miles in length) and from Ford Avenue from the north end of the City of Gridley to approximately 0.75 mile south of SR 99/SR 149 interchange (approximately 16.5 miles in length).

2.3.1.2.2 Butte County Rural Bridge Replacement Projects

Covered rural bridge replacement projects include replacement of up to 87 bridges (see Table 2-2, *Covered Rural Bridge Replacement Projects* and Figure 2–3) by the County of Butte over the term of the BRCP. Each of the bridge replacement projects is assumed to require a 2-acre construction footprint, including a 1-acre staging area. The footprint area within which equipment will be operated within stream channels for replacement of bridges across water courses is assumed to encompass 0.26 acre of channel bed.

The lifespan of a typical bridge in Butte County is approximately 50 years and many rural bridges in Butte County have already exceeded this timeframe. While 87 bridge replacement projects have been identified for replacement outside of UPAs (see Table 2–2), it is likely that only a portion of the 87 bridges will be replaced during the 50-year term of the BRCP based on a current lack of funding available for bridge replacement projects. If additional bridge replacement projects are identified during implementation that are not included in Table 2–2, they can also be covered activities as long as the 87-bridge limit is not exceeded and the bridge replacement projects are similar in size and scope to those identified in Table 2–2.

2.3.1.2.3 Butte County Rural New Bridge Construction Projects

Covered new bridge construction projects include construction of new bridges along Ord Ferry Road at “the dips” and a new bridge across Mud Creek. Ord Ferry Road is an east-west route connecting Butte County with adjacent Glenn County via the Ord Ferry Bridge over the Sacramento River. “The dips” include three adjacent yet separate sections of the roadway that flood frequently during the rainy season, causing a public safety hazard and resulting in frequent road closures throughout the winter months. This project involves the construction of three new bridges spanning each of three flood-prone dips (see Figure 2–3). A new bridge will also be constructed across Mud Creek as part of the new Eaton Road extension (see Section 2.3.1.2.5, *Butte County Rural Roadway Improvement Projects* and Figure 2–3). Each of the new bridges is assumed to require a 2-acre construction footprint, including a 1-acre staging area. The footprint area in the Mud Creek channel within which equipment will be operated to construct the new bridge across Mud Creek is assumed to encompass 0.26 acre of channel bed below the bridge centerline. The bridge across Mud Creek is assumed to remove 100 feet of channel bank habitat along each side of the channel associated with placement of bridge revetment material.

2.3.1.2.4 Butte County Rural Intersection Improvement Projects

Covered rural intersection improvement projects include installation of traffic signals and widening of the roadway to accommodate the creation and/or extension of intersection turn lanes and through lanes as well as bicycle and pedestrian facilities (e.g., bike lanes, crosswalks, islands). Covered rural intersection improvement projects will be implemented by the County of Butte and include the following five projects (see Figure 2–3):

- SR 99 at Township Road
- Pentz Road at Durham-Pentz Road
- Dayton Road at Durham Dayton Highway
- Dayton Road at Hegan Lane
- East Gridley Road at Larkin Road

Each of the roadway intersection improvement projects is assumed to require a 3-acre construction footprint, including a staging area.

2.3.1.2.5 Butte County Rural Roadway Improvement Projects

Covered rural roadway improvement projects include projects to extend and widen existing roads, improve their structural integrity, add bike lanes, and other improvements. Covered rural roadway improvement projects will be implemented by the County of Butte and include the nine projects discussed below (see Figure 2–3).

The width of project ROWs, within which all construction activity (including establishment of staging areas) will occur, is assumed to average 150 feet (the approximate length of each road improvement is provided in each project description below). Project equipment staging areas will be located within the 150-foot ROW work areas.

- **Southgate Avenue Extension**. Extension of the existing 28-foot-wide roadway from SR 99 to Midway (approximately 1 mile in length).
- **La Porte Road Reconstruction Project**. Reconstruction of a 2.5-mile segment of roadway to provide additional shoulder width, structural rehabilitation (construction of a new structural section involving complete removal of existing roadway including base material and reconstructing new roadway in its place), and minor roadway alignment adjustments.
- **East Gridley Road**. Widening of the roadway from two to four lanes from SR 99 in Gridley to SR 70 to the east (approximately 4.5 miles in length).
- **Oroville-Bangor Highway Reconstruction Project**. Reconstruction of the Oroville-Bangor Highway from North Honcut Creek to White Hall Ravine

(approximately 1.5 miles in length) to provide additional shoulder width, structural rehabilitation (construction of a new structural section involving complete removal of existing roadway including base material and reconstructing new roadway in its place), and minor roadway alignment adjustments.

- **Oroville-Chico Highway Reconstruction Project**. Reconstruction of the Oroville-Chico Highway from Durham-Dayton Highway to Estates Drive (approximately 3.5 miles in length) to include additional shoulder width, additional width to add Class 2 bike lanes (4-foot total widening), structural rehabilitation of the roadway (construction of a new structural section involving complete removal of existing roadway including base material and reconstructing new roadway in its place), and minor roadway alignment adjustments.
- **Neal Road Reconstruction**. Reconstruction of Neal Road from 4.7 miles east of SR 99 to eastern Plan Area boundary (approximately 2.5 miles in length). The project includes widening the shoulder, widening the road to add Class 2 bike lanes (4-foot total widening), structural rehabilitation of roadway (construction of a new structural section involving complete removal of existing roadway including base material and reconstructing new roadway in its place), and minor roadway alignment adjustments.

Table 2-2. Covered Rural Bridge Replacement Projects

1.	Midway at Butte Creek	45.	Johnson Clan Avenue at Live Oak Slough
2.	River Road at Grassy Banks Slough	46.	Afton Road at Main Drain
3.	Ord Ferry Road at Little Chico Creek	47.	Farris Road at Main Drainage (1)
4.	Oroville Bangor Highway at Whitehall Ravine Bridge	48.	Farris Road at Main Drainage (2)
5.	River Road at Shady Oaks Slough	49.	Farris Road at Main Drainage (3)
6.	Central House Road at Wyman Ravine	50.	Afton Road at Butte Creek
7.	Central House Road at Wyandotte	51.	Richvale Highway at High Gravity Lateral
8.	East Evans Reimer at Sutter Butte Canal	52.	Erickson Road at Western Canal
9.	Mesa Road at Durham Mutual Ditch	53.	Nelson Road at Little Dry Creek Overflow
10.	Los Verjeles Road at Honcut Creek	54.	Nelson Road at Durham Slough
11.	Durham-Dayton Highway at Butte Creek	55.	East Rio Bonito Road at Sutter Butte Canal
12.	Oro-Chico Highway at Nance Canyon Stream	56.	Oregon Gulch Road at Morris Ravine
13.	Neal Road at Nance Canyon Stream	57.	Oregon Gulch Road at Oregon Gulch Creek
14.	Colusa Highway at Hamlilton Slough	58.	Oro-Chico Highway at Hamlin Slough
15.	Colusa Highway at Lateral D	59.	Grape Way at Lindo Channel
16.	Midway at Moulton Slough	60.	Cana-Pine Creek Road at Pine Creek

Table 2-2. Covered Rural Bridge Replacement Projects (continued)

17.	Midway at Nelson Slough	61.	Alberton Avenue at Little Chico Creek
18.	Midway at Lost Slough	62.	Edgar Avenue at Comanche Creek
19.	Midway at Hamlin Slough	63.	Middle Honcut Road at Wyandotte Creek
20.	Midway at Butte Creek Overflow	64.	Central House Road at Drainage Ditch
21.	Palermo Honcut Highway at East Branch Wydotte Creek	65.	Bennett Road at Jordan Creek
22.	Pacific Heights Road at Dredger Gulch	66.	Durnell Road at Butte Creek
23.	Table Mtn. Blvd. at Campbell Creek Overflow	67.	Afton Road at Little Dry Creek
24.	West Liberty Road at Belding Lateral	68.	Nord Gianella Road at Channel Crossing
25.	Luckehe Road at Morrison Slough	69.	Nord Gianella Road at Rock Creek
26.	Nord Gianella Road at Pine Creek	70.	Nord Gianella Road at Bare Pole Ditch
27.	Stimpson Road at Wyman Ravine	71.	Dunstone Drive at Wilson Creek
28.	East Gridley Road at Sutter Butte Canal	72.	Lower Honcut Road at Wyandotte Creek
29.	Bangor Park Road at Wilson Creek	73.	Cana Highway at Diane's Ditch
30.	Cana Highway at Dianne’s Ditch No. 2	74.	Bradford Road at Little Dry Creek
31.	Hamilton Nord Cana Highway at Red Barn Slough	75.	Durham Dayton Road at Hamlin Slough
32.	Oak Way at Lindo Channel/Sandy Gulch	76.	Nelson-Shippee Road at Western Canal
33.	Cana Highway at Slough Branch of Pine Creek	77.	Midway at High Lift Lateral Canal
34.	Nelson Road at Ash Creek Overflow	78.	Meridian Road at Grassy Banks Slough
35.	Lone Pine Avenue at Little Chico Creek	79.	Bennett Road at Pine Creek
36.	Crouch Avenue at Little Chico Creek	80.	East Gridley Road at Feather River
37.	Cottonwood Road at Dudley Creek	81.	Openshaw Road at Dry Creek (1)
38.	Richvale Highway at Little Dry Creek	82.	Openshaw Road at Dry Creek (2)
39.	Cottonwood Road at Cottonwood Creek	83.	Middle Honcut Road at Wyman Ravine
40.	Nelson Shippee Road at Little Dry Creek	84.	Larkin Road at Main Drainage Canal
41.	Richvale Highway at Irrigation Canal	85.	Riceton Highway at Lateral A
42.	West Hamilton Road at Biggs Extension Canal	86.	Wilson Landing Road at Rock Creek
43.	West Hamilton Road at Irrigation Ditch Branch of SBC	87.	Pennington Road at Ditch (0.17 mile north of County Line)
44.	Mead Avenue at Branch of Sutter Butte Canal		

- **Los Verjeles Road Reconstruction**. Reconstruction of Los Verjeles Road from La Porte Road to the Yuba County line (approximately 2.5 miles in length). The project

includes widening the shoulder, structural rehabilitation of roadway (construction of a new structural section involving complete removal of existing roadway including base material and reconstructing new roadway in its place), and minor roadway alignment adjustments.

- **La Porte Road Reconstruction**. Reconstruction of La Porte Road from the Honcut UPA boundary to the Yuba County line (approximately 14.5 miles in length). The project includes widening the shoulder, structural rehabilitation of roadway (construction of a new structural section involving complete removal of existing roadway including base material and reconstructing new roadway in its place), and minor roadway alignment adjustments.
- **Eaton Road Extension**. Construction of a new four-lane road that would extend Eaton Road westerly to connect to SR 32 (approximately 1.5 miles in length). Total project width is assumed to be 150 feet.

2.3.1.3 Agricultural Services Permanent Development Activities outside UPAs

Covered agricultural services permanent development projects outside the UPAs include construction of agriculture-related service facilities, including associated staging areas, that are complementary to existing agricultural uses, including industrial uses such as processing facilities, commercial uses such as agricultural equipment sales, and technologies that use agricultural byproducts. "Agricultural services" is a land use designation identified in the Butte County General Plan that occurs only on single, isolated parcels that are primarily surrounded by agricultural land. Because this land use designation was only applied to individual isolated parcels, they were deemed too small and isolated to be designated as UPAs. Alternatively, they are being included as a covered activity outside of the UPAs, and represent the only land development activity that is covered under the BRCP outside of the 15 UPAs.

Figure 2–3 depicts locations of individual parcels within the BRCP Plan Area that were designated by the Butte County General Plan as agricultural services and are covered activities under the BRCP. The development footprint for all agricultural services covered activities is assumed to be the entire parcel. With the exception of culverts placed in small intermittent drainages along roads within the footprint of agricultural services facilities, these covered activity projects are not expected to include in-channel development activities.

2.3.2 Recurring Maintenance Activities outside UPAs

This section describes recurring maintenance activities involving existing and new facilities that are covered activities outside of the 15 UPAs. The description of activities provided in this section is not exhaustive but provides an overview of the types of recurring maintenance activities that are expected to occur and be covered under the BRCP. Covered recurring maintenance activities are intended to be as inclusive as possible to accommodate all

ground-disturbing maintenance activities that are likely to occur outside of the UPAs over the term of the BRCP.

2.3.2.1 Wastewater Management Facility Recurring Maintenance Activities outside UPAs

Covered wastewater management facility recurring maintenance activities include the maintenance of force mains, effluent lines, trunk/sewer lines, discharge lines, reclamation lines and mainlines and all related appurtenant infrastructure. This activity includes accessing, surveying, excavating, trenching, removing or storing of overburden materials, and replacement of force mains, effluent lines, trunk/sewer lines, discharge lines, reclamation lines, and mainlines and all related appurtenant infrastructure.

The covered activities include maintenance of approximately 4 miles of existing sewer force mainline east of Gridley and maintenance on 3 additional miles of a new mainline that will be built over the term of the BRCP on a new alignment outside the UPAs associated with the Gridley WWTP (see Figure 2–3 and Section 2.3.1.1, *Wastewater Management Facilities Permanent Development Activities outside UPAs* for the location and description of the new Gridley WWTP mainline).

The covered activities also include maintenance on all of the existing wastewater treatment line associated with the Chico WWTP that are located outside the UPAs (up to 7 miles in length), and maintenance on an additional 5 miles of new line that will be constructed over the term of the BRCP on a new alignment (see Figure 2–3 and Section 2.3.1.1 for the location and description of the new Chico WWTP wastewater treatment line). Maintenance of Gridley WWTP and Chico WWTP wastewater treatment lines is assumed to occur within a 100-foot ROW extending 50 feet on each side of the line centerlines.

Recurring maintenance activities associated with wastewater management facilities are not expected to include in-water maintenance activities.

2.3.2.2 Transportation Facility Recurring Maintenance Activities outside UPAs

There are approximately 311 miles of roadways outside UPAs.[5] Covered transportation facility recurring maintenance activities include rehabilitation (e.g., repainting and washing of facilities, replacement of facility fixtures, trash removal) and minor improvement (i.e., within the footprint of existing roadways and facilities) of existing roadways (e.g., patching, striping, guardrail and shoulder repair, grading and mowing of existing roadways and shoulders); bike paths (e.g., vegetation/landscape maintenance and maintenance of paved/unpaved surfaces); roadside parking and viewing facilities; transit facilities (e.g., transit stops, shelters, signs, transit centers, transit maintenance yards, transit vehicle refueling stations); rail and light rail facilities; airports;

[5] As calculated from the BRCP GIS roadway data layer.

charging stations for electric vehicles; and park-and-ride lots. Covered activities also include maintenance of ancillary drainage systems, gutters, and ditches, and erosion prevention.

Covered bridge and drainage structure recurring maintenance activities include maintenance of bridge structures and associated drainage, including bridge structure protection, bridge structure repair, repair of culverts passing under roads, bridge guardrail repair and replacement, and bridge deck sealing, patching, and painting. Covered in-water recurring maintenance activities include the in-stream operation of equipment to repair and prevent scour of the streambed beneath and adjacent to bridge structures; debris and woody debris removal from bridge piers and pilings; vegetation management beneath and adjacent to bridge structures; and erosion/sediment control for bridges and drainage infrastructure beneath and adjacent to bridge structures.

2.3.2.3 Flood Control and Stormwater Management Recurring Maintenance Activities outside UPAs

Covered flood control and stormwater management recurring maintenance activities outside the UPAs are limited to the ongoing and existing control of vegetation on the top and outer side of levees (i.e., does not include in-stream maintenance or repair of levees) on the Sycamore-Mud Creek system. Maintenance includes actions such as mowing, trimming and removing vegetation from levee surfaces. Recurring maintenance activities associated with flood control and stormwater management are not expected to include in-water maintenance activities.

All other flood control levee and canal maintenance activities within the Plan Area outside of UPAs are conducted by DWR; DWR is not a permit applicant and its activities are not covered under the BRCP.

2.3.2.4 Vegetation Management Recurring Maintenance Activities outside UPAs

Covered vegetation management recurring maintenance activities include vegetation clearing for fire control/fuel breaks, and the trimming and removal of trees, if necessary, to maintain the existing and new permanent development and the infrastructure and other facilities described above that are outside UPA's and that are not associated with recurring transportation facilities (see Section 2.3.2.2, *Transportation Facility Recurring Maintenance Activities outside UPAs*) and flood control and stormwater management maintenance activities (see Section 2.3.2.3, *Flood Control and Stormwater Management Recurring Maintenance Activities outside UPAs*). Recurring maintenance activities associated with vegetation management are not expected to include in-water maintenance activities.

2.4 COVERED ACTIVITIES WITHIN WATER AND IRRIGATION DISTRICTS

This section describes permanent development and recurring maintenance covered activities within WCWD, Biggs-West Gridley Water District, Butte Water District, and Richvale Irrigation District. Figure 2–4, *Irrigation and Water District Boundaries* (see separate file), depicts the

boundaries of each of these districts. While some of the maintenance activities described below focus on specific WCWD covered activities, all of these activities are covered under the BRCP for WCWD, Biggs–West Gridley Water District, Butte Water District, and Richvale Irrigation District.

2.4.1 Permanent Development Projects within Water and Irrigation Districts

Covered permanent development projects within water and irrigation districts include rerouting of up to 12 miles of existing canals averaging 55 feet in width that are operated by the water and irrigation districts over the term of the BRCP. Establishment of staging areas associated with rerouting of canals is also a covered activity. Each of the four districts uses open canals comprised of compact earth to convey water throughout the rice fields within their district. Canals need to be periodically rerouted within the districts to better meet water delivery objectives.

Some portions of the existing decommissioned canals may be reclaimed to a natural state by removing any concrete and other non-natural materials, and restored to better functioning habitat. Other decommissioned canals may be converted to agricultural uses, planted with trees such as cottonwoods, continued to be used as canals, or used to store riprap or other materials.

2.4.2 Recurring Maintenance Activities within Water and Irrigation Districts

Covered recurring maintenance activities within water and irrigation districts include the replacement of water conveyance structures (weirs, siphons, pipes and water elevation control check structures); replacement of pipes extending from canals and ditches to irrigated fields; replacement of laterals; mowing and trimming of vegetation to maintain service road widths throughout the districts; and removal of vegetation and debris from canals, ditches, and laterals. Most recurring maintenance activities are expected to be completed in the winter after the water conveyance structures have been dewatered. Smaller projects will generally be completed every year and larger projects less frequently (i.e., every 4 to 5 years).

Smaller covered recurring maintenance activities primarily include replacement of water delivery structures such as underground pipe and concrete supports. These projects typically occur in already disturbed areas (i.e., none habitat or low-functioning habitat for covered and other native species) and typically include a disturbance area, including the construction zone, of approximately 20 feet by 30 feet per project. Approximately 15 of these smaller projects may be completed per year, per district (up to 60 total small projects annually for all four districts) and are typically done in September through December and late January to early April when the water conveyance structures are dewatered.

Larger projects include replacing larger structures (e.g., large weirs). These projects would typically include a disturbance area, including the construction zone, of approximately 200 feet by 200 feet, all within already disturbed areas (e.g., within the canal itself or on the banks). Typically one large project may be completed every 4 to 5 years per district (i.e., four total large projects every 4 to 5 years for all four districts).

The districts routinely mow and trim vegetation along district service roads to maintain accessibility and operate machinery (e.g., excavators, backhoes, dozers) used to maintain and repair the shape, slope and integrity of canals and canal beds. The clay material used in the canals sloughs off the sides of the canals when water is not being transported through them, which requires periodic resloping of the canals to maintain conveyance capacity. Resloping and repair of canals is typically conducted during fall and mid-January through April, when the canals are not in service.

Machinery (e.g., excavators, backhoes) is used to remove aquatic weeds from canals during the summer months when the water conveyance system is actively transporting water to prevent canals from being choked with vegetation, reducing the capacity of the water conveyance system. The machinery typically does not enter the water conveyance system itself, but is positioned on an adjacent canal service road and reaches into the conveyance system to remove unwanted vegetation with the excavator or backhoe arms.

Recurring maintenance activities to remove aquatic vegetation from canals generally maintain the existing conditions and habitat does not typically reestablish between maintenance events. A portion of the canals is maintained annually while others are maintained less frequently. Typically each year, approximately 5 miles of WCWD canals are repaired and resloped with approximately 50 percent of these being the same canals maintained every year. Every five years, approximately 25 miles of WCWD canals are maintained, and every 10 years approximately 49 miles are maintained. Within the permit term, maintenance activities will have been conducted at least once for all approximately 49 miles of WCWD canals and ditches likely to be maintained. Approximately 1 mile of canal and ditches in total would be expected to be annually maintained among the Biggs-West Gridley Water District, Butte Water District, and Richvale Irrigation District inside the UPAs; and approximately 14 miles in total of canals and ditches would be expected to be annually maintained outside the UPAs among the four participating districts.

2.5 COVERED ACTIVITIES WITHIN CONSERVATION LANDS

This section describes the types of activities that will occur within BRCP conservation lands that are covered under the BRCP. Implementation of some BRCP conservation actions could result in localized adverse effects on covered species and natural communities to provide an overall conservation benefit for the covered species and natural communities. Most of these activities will take place within the system of BRCP conservation lands that will be assembled as described in Chapter 5, *Conservation Strategy*.

Some conservation activities that are also covered under the BRCP may also occur outside of the BRCP conservation lands system on public or private lands. The following describes the types of covered conservation activities that are associated with implementing the conservation actions described in Chapter 5, *Conservation Strategy*.

1. **Habitat management and enhancement**. Habitat management and enhancement-related activities include actions necessary to maintain and enhance the functions of conservation lands as habitat for covered and other native species. Examples of habitat management and enhancement actions include vegetation management and control of nonnative species using a variety of tools, including livestock grazing, controlled fire, manual labor, water management, and mechanical vegetation removal.
2. **Habitat restoration**. Habitat restoration–related activities include actions necessary to restore natural communities and covered species habitat. Examples of habitat restoration actions include ground surface grading and recontouring, vegetation removal, installation of plantings, installation and operation of irrigation systems, and other activities necessary to establish restored physical and biological conditions that support native species habitats. Also included is demolition or removal of structures, roads, or manmade ponds to increase public safety or to restore habitat.

   All habitat restoration and enhancement activities conducted within BRCP conservation lands that are consistent with the requirements of the BRCP are covered activities.
3. **Habitat and species surveys and monitoring**. Habitat and species surveys and monitoring activities include conducting surveys to determine the status of covered species, vegetation communities, and other resources within conservation lands. Activities will include collection of plant material, and observation, trapping, and handling of wildlife. Additionally, surveys for covered species will also be conducted on private land being considered for acquisition by the BRCP as part of the conservation lands system. All survey activities consistent with the BRCP are covered activities under the BRCP.
4. **Directed studies**. Includes implementation of studies to gather information necessary to improve the effectiveness of the BRCP implementation in achieving the biological goals and objectives (Section 5.3, *Biological Goals and Objectives*). Implementation of directed studies may include the establishment of transects, capture of wildlife, collection of plants, and other activities, depending on the nature of the study. All such studies are covered activities under the BRCP.

   Research conducted by biologists on BRCP conservation lands in support of BRCP implementation is a covered activity provided the research projects have a negligible effect on populations of covered species. The researchers must be under legal contract with at least one of the Permittees[6] or hold an ESA section 10(a)(1)(A) recovery permit to cover incidental take that may occur as a result of research conducted on conservation

[6] Authorization for take of species would be provided to the contractor through the Permittee's ESA section 10(a)(1)(B) permit.

lands. Research on BRCP conservation lands unrelated to the BRCP is not a covered activity. Such researchers would be granted access on a case-by-case basis.

5. **General maintenance of conservation lands**. General maintenance–related activities on conservation lands include maintenance of access roads, fences, and fire/fuel breaks; travel through the preserve by foot, all-terrain vehicle, truck, or off-road vehicle; and construction and maintenance of facilities needed to manage conservation lands, including but not limited to reserve field offices, maintenance sheds, carports, restrooms, service roads, bridges, fences, gates, wells, stock tanks, and stock ponds. All such structures will be constructed to minimize impacts on covered species and vegetation communities. Facilities existing at the time of land acquisition will be used whenever feasible. Wells will be installed only as necessary for natural resource management purposes and when no alternative water supplies are available. Wells will be sited so that they do not affect seeps or springs and will not degrade surrounding habitat.
6. **Avoidance and minimization measures**. Avoidance and minimization measures include actions to avoid and minimize adverse effects of conservation activities on natural communities and covered species. Examples of avoidance and minimization measures that could affect covered species and would be covered under the BRCP include preconstruction surveys; implementation of best management practices; and capturing and translocating covered species from construction sites, which could require handling of individuals and temporarily render habitat unavailable to covered species.
7. **Species population enhancement**. Species population enhancement–related actions include seeding of native species; planting of, or introduction of, additional individuals of a specified species population; replenishment of spawning gravels; modification of diversions to minimize fish entrainment; and targeted control of introduced predators (e.g., feral cats and dogs, pigs, nonnative fish, bullfrogs) to benefit a specific covered species' population. Also included is the reintroduction of certain vernal pool covered species to extant vernal pools on soil types upon which surveys indicate that the species once existed.
8. **Public education and access control facilities**. Public education and assess control facility–related actions include the construction of trails, access gates, access barriers, kiosks, signs, and other minor structures that may be required to facilitate conservation-related public education and to control and direct access.
9. **In-water conservation actions**. All of the covered activities described in items 1 through 7 above could require in-water operation of equipment or other activities that could result in the disturbance of aquatic environments. Examples of in-water activities include removal of vegetation from water conveyance ditches and ponds to maintain capacity; re-sculpting of channel banks to restore and enhance aquatic and riparian habitat conditions; placement of spawning gravels and modification of diversions; in-stream monitoring and research activities; maintenance of stream crossings; control of nonnative aquatic species, and capture and translocation of covered amphibian species.

In addition to the conservation-related activities described above, ongoing land uses and activities (e.g., agricultural and grazing practices, infrastructure maintenance activities, use of public roads) as approved in BRCP Conservation Lands Management Plans (see conservation measure CM6, Enhance and Manage Protected Natural Communities in Section 5.4.2, *Natural Community-Level Conservation Measures*) and BRCP conservation easements are covered activities. These allowable uses are described in Section 8.8, *Allowable Activities in BRCP Conservation Lands*.

2.6 EMERGENCY ACTIVITIES ASSOCIATED WITH CHANGED CIRCUMSTANCES

An emergency is a situation involving disasters, casualties, national defense, or security emergencies and includes response activities that must be taken to prevent imminent loss of human life or property (USFWS and NMFS 1998). USFWS, NMFS, and CDFW will not obstruct an emergency response decision made by the Permittees in which human life is at stake. With the exception of changed circumstances addressed in Chapter 8, *Plan Implementation*, impacts on covered species associated with emergencies and responses to emergencies are not covered under the BRCP and its associated permits.

2.7 ACTIVITIES NOT COVERED BY THE PLAN

The BRCP covers a broad range of activities that will be implemented within the Plan Area over the term of the BRCP. There are several types of activities, however, that are not covered under the BRCP because either the activities are not under the jurisdiction of the Permittees or the fish and wildlife agencies, or information about an activity is not sufficiently understood at the time of BRCP development to determine its effects on covered biological resources. Activities not covered under the BRCP that could occur in the Plan Area and may be authorized under the ESA and CESA through separate processes include the following:

- Construction or maintenance of flood control facilities (including the levees on the Sacramento River) under the control or responsibility of the U.S. Army Corps of Engineers (USACE).
- Construction or maintenance of flood control facilities (including the levees on the Feather River) under the control or responsibility of DWR.
- Operations of water control facilities for water conveyance or flood management (including dams, diversions, reservoirs, and bays) under the control or responsibility of the USACE (including facilities outside the Plan Area that affect flows on the Sacramento River in the Plan Area).
- Operations of water control facilities for water conveyance or flood management (including dams, diversions, reservoirs, and bays) under the control or responsibility of DWR (including Oroville Dam, Lake Oroville, Thermalito Afterbay, and Thermalito Forebay).

- Operation of existing water diversion facilities on stream courses, including the Sacramento and Feather Rivers.
- In-channel construction and operation of new water diversion facilities.
- Conveyance or delivery of water through existing or new facilities. However, the maintenance of some conveyance channels (e.g., by BRCP permitted irrigation and water districts) are covered under the BRCP.
- Emergency activities not defined as Changed Circumstances in Chapter 8, *Plan Implementation.*[7]
- Application of pesticides and herbicides.

[7] During the BRCP permit term, the Permittees and those under their jurisdiction may need to respond to emergencies, as defined in Section 2.6, *Emergency Activities Associated with Changed Circumstances* above. The fish and wildlife agencies will not obstruct any emergency response decisions made by the Permittees. Existing ESA consultation regulations will apply to emergency activities (50 *Code of Federal Regulations* 402.05).

CHAPTER 3. ECOLOGICAL BASELINE CONDITIONS

3.1 INTRODUCTION

This chapter describes the current environmental conditions present in the Butte Regional Conservation Plan (BRCP) Plan Area and other information specific to meeting the requirements of the federal Endangered Species Act (ESA) and Natural Community Conservation Planning Act (NCCPA). The ecological information presented in this chapter will be used to identify the potential impacts of covered activities on proposed covered species and natural communities and to develop measures to address impacts on and conservation of covered species and natural communities. Section 3.2, *Geographic Scope*, describes the geographic extent of the BRCP Plan Area; Section 3.3, *Environment*, describes the general physical environmental conditions of the Plan Area; Section 3.4, *Land Cover Type Mapping*, defines the land cover types present in the Plan Area and describes how they were delineated; Section 3.5, *Covered Natural Communities*, describes the ecological attributes and functions of the covered natural communities; Section 3.6, *Proposed Covered Species* and Appendix A, *Covered Species Accounts*, describe the covered species selection process and the status of the proposed covered species, respectively; Section 3.7, *Local Concern Species* and Section 3.8, *Migratory Deer Herds in the Plan Area* focus on additional species of special concern within the Plan Area; and Section 3.9, *Extent of Potential Jurisdictional Wetlands and Other Waters in the Plan Area* describes the extent of wetland and aquatic land cover types that may be regulated under Section 404 of the Clean Water Act (CWA).

Figures depicting physical and biological attributes of the Plan Area include the boundaries of Conservation Acquisitions Zones (CAZs). The design and purpose of the CAZs are described in Section 5.2.3.3, *Landscape Context—Conservation Acquisition Zones*. The CAZs are shown for reference because they were used to develop the Conservation Strategy described in Chapter 5 and to conduct the impact analysis described in Chapter 4, *Impact Assessment and Estimated Level of Take*.

3.2 GEOGRAPHIC SCOPE

The Plan Area is shown in Figure 3–1, *Butte Regional Conservation Plan Conservation Acquisition Zones (CAZ*) (see separate file) and encompasses 564,203 acres (228,352 hectares) of land.[1] The Plan Area includes the western lowlands and foothills of Butte County bounded on the west by the County's boundaries with Tehama, Glenn, and Colusa counties; bounded on the south by the boundaries with Sutter and Yuba counties; bounded on the north by the boundary with Tehama County; and bounded on the east by the upper extent of landscape dominated by oak woodland natural communities. The eastern oak woodland boundary is defined by a line

[1] Note that this value is 16 acres less than the total Plan Area acreage shown in Tables 3-5 and 5-3. This 0.005 percent difference is attributed to the difference between the total acreage present within the Plan Area boundary and calculating the sum acreage of several thousand land cover type polygons that comprise the Plan Area as shown in Tables 3-5 and 5-3.

below which land cover types dominated by oak trees comprise more than one-half of the land cover present (referred to hereafter as the oak zone) plus a small portion of the City of Chico that extends above the oak zone. The upper elevation range of the oak zone varies from about 800 to 1,500 feet above mean sea level.

Typically oak tree–dominated land cover types are replaced with either chaparral or conifer-dominated land cover types at higher elevations. Although the Plan Area includes portions of the Sacramento River within Butte County, the BRCP does not address activities that could affect listed fish species in the Sacramento River; such activities are addressed under other regional conservation planning efforts for the Sacramento River (e.g., the Anadromous Fish Restoration Program). The Sacramento River floodplain within Butte County is included in the BRCP for implementing conservation measures for covered species and natural communities.

The Plan Area was designed to encompass the area within which covered activities would be implemented and to provide sufficient land and resources to implement measures to provide for the conservation of covered species and habitats impacted by the proposed covered activities.

3.3 PHYSICAL ENVIRONMENT

3.3.1 Data Sources

Data sources used to describe the physical environment of the Plan Area include the following:

- Geologic Map of Chico Quadrangle (California Department of Conservation 1992);
- Geology Map of California (Saucedo et al. 2000);
- Late Cenozoic Tectonism of the Sacramento Valley, California (Harwood and Helley 1987);
- The Red Bluff Pediment – A Datum Plane for Locating Quaternary Structures in the Sacramento Valley, California (Helley and Jaworowski 1985);
- Geologic Map of the Late Cenozoic Deposits of the Sacramento Valley and Northern Sierran Foothills, California (Helley and Harwood 1985);
- Soil Survey of Butte Area, California, Parts of Butte and Plumas Counties (Natural Resources Conservation Service [NRCS] 2006);
- Big Chico Creek Existing Conditions Report (Big Chico Creek Watershed Alliance 1999);
- Butte Creek Existing Conditions Report (California State University [CSU] Chico 1998);
- Department of Water Resources Lake Oroville website; and
- Various other technical reports and documents.

3.3.2 Topography

Elevation within the Plan Area generally ranges from about 100 feet above mean sea level along the west boundary of the Plan Area to approximately 1,500 feet associated with the foothills of the Sierra Nevada and Cascade Mountains to the east (see Figure 3–2, *Topography of the Plan Area* [separate file]).

The lowest elevation in the Plan Area is 46 feet and the highest elevation is 2,073 feet. Topography of the Plan Area is generally defined by discrete geological features: Central Valley, alluvial fans and terraces, and foothills of the northern Sierra Nevada and southern Cascade Mountains.

The western part of the Plan Area is naturally flat valley basin topography with the Sacramento and Feather rivers (and their tributaries) cutting channels across the Plan Area. Most of the valley basin that occurs within the Plan Area has been artificially leveled to accommodate agricultural production. Agriculture-related infrastructure maintains irrigation and natural drainage flowing across the valley for agricultural use. Most of the valley in this area gently slopes to the southwest.

The elevation within the Plan Area increases to the east, and the slope of the landscape more noticeably increases with a western facing aspect. The foothills of both the southern Cascade and the Sierra Nevada ranges are gradually undulating features ranging in elevation from the valley basin at approximately 100 feet to 1,500 feet above mean sea level within the Plan Area. Like the mountain ranges, the foothills run north-south and can be most easily discerned from northeast of the City of Chico to south of Lake Oroville. The sole exception to this pattern is the east-west distribution of the Lovejoy basalt that formed Table Mountain. Major streams have cut deep valleys with steep sides through the foothill terrain.

A description of landforms and geology within the Plan Area is included as Section 3.3.5, *Geology and Soils*.

3.3.3 Climate

Climate within the Plan Area is temperate, annually averaging about 46.5 degrees Fahrenheit (°F) during winter and 75.4 °F during summer at elevations below 1,500 feet in Butte County. Mean annual air temperatures range from about 60 °F to 62 °F (see Figure 3–3, *Mean Annual Air Temperature (Fahrenheit)* [separate file]). The coolest months of the year are January and December, with minimum low temperatures of about 35 °F at Chico and 37 °F at Oroville. The warmest months of the year are July and August, with average high temperatures ranging from about 93 °F at Chico to 95 °F at Oroville. The average annual number of frost-free days in the Plan Area ranges from about 240 to 260 days (see Figure 3–4, *Frost-Free Days (above 32 degrees F)* [separate file]) (NRCS 2006).

Precipitation is almost exclusively from rainfall and annually averages about 26 inches at Chico and 30 inches at Oroville. Figure 3–5, *Mean Annual Precipitation in Inches (Based on the 30-year period from1951-1980)* (see separate file) shows average annual distribution of precipitation for the Plan Area and Butte County. About 90 percent of the annual precipitation is

received from October through April, with the greatest average amount of monthly precipitation occurring in January (NRCS 2006).

3.3.4 Watersheds

The Plan Area lies within the Sacramento River Basin. Plan Area watersheds that are tributary to the Sacramento River include those of Big Chico Creek, Butte Creek, Dry Creek, Honcut Creek, the Feather River, and the Sutter Bypass. Watersheds of the Plan Area are defined in the USGS National Hydrography Dataset (2012). The classifications of watersheds are hierarchical and are shown at the hydrologic area level for the Plan Area in Figure 3–6, *Hydrologic Units of the Plan Area* (see separate file). The Plan Area includes portions of 11 watersheds, the largest of which is the Butte Basin watershed that drains 165,636 acres of the Plan Area. Table 3–1, *Watersheds Present in the Plan Area (10-digit HUC)* summarizes the drainage area of each watershed within the Plan Area.

Table 3-1. Watersheds Present in the Plan Area (10-digit HUC)

Watershed	Acres
Angel Slough	39,153
Big Chico Creek	8,842
Gilsizer Slough-Snake River	21,819
Honcut Creek	88,590
Jewett Creek-Sacramento River	8,017
Lower Butte Creek	165,636
Lower Feather River	210
Lower Middle Fork Feather River	1,149
Lower North Ford Feather River	2,124
Middle Butte Creek	89,965
Mud Creek	52,602
Pine Creek	30,824
Sacramento River	6,242
Upper Feather River	47,171
West Branch Feather River	1,860
Total	**564,204**

Source: USGS National Hydrography Dataset (NHD) (2012).

3.3.5 Geology and Soils

3.3.5.1 Geology and Landforms of the Plan Area

The Plan Area occurs at the junction of several distinct landforms and geological features, including a large section of wide and relatively level valley alluvium, which is linked to the eastern Cascade and Sierra Nevada mountain ranges by foothills of volcanic lahars and volcanic mudflows. The Plan Area includes portions of the Great Valley, Cascade Range, and the Sierra Nevada geomorphic provinces.

The western half of the Plan Area, dominated by the floodplains, basins, and fans of the Sacramento Valley, is characterized by Holocene and Quaternary sedimentary rocks and alluvium (Helley and Harwood 1985, California Department of Mines and Geology [CDMG]

2000[2]). The generally flat sections encompassing the Valley extend east-west approximately 10 miles and north-south approximately 50 miles within the Plan Area. Most areas within the Valley (outside of the active or recently active river channels) have been leveled for agricultural production because of the excellent soil properties on the floodplains (NRCS 2006).

East of the Valley, the northeastern section of the Plan Area is dominated by foothills associated with the southern Cascade Range (northeast and east of Chico). The foothills are characterized by Tertiary volcanic mudflows (Tuscan Formation) with small inclusions of Cretaceous marine sedimentary rocks near the eastern boundary. The foothills are marked by a series of dissected ridges of breccias, sandstones, and conglomerates cut by numerous creeks, including Pine, Rock, Mud, Sycamore, Big Chico, Little Chico, Butte, Little Butte, Little Dry, Clear, and Dry Creeks (NRCS 2006). The foothills north of the Feather River are geologically distinct from the southern foothills in that they originated from volcanic- and pyroclastic-derived mudflows associated with the Cascade Range. They also have been abruptly elevated above the valley plain by the Chico monocline with the effect diminishing to the south (Harwood and Helley 1987).

The southeastern part of the Plan Area is associated with the Sierra Nevada foothills. The foothills of the Sierra Nevada are also dominated by large sections of igneous and metamorphic rocks, volcanic mud flow features, and are generally older in origin (Paleozoic–Mesozoic) than the Cascade foothills to the north. Continuing eastward, the higher foothills are present as large complexes of Mesozoic granitic basement rock.

The distinctive geology of this area has produced a series of physiographic features, including most notably foothills covered with large stands of mature oak woodland slowly eroding and draining west into expanses of low relief; slow-draining grasslands at the base of the eastern foothills; and wide, flat valley floor lands fed by high precipitation rates in the Cascade and Sierra Nevada Mountain Ranges. The Sacramento and Feather River systems also define the lowland formation with wide areas of riparian forest, river bar, and open water features meandering north to south.

3.3.5.2 Geologic Formations and Natural Community Relationships

Major geologic formations and features in the Plan Area include landforms of alluvial, volcanic, and plutonic origin (Figure 3–7, *Geology of the Plan Area* [see separate file]). This section provides summary descriptions of the major geologic landforms in the Plan Area and the present and historical dominant vegetation associated with each landform.

Modesto Formation. The Modesto Formation is a late Pleistocene alluvial terrace generally bordering and probably deposited by streams still running today (Helley and Harwood 1985, Blake et al. 1999). This youngest alluvial terrace is derived from a heterogeneous mix of alluvium derived from metamorphic, sedimentary, and volcanic rock 10–16 feet thick (Blake et al. 1999). Modesto Formation is estimated to have formed 10–40 thousand years ago (kya)

[2] CDMG, California Department of Mining and Geology, is now called California Geological Survey.

(California Department of Conservation 1992). Modesto Formation historically supported grasslands, grasslands with vernal pools, and valley oak savanna. Vernal pools are classified as Northern Hardpan Vernal Pools. Vernal pools on Modesto Formation are typically at lower density but are, on average, larger than vernal pools on other alluvial terraces (Platenkamp 1998). Present vegetation is dominated by orchards, mostly of almond and prune trees, to the west and southwest of Chico.

Riverbank Formation. Riverbank Formation is a mid-Pleistocene alluvial terrace. It is similar to Modesto Formation, but is older and at a higher topographic position (Helley and Harwood 1985, Blake et al. 1999). This young terrace is estimated to have formed between 100 and 300 kya. Riverbank Formation supports grasslands with vernal pool and swale terrain (Smith and Verrill 1998). Vernal pool densities on Riverbank Formation tend to be higher and pool sizes larger than on other geologic formations with vernal pools (Platenkamp 1998). Vernal pools on Riverbank Formation are classified as Northern Hardpan Vernal Pools and are often associated with Eastbiggs and Kimball soil series (NRCS 2006).

Red Bluff Pediment. Red Bluff pediment is an early Pleistocene alluvial terrace of coarse red gravel derived from Tuscan Formation volcanic material of the Cascades (Helley and Harwood 1985, Helley and Jaworowski 1985, California Department of Conservation 1992, Blake et al. 1999). Red Bluff is older and at a higher geomorphic position than Riverbank Formation. This high terrace supports mound-swale relief with a cemented duripan (NRCS 2006). Red Bluff Formation supports grassland with vernal pools classified as Northern Hardpan Vernal Pools (Smith and Verrill 1998). Typical soils include Redsluff, Redtough (mounds), and Redswale (swales) series (NRCS 2006).

Turlock Lake Formation. Turlock Lake Formation is an early Pleistocene alluvial fan derived primarily from plutonic rocks of the Sierra Nevada that evidences significant erosional relief and only exists within the Plan Area south of the Feather River (Helley and Harwood 1985). It overlies the Mehrten Formation and underlies the Red Bluff pediment. This terrace supports grassland with vernal pools classified as Northern Hardpan Vernal Pools.

Laguna Formation. The Laguna Formation is a mid-Pliocene alluvial terrace of interbedded gravel, sand, and silt derived from the Sierran metamorphic rocks (Helley and Harwood 1985, California Department of Conservation 1992). This formation is estimated to have formed between 1.6 and 2.0 million years ago. This terrace supports grassland with vernal pools classified as Northern Hardpan Vernal Pools typically on Oroville and Vistarobles soil series (Smith and Verrill 1998, NRCS 2006). Vernal pools on Laguna Formation typically are smaller and occur at moderate densities relative to vernal pools on other formations (Platenkamp 1998).

Tuscan Formation. The Tuscan Formation is a mid-Pliocene geologic formation composed of lahars (volcanic mudflows), volcanic conglomerate, volcanic sandstone and siltstone, and pumiceous tuffs resulting from volcanic activity in the Cascade Mountains (Helley and Harwood 1985, California Department of Conservation 1992). The Tuscan formation supports grassland

with vernal pools classified as Northern Hardpan Vernal Pools often on Doemill and Jokerst soil series (NRCS 2006). Vernal pools on Tuscan Formation are typically small, rocky, and shallow (Jokerst 1990). Above its contact point where it is overlapped by the Redbluff Pediment, portions of the Tuscan Formation support Blue Oak Woodland and Savanna and Grassland without vernal pools.

Lovejoy Basalt. The Lovejoy Basalt is an early Miocene feature created by basaltic lava flows running westward in ancient river beds. The Lovejoy Balsalt forms Table Mountain in the central eastside of the Plan Area and the Cohasset Ridge near the City of Chico (Harwood and Helley 1987). Lovejoy Basalt is mostly grassland with vernal pools and swales, classified as Northern Basalt Flow Vernal Pools, with some oak woodland.

Basin. The Basin feature dominates the southwestern portion of the Plan Area. The Basin is composed of recent (Holocene) alluvium of fine-grained deposits of silt and clay and organic marsh deposits on broad flats between modern water courses (California Department of Conservation 1992, Smith and Verrill 1998). The Basin is associated with overflow areas of the Sacramento and Feather Rivers and distributaries of smaller streams. Historically, prior to construction of levees and dams, the basin would flood annually and supported tule and cattail marshes. Today, rice farming dominates the basin. Managed wetlands, including federal and state wildlife refuges and private duck clubs, have been created in the basin and support biological communities similar to the historical marshes with controlled hydrology.

Sierran Foothill Metamorphics and Volcanics. Sierran Foothill Metamorphics and Volcanics is a group of geologic features originating in the Jurassic, Miocene, and Eocene in the southeast portion of the Plan Area. These geologic formations support oak woodland, grassland, and chaparral.

Cascade Foothill Volcanics. Cascade Foothill Volcanics is a group of geologic features originating in the mid-Pliocene in the northeast portion of the Plan Area. These geologic formations support oak woodland and savanna.

Natural Levees and Channel Deposits. Natural Levees and Channel Deposits are associated with Sacramento and Feather rivers. These recent (Holocene) alluvial deposits formed within the past 10,000 years in the active stream channels, floodplains, and natural levees of these major rivers. Historically, the natural vegetation on these deposits was a broad band of riparian forests (cottonwood-willow and valley oak riparian forests).

Today, most of this landform is cultivated as orchards (almond and prune trees) along the Sacramento and lower Feather Rivers. This landform has been heavily disturbed by dredger mining along the Feather River west of Oroville where the landscape is now dominated by mine tailings. Remnants of riparian forest and scrub remain along the Sacramento and Feather Rivers.

Table 3–2, *General Soil Units* and Figure 3–8, *Soils of the Plan Area* (see separate file) identify soils present in the Plan Area (NRCS 2006). To simplify the presentation, soils have been

broken down into General Soil Units within the Plan Area, as influenced by the physical and biological environment in which they were formed. Local geology, source material, topography, aspect, climate, and time have the greatest influence on soil formation.

Table 3-2. General Soil Units

General Soil Type (Soil Complexes)	Plan Area Setting	Soil Properties	Area (acres)
Sacramento Valley Flood Plain Thermic 1. Parrott-Gianella-Farwell 2. Xerothents, Tailings-Gianella	Landscape: Sacramento Valley Slope range: 0 to 50 percent Typical vegetation: Walnut and almond orchards, valley oak, Fremont cottonwood, coyotebrush, sycamore, and willow.	Very deep, nearly level to steep, moderately well-drained to that formed in Sacramento River alluvium to somewhat excessively drained soils that formed in Feather River and Butte Creek alluvium derived from mixed rock sources; on flood plains and stream terraces; fine to coarse loamy and sandy.	53,351
Sacramento Valley Flood Basins Thermic 3. Lofgren-Blavo 4. Esquon-Neerdobe 5. Bosquejo-Galt 6. Gridley Taxadjunct-Subaco Taxadjunct	Landscape: Sacramento Valley Slope range: 0 to 2 percent Typical vegetation: Rice, carex, spikerush, swampgrass, willow, and cottonwood; Italian ryegrass, curly dock, valley oak in areas adjacent to Butte Creek, safflower; wheat; alfalfa; sugar beet, prune, and almond orchards; and annual grasses and forbs.	Moderately deep and deep, nearly level, somewhat poorly drained soils that formed in alluvium derived from mixed rock; on low terraces and in flood basins; very fine to fine.	162,692
Sacramento Valley Alluvium Fan Thermic 7. Olashes 8. Conejo-Almendra-Vina 9. Haploxerolls-Durixerolls	Landscape: Sacramento Valley Slope range: 0 to 2 percent Typical vegetation: Almond, walnut, and prune orchards, rice, and beans, valley oak, and annual grasses and forbs, wheat, alfalfa, and safflower.	Deep, moderately deep, and very deep; nearly level; somewhat poorly drained, moderately well-drained and well-drained soils that formed in alluvium derived from volcanic and mixed rock sources; on alluvial fans; fine-loamy and course-loamy particle size.	62,478
Thermic Soils That Formed in Cascade Alluvium; on Fan Terraces in the Sacramento Valley 10. Redsluff-Redtough-Redswale	Landscape: Sacramento Valley Slope range: 0 to 35 percent Typical vegetation: Annual grasses and forbs.	Very deep, shallow, and very shallow; nearly level to steep; moderately well-drained, somewhat poorly drained, and poorly drained soils that formed in alluvium; on fan terraces; loamy alluvium over cemented, gravelly alluvium derived from volcanic and mixed rock sources; fine-loamy and loamy.	28,995
Thermic Soils on Feather River Terraces in the Sacramento Valley 11. Liveoak-Boga-Loemstone	Landscape: Sacramento Valley Slope range: 0 to 2 percent Typical vegetation: Walnut, prune, kiwi, peach, and nectarine orchards; valley oak; and annual grasses and forbs.	Very deep and deep, nearly level, moderately well-drained soils that formed in Feather River alluvium; on terraces; loamy alluvium over dense, silty alluvium derived from mixed rock sources; fine-loamy.	16,602
Thermic Soils That Formed in Sierra Nevada Alluvium; on Low Fan Terraces in the Sacramento Valley 12. Eastbiggs-Duric Xerarents-Kimball	Landscape: Sacramento Valley Slope range: 0 to 3 percent Typical vegetation: Annual grasses and forbs, rice, prune orchards, and valley oak.	Moderately deep, shallow, and very deep, nearly level, somewhat poorly drained and well-drained soils that formed in alluvium; on low terraces; clayey and loamy alluvium over cemented and loamy alluvium derived from mixed rock sources; fine.	30,649

Table 3–2. General Soil Units (Continued)

General Soil Type (Soil Complexes)	Plan Area Setting	Soil Properties	Area (acres)
Thermic Soils That Formed in Sierra Nevada Alluvium; on Intermediate and High Fan Terraces in the Sacramento Valley 13. Thompson flat-Oroville-Vistarobles	Landscape: Sacramento Valley Slope range: 0 to 30 percent Typical vegetation: Annual grasses and forbs, blue oak, interior live oak, buckbrush, toyon, and whiteleaf Manzanita.	Very deep, moderately deep, and shallow, nearly level to moderately steep, moderately well-drained and poorly drained soils that formed in alluvium; on intermediate and high fan terraces; loamy alluvium over clayey alluvium over gravelly and cemented alluvium derived from mixed rock sources; clayey, fine and fine-loamy.	37,826
Thermic Soils on Lovejoy Basalt and Ione Sediments on Sierra Nevada Foothills 14. Palexerults-Rock Outcrop, Basalt-Coalcanyon, Thermal rocks, Campbellhills	Landscape: Sierra Nevada foothills Slope range: 2 to 50 percent Typical vegetation: Annual grasses and forbs, lichens, interior live oak, blue oak, and valley oak.	Exposed bedrock and very deep, nearly level to very steep, well-drained soils that formed in colluvium and residuum; on foothills and basalt plateaus; rock outcrops of Lovejoy basalt; loamy colluvium derived from volcanic rocks over clayey residuum derived from Ione Formation claystone, gravelly colluvium derived from Lovejoy basalt; loamy-skeletal, fine-loamy and fine.	18,384
Thermic Soils on Strath Terraces on Volcanic Cascade Foothills 15. Tuscan-Clearhayes-Typic Xerofluvents-Redtough-Redswale-Anita	Landscape: Cascade foothills Slope range: 0 to 2 percent Typical vegetation: Annual grasses and forbs, cottonwood, sycamore, black walnut, and valley oak.	Shallow, deep, and very deep, nearly level, somewhat poorly drained and well-drained soils that formed in alluvium; on strath terraces on volcanic foothills; loamy alluvium over clayey alluvium over cemented, gravelly alluvium derived from volcanic rocks, loamy overbank deposits over gravelly channel deposits derived from volcanic rocks, sandy alluvium derived from hydraulic mine deposition; clayey, coarse-loamy, fine-loamy and sandy-skeletal.	18,868
Thermic Soils on Volcanic Cascade Foothills 16. Lucksev-Butteside-Carhart 17. Doemill-Jokerst 18. Xerorthents, Shallow-Typic Haploxeralfs-Doemill	Landscape: Cascade foothills Slope range: 2 to 100 percent Typical vegetation: Annual grasses and forbs, blue oak, interior live oak, canyon live oak, foothill pine, buckbrush, and Manzanita.	Very shallow, shallow, moderately deep and deep, nearly level to very steep, moderately well-drained, well-drained, somewhat poorly and poorly drained soils that formed in alluvium, residuum, and colluvium; on foothills; ridgetops, side slopes, and strath terraces, basins and footslopes on volcanic foothills; fine, clayey and loamy.	62,385
Thermic Soils on Metamorphic Sierra Nevada Foothills 19. Dunstone-Loafercreek-Argonaut Taxadjunct 20. Dunstone-Loafercreek-Oroshore 21. Mounthope-Hartsmill 22. Ultic Haploxeralfs, Thermic, High Terrace	Landscape: Sierra Nevada foothills Slope range: 1 to 90 percent Typical vegetation: Annual grasses and forbs, interior live oak, blue oak, foothill pine, whiteleaf manzanita, buckbrush, toyon, Pacific madrone, and scattered ponderosa pine.	Shallow and moderately deep, very deep and deep, nearly level to very steep, well-drained and moderately well-drained soils that formed in alluvium, residuum and colluvium derived from metasedimentary metavolcanic and mixed rocks; on foothills and high terraces; fine, fine-loamy, loamy and loamy-skeletal.	48,925

Table 3–2. General Soil Units (Continued)

General Soil Type (Soil Complexes)	Plan Area Setting	Soil Properties	Area (acres)
Thermic Soils on Plutons on Sierra Nevada Foothills 23. Flanly-Swedesflat-Parkshill 24. Crystalhill-Oregongulch-Craigsaddle	Landscape: Sierra Nevada foothills Slope range: 2 to 70 percent Typical vegetation: Annual grasses and forbs, interior live oak, blue oak, canyon live oak, foothill pine, and buckbrush, Whiteleaf manzanita, toyon, Pacific madrone, and scattered ponderosa pine.	Moderately deep, shallow, and very deep, nearly level to very steep, somewhat excessively drained and well-drained soils that formed in residuum and colluvium from quartz diorite or gabbro and intrusive igneous rocks; ridgetops and side slopes on plutons in foothills; fine-loamy, loamy, coarse-loamy	10,407
Mesic Soils on Volcanic Cascade Foothills 25. Rockstripe-Ultic Haploxeralfs, Mesic-Ultic Haploxeralfs	Landscape: Cascade foothills Slope range: 2 to 100 percent Typical vegetation: Buckbrush, scrub oak, manzanita, annual grasses and forbs, interior live oak, canyon live oak, California black oak, and foothill pine.	Very shallow, moderately deep, and deep, nearly level to very steep, somewhat poorly drained and well-drained soils that formed in residuum and colluvium; on volcanic foothills; fine-loamy, fine, loamy-skeletal, clayey-skeletal.	2,003
Mesic Soils on Metamorphic Sierra Nevada Foothills 26. Bigridge-Minniecreek	Landscape: Sierra Nevada foothills Slope range: 2 to 70 percent Typical vegetation: Whiteleaf manzanita, toyon, interior live oak, Pacific madrone, canyon live oak, foothill pine, ponderosa pine, and poison oak.	Deep and moderately deep, nearly level to very steep, well-drained soils that formed in residuum and colluvium; ridgetops and side slopes on metamorphic foothills; fine-loamy.	12
39.	Sierra Nevada and Cascade foothills	Frigid soils on moraines	207
99.	Throughout Plan Area	Water	7,651

Source: Modified from NRCS 2006.

Hundreds of soil series occur within the Plan Area. As a result, soils are categorized below by soil complex (grouping of series that have common characteristics) and general soil units (general grouping of soils that have similar characteristics in source material, region, and climate during formation). Soils in the western part of the Plan Area are all representative of low energy floodplain, flood basin, and lower relief alluvial fan terrace development in geologically young alluvium; however, soils associated with the Sacramento and Feather Rivers have developed on plain features and are generally moderate to well-drained and indicative of a historically higher energy environment (active river system) than neighboring basin soils. These soil units are limited to within and immediately adjacent to the river system.

Soils in the southwestern section of the Plan Area are generally flood basin–developed, deep and poorly drained, and representative of low energy formation. These areas occur within the Plan Area between the Sacramento and Feather River systems where the alluvial basins are internally

draining (or would be in the absence of modifications to surface flow patterns associated with agriculture production).

Soils in the foothills of the Plan Area have developed at the base of the Cascade and Sierra Nevada Mountains. Geologically the foothills are alluvial terraces derived from upslope volcanic rock and mudflow associated with the ranges. Soils are diagnostic of their material of origin and, as a result, soils associated with the Cascade foothills are different than soils associated with Sierra Nevada foothills; however, soils associated with both ranges are generally poorly to moderately drained alluvium over clay or cemented gravelly alluvium. They range from red soils associated with the Tuscan series of the northeast Plan Area to dark volcanic rocky soils in the southeast.

3.3.6 Hydrology

Butte County has numerous surface water bodies, and drainage is primarily to the southwest (see Figure 3–9, *Hydrologic Features in the Plan Area* [separate file]). These water bodies include rivers and streams, impoundments, vernal pools, irrigation canals, managed wetlands and managed seasonal wetlands (for waterfowl), stock ponds, and rice fields (when flooded). The Plan Area is within the drainage basin of the Feather River and the Sacramento River. The Sacramento River flows along the western edge of Butte County. Big Chico Creek and Butte Creek are the primary tributaries to the Sacramento River, and they drain much of the Plan Area. The streams generally have a high gradient in the steep terrain of the mountains and foothills and then flow slowly across the nearly flat valley floor. Most streams on the valley floor have been altered for flood control and water diversions.

Big Chico Creek. Big Chico Creek drains most of the northwestern portion of the Plan Area and flows into the Sacramento River at the western edge of the county just southwest of Chico. Its main tributary is Mud Creek, which includes Rock Creek. Big Chico Creek channel on the valley floor is dry in dry years (Big Chico Creek Watershed Alliance 1999). Mud Creek, a tributary to Big Chico Creek, has a 69-foot waterfall at Richardson Springs that is a barrier to fish. Rock Creek originally flowed into a large marsh near Nord, but it is now a tributary to Mud Creek.

Butte Creek. Butte Creek drains the central to southwestern portion of the Plan Area. South of Chico, it flows along the western boundary of the county with Glenn and Colusa counties. It enters Butte Slough south of Butte County (CSU Chico 1998), then flows into the Sutter Bypass and then into the Sacramento River. A portion of Butte Sink is located in the southwestern corner of the county. Levees are present along one or both sides of the creek from Chico to just downstream of the Glenn-Butte County boundary. The annual mean flow above Parrott-Phelan Dam (southeast of Chico) is 409 cubic feet per second (cfs) (1931 to 1997 data) with a lowest daily mean flow of 44 cfs and a highest daily mean flow of 26,600 cfs. On a monthly basis, the mean flows were highest in January through April and lowest in September (CSU Chico 1998). Within the Butte Creek watershed are a number of natural streams that were never connected to

Butte Creek or that have been modified so that they no longer connect. These are now used for water conveyance and storage.

Feather River. The Feather River originates in the Sierra Nevada east of the Plan Area. The river and its tributaries downstream of Oroville Dam drain the southeastern part of the Plan Area. Flows below Oroville Dam are highly regulated for hydroelectric power production, flood control, water supply, and fish and wildlife. Flows in the river vary seasonally with peaks in the winter to spring and lows in November to December. Measurements at Gridley from 1995 through 1998 recorded a peak of just over 40,000 cfs and a low of 1,000 cfs (Bratovich et al. 2004). Flow in the Low-Flow Channel, from the Fish Barrier Dam to the Thermalito Afterbay Outlet, is relatively constant with low water temperatures all year. Flows at the other facilities are discussed below in Section 3.3.6.1, *Dams and Diversions*.

Other Water Bodies. In addition to the rivers and their tributaries, other natural water bodies in the county include thousands of vernal pools, seeps, and marshes. The vernal pools occur in grassland and blue oak savanna; some vernal pools are connected through swales and ephemeral drainages to surface tributary systems, which connect to major creeks and rivers, and other vernal pools are isolated from stream drainages. Their water source is direct precipitation and runoff from the surrounding uplands. Vernal pools generally contain water during the rainy season and into spring or summer when they dry out until the following wet season. Marshes can be isolated or connected to streams, and their water sources include runoff from precipitation, overbank flooding, backwater flooding, and shallow groundwater. Seeps are typically isolated and their water source is typically groundwater discharge. Marshes (emergent wetlands) and seeps can have water seasonally or all year, depending on location and water source.

Artificial water bodies include impoundments, irrigation canals, agricultural drains, waterfowl ponds (managed wetlands and managed seasonal wetlands), and rice fields (when flooded). The largest impoundments in the Plan Area are the Thermalito Afterbay and Thermalito Forebay, both associated with Lake Oroville (see Figure 3–10, *Lake Oroville Facilities: State Water Project* [separate file]). These are discussed below in Section 3.3.6.1.

Ponds, smaller impoundments for water storage and livestock, are also present. Large areas of managed wetlands are present in the southwestern and western portions of the Plan Area and a smaller area of managed seasonal wetlands are present in the southeastern part of the Plan Area. These are relatively flat areas that are flooded, particularly during the winter, to provide habitat for wintering or migrating waterfowl and for hunting opportunities. Water depths are shallow and support emergent aquatic vegetation if soils are moist much to all of the year. More information on managed wetlands is provided in Section 3.5.4, *Wetlands*.

3.3.6.1 Dams and Diversions

Feather River. Oroville Dam is located at the eastern edge of the Plan Area. This dam provides flood control, water storage, and power production as well as recreational opportunities. The

Oroville-Thermalito Pumped Storage Power Complex (California Department of Water Resources [DWR] no date(a)) is located at and below Oroville Dam (see Figure 3–10). This complex includes the following elements:

- Hyatt Power Plant at the dam (645 megawatts).
- Thermalito Pumping-Generating Plant (114 megawatts).
- Thermalito Dam Power Plant (3 megawatts), which generates electricity from water released from Oroville Dam for fish habitat between the diversion dam and the Thermalito Afterbay river outlet.
- Thermalito Power Canal, which carries water in either direction for pumping back into Lake Oroville.
- Thermalito Diversion Dam, which diverts water in the Thermalito Power Canal to the Thermalito Pumping-Generating Plant, provides a tailwater pool for the Hyatt Power Plant, and acts as a forebay when water is pumped back into Lake Oroville.
- Thermalito Forebay, an offstream reservoir to convey generating and pumping water between the Thermalito Power Canal and the Thermalito Power Plant, which provides regulatory storage and surge damping for the Oroville-Thermalito Power Complex.
- Thermalito Afterbay, an offstream reservoir for pumpback water storage, which is a major agricultural water supply diversion; it also helps regulate the power system, helps control flows in the river, and provides recreational opportunities.

The maximum controlled release from Oroville Dam is 150,000 cfs (Bratovich et al. 2004). Flows at the facilities are as follows (Bratovich et al. 2004, Bogener 2004):

- Hyatt Power Plant – maximum of 17,400 cfs.
- Diversion Dam – minimum of 600 cfs.
- Diversion Dam Power Plant – maximum of 615 cfs.
- Thermalito Power Canal – maximum capacity of 16,900 cfs.
- Pump-back facilities – 9,120 cfs.
- Below Thermalito Afterbay – minimum 1,700 cfs October through March and 1,000 cfs April through September, with maximum of 2,500 cfs October 15 to November 30. In dry years with less than 1,942,000 acre-feet of runoff in April through July, the minimum can be reduced to 1,200 cfs October through February and 1,000 cfs in March.

When flows are less than 2,500 cfs, reductions must be less than 200 cfs per 24 hours, except for flood management. Agricultural irrigation diversions of up to 800,000 acre-feet occur from the Thermalito Complex from May through August (Bogener 2004). The Thermalito Afterbay water surface elevation can vary by up to 12 feet.

Butte Creek. A number of dams and diversions are present on Butte Creek and its tributaries. Eight agricultural/wildlife enhancement water diversion dams are present from the southern county boundary to southeast of Chico, and three power generation diversions are present upstream of the Plan Area (CSU Chico 1998). The Centerville Powerhouse is within the Plan Area. The Centerville Head Dam, located upstream of the Plan Area, is a barrier to fish migration. Water is diverted from that dam into the Lower Centerville Canal to the Centerville Powerhouse at up to 180 cfs. Water diverted from the West Fork of the Feather River is released into Butte Creek at the DeSabla Powerhouse above the Centerville Head Dam at an average rate of 65.8 cfs. These diversions are non-consumptive. Two dams on Little Butte Creek provide water for the town of Paradise (CSU Chico 1998).

The Parrott-Phelan Dam near Chico is the first consumptive use diversion of water from Butte Creek and takes 25.4 percent of the flow from April through September. This dam has a fish ladder and the diversion is screened. The Durham Mutual, Adams, and Gorrill Dams are south of Chico. These dams were retrofitted with fish ladders and screens in the late 1990s as part of the CALFED Bay-Delta Program's (CALFED) Ecosystem Restoration Program Fish Passage Improvement element (DWR 2005). In 1998, Western Canal Water District, in conjunction with CALFED and the Department of the Interior, also removed Point Four, McGowan, McPherrin, Western Canal East Channel, and Western Canal Main Dams to improve anadromous fish passage on Butte Creek (DWR 2005).

The Sanborn Slough Bifurcation takes much of the Butte Creek flow into waterfowl clubs in Butte Sink. In 1998 CALFED completed initial improvements of the structure to enhance fish passage and water control (DWR 2005). White Mallard Dam diverts water into White Mallard Canal.

Big Chico Creek. Flood flows in Big Chico Creek are diverted into Lindo Channel, which has a capacity of 14,500 cfs. These flows are further diverted into Sycamore Creek (up to 8,500 cfs). Lindo Channel is 8 miles long and returns to Big Chico Creek about 2.5 miles from its confluence with the Sacramento River (Big Chico Creek Watershed Alliance 1999). A fish ladder constructed in the 1950s, located on Big Chico Creek in Upper Bidwell Park, is in disrepair and impeding passage of anadromous fish upstream of the ladder. DWR has completed designs to improve passage at the site (DWR no date(b)).

3.3.6.2 Agriculture

Rice fields are the dominant form of agriculture in the southwestern portion of the Plan Area, with orchards and vineyards to the north and southeast, primarily west of Highway 99. Rice fields are flooded from April to September for the rice growing season and are flooded again from October to January for rice decomposition, disease control, and waterfowl needs. Orchards and vineyards are also irrigated during the growing season.

3.4 LAND COVER TYPE MAPPING

A land cover dataset was created for the BRCP for use in developing the BRCP conservation strategy and conducting the assessment of impacts of the covered activities on natural communities and covered species. This section describes the land cover classification system and the methods used to map the land cover types. The land cover dataset was generated at a scale and level of resolution appropriate for regional resources planning and reflect ground conditions as of October 2011; it was not developed for use in project-level planning.

3.4.1 Data Sources

Land cover was mapped primarily using 2005 National Agriculture Imagery Program (NAIP) color orthorectified aerial imagery (at 1-meter resolution; flown from June 30 through September 30). Additional aerial imagery flown on February 28, 2002 (1-meter resolution) and in May 2006 (1-meter resolution) was used to assist in the land cover mapping. Data from the Soil Survey of Butte County Area (NRCS 2006) was used to support the land cover mapping, establish mapping criteria, and develop land cover type definitions. Additional 1-meter imagery from October 2011 was reviewed to update the land cover mapping with any changes to land cover since the 2006 mapping.

3.4.2 Land Cover Type Classification

The land cover classification system was specifically developed for the BRCP. Existing classification systems were incorporated or adapted where appropriate to maximize the use of existing land cover data and to reduce the potential number of land cover types.

Existing classification systems considered included Terrestrial Natural Communities in California (Holland 1986), California Natural Diversity Database (California Department of Fish and Game [DFG] 2007a), Manual of California Vegetation (Sawyer and Keeler-Wolf 1995), and Fire and Resource Assessment Program (FRAP)/California Wildlife Habitat Relationships System (CWHR). FRAP is used by the California Department of Forestry (CDF) as a tool to assess California's forest and rangeland resources. A total of 30 BRCP land cover types were identified and mapped. The BRCP land cover types and corresponding land cover types from these other classification systems are presented in Table 3-3, *BRCP Land Cover Type Classification and Corresponding Land Cover Types under Other Classification Systems*.

3.4.3 Mapping Methods

BRCP land cover types were mapped using the ArcGIS 9.1 Geographic Information System (GIS) to establish the perimeter or point location of each unit of each land cover type. Classification of land cover types was based on a visual interpretation of their appearance using 2005 aerial imagery as a base map. Aerial imagery from February 2002 and May 2006 was used for more detailed image interpretation as needed. Table 3-4, *Land Cover Type Mapping Criteria*

presents land cover type definitions and the minimum mapping unit (MMU) for each land cover type. Reconnaissance-level site visits were made to selected areas to verify the accuracy of the land cover mapping process for five-day periods in September and November 2006.

A 10-acre MMU resolution was used for most upland, agriculture, and disturbed/developed land cover types to allow for cost efficiency and local uniformity in mapping the large Plan Area. The 10-acre MMU is sufficient to identify significant patches of covered species habitat. Smaller MMUs—0.01 acre for larger vernal pools and altered vernal pools, 5 acres for grassland with vernal swale complex, and 1 acre for other wetland and riparian habitats—were used due to the relatively higher importance of these habitats to covered species and their typically small size.

Cover type classification was determined based on the visual signature (i.e., color and texture) of a given area on the aerial imagery. For example, grasslands were generally dull green while emergent wetland was bright green. Orchards were indicated by distinct regular rows of trees while woodlands containing trees were randomly distributed or clumped. Tree-dominated land cover had a larger canopy size and rougher appearance than shrub-dominated land cover. Table 3-4 provides some basic information on the criteria used to map land cover. Additional information on each land cover type designation and typical inclusions of other land cover types is provided below.

Table 3-3. BRCP Land Cover Type Classification and Corresponding Land Cover Types under Other Classification Systems

BRCP Land Cover Type	Holland 1986	Sawyer and Keeler-Wolf 1995	California Natural Diversity Database Plant Community[1]	FRAP/CWHR
Grassland	Valley Needlegrass Grassland, Nonnative Grassland, Wildflower Field	Nodding Needlegrass Series, Purple Needlegrass Series, Ashy Ryegrass Series, Creeping Ryegrass Series, California Annual Grassland Series, Cheatgrass Series	Native Grassland, Nonnative Grassland	Annual Grassland, Perennial Grassland
Grassland with Vernal Swale Complex	Valley Needlegrass Grassland, Nonnative Grassland, Wildflower Field, Northern Hardpan Vernal Pool, Northern Volcano Mudflow Vernal Pool	Nodding Needlegrass Series, Purple Needlegrass Series, Ashy Ryegrass Series, Creeping Ryegrass Series, California Annual Grassland Series, Cheatgrass Series	Native Grassland, Nonnative Grassland, Vernal Pools	Annual Grassland, Perennial Grassland
Vernal Pools	Valley Needlegrass Grassland, Nonnative Grassland, Wildflower Field, Northern Hardpan Vernal Pool, Northern Volcano Mudflow Vernal Pool	Nodding Needlegrass Series, Purple Needlegrass Series, Ashy Ryegrass Series, Creeping Ryegrass Series, California Annual Grassland Series, Cheatgrass Series	Native Grassland, Nonnative Grassland, Vernal Pools	Not applicable
Altered Vernal Pools	Not applicable	Not applicable	Not applicable	Not applicable
Stock Ponds	Not applicable	Not applicable	Not applicable	Not applicable
Cottonwood-Willow Riparian Forest	Great Valley Cottonwood Riparian Forest, Great Valley Mixed Riparian Forest	Arroyo Willow Series, Fremont Cottonwood Series, California Sycamore Series, Mixed Willow Series, Pacific Willow Series, Red Willow Series, Sandbar Willow Series	Riparian Forest and Woodland	Valley Foothill Riparian, Riverine
Valley Oak Riparian Forest	Great Valley Oak Riparian Forest	California Sycamore Series, Valley Oaks Series	Riparian Forest and Woodland, Oak Woodlands and Forest	Valley Oak Woodland, Valley Foothill Riparian
Willow Scrub	Great Valley Willow Scrub	Arroyo Willow Series, Mixed Willow Series, Pacific Willow Series, Red Willow Series, Sandbar Willow Series	Riparian Forest and Woodland; High to Low Elevation Riparian Scrub	Riverine

Table 3–3. BRCP Land Cover Type Classification and Corresponding Land Cover Types under Other Classification Systems (Continued)

BRCP Land Cover Type	Holland 1986	Sawyer and Keeler-Wolf 1995	California Natural Diversity Database Plant Community[1]	FRAP/CWHR
Herbaceous Riparian and River Bar	Not applicable	Sandbar Willow Series	Nonnative Grasslands	Riverine
Dredger Tailings with Sparse Herbaceous Vegetation	Not applicable	Not applicable	Not applicable	Barren
Dredger Tailings with Riparian Forest and Scrub	Great Valley Cottonwood Riparian Forest, Great Valley Mixed Riparian Forest, Coastal and Valley Freshwater Marsh	Arroyo Willow Series, Fremont Cottonwood Series, Mixed Willow Series, Pacific Willow Series, Red Willow Series, Sandbar Willow Series, Bulrush Series, Bulrush-Cattail Series, Cattail Series, Common Reed Series	Not applicable	Barren
Emergent Wetland	Coastal and Valley Freshwater Marsh	Bulrush Series, Bulrush-Cattail Series, Cattail Series, Common Reed Series	Meadows and Seeps not Dominated by Grasses, Marsh,	Fresh Emergent Wetland, Riverine
Managed Wetland	Freshwater Swamp	Bulrush Series, Bulrush-Cattail Series, Cattail Series, Arrow Weed Series, Common Reed Series, Arroyo Willow Series, Fremont Cottonwood Series, Mixed Willow Series, Pacific Willow Series, Red Willow Series, Sandbar Willow Series	Meadows and Seeps not Dominated by Grasses, Marsh	Fresh Emergent Wetland, Valley Foothill Riparian
Managed Seasonal Wetland				Not applicable
Open Water	Not applicable	Not applicable	Not applicable	Riverine, Lacustrine
Major Canal	Not applicable	Bulrush Series, Bulrush-Cattail Series, Cattail Series, Arrow Weed Series, Common Reed Series, Arroyo Willow Series	Meadows and Seeps not Dominated by Grasses, Marsh	Fresh Emergent Wetland, Riverine
Chaparral	Not applicable	Not applicable	Not applicable	Montane Chaparral, Mixed Chaparral, Chamise-Redshank Chaparral
Blue Oak Woodland	Blue Oak Woodland	Blue Oak Series	Oak Woodlands and Forests	Blue Oak Woodland

Table 3–3. BRCP Land Cover Type Classification and Corresponding Land Cover Types under Other Classification Systems (Continued)

BRCP Land Cover Type	Holland 1986	Sawyer and Keeler-Wolf 1995	California Natural Diversity Database Plant Community[1]	FRAP/CWHR
Blue Oak Savanna	Blue Oak Woodland	Blue Oak Series	Oak Woodlands and Forests	Blue Oak Woodland
Interior Live Oak Woodland	Interior Live Oak Woodland	Interior Live Oak Series	Oak Woodlands and Forests	Blue Oak-Foothill Pine
Mixed Oak Woodland	Blue Oak Woodland, Interior Live Oak Woodland, Open Digger Pine Woodland, Digger Pine Oak Woodland	Blue Oak Series, Foothill Pine Series, Interior Live Oak Series, Mixed Oak Series	Oak Woodlands and Forests	Blue Oak-Foothill Pine
Conifer-Dominated Forest	Not applicable	Not applicable	Not applicable	Ponderosa Pine
Nonnative Woodlands	Not applicable	Eucalyptus Series	Not applicable	Eucalyptus
Orchards / Vineyards	Not applicable	Not applicable	Not applicable	Orchard-Vineyard, Deciduous Orchard, Evergreen Orchard, Vineyard
Rice	Not applicable	Not applicable	Not applicable	Rice
Cropland (Non-Rice)	Not applicable	Not applicable	Not applicable	Irrigated grain Crops, Irrigated Hayfield, Irrigated Row and Field Crops
Irrigated Pasture	Nonnative Grassland	Creeping Ryegrass Series, California Annual Grassland Series	Nonnative Grassland	Irrigated Hayfield
Urban	Not applicable	Not applicable	Not applicable	Urban
Ranchettes – Wooded	Blue Oak Woodland, Interior Live Oak Woodland, Open Digger Pine Woodland, Digger Pine Oak Woodland	Blue Oak Series, Foothill Pine Series, Interior Live Oak Series, Mixed Oak Series	Oak Woodlands and Forests	NA
Ranchettes – Open	Nonnative Grassland	Nodding Needlegrass Series, Purple Needlegrass Series, Ashy Ryegrass Series, Creeping Ryegrass Series, California Annual Grassland Series, Cheatgrass Series	Nonnative Grassland	NA
Disturbed Ground	Not applicable	Not applicable	Not applicable	Barren

[1] California Department of Fish and Game (DFG) California Natural Diversity Database (CNDDB) plant community list (DFG 2007a).

Table 3-4. Land Cover Type Mapping Criteria

Land Cover Type	Symbol	Minimum Mapping Unit (MMU)	Criteria for Designation by Remote Sensing
Grassland	G	10 acres	Herbaceous vegetation generally lacking vernal pool-type features (e.g., vernal swale pattern, indications of ponding water in the winter and spring). Polygons mapped as grasslands support inclusions of vernal swale complex, vernal pool, and altered vernal pool land cover types that are too small or too sparse to meet the mapping criteria for these other land cover types (see descriptions in Section 3.4.4, *Land Cover Type Descriptions*). Grasses are generally nonnative with varying amounts of native herbaceous species and occasionally oaks with less than 3 percent cover, and disturbed areas (ranch buildings, development, and agriculture less than 10 acres in size).
Grassland with Vernal Swale Complex	GVSC	10 acres	Grassland with vernal swale complex was mapped using 2005 imagery to construct polygons around swales and individual vernal pools that were previously mapped in a mapping feasibility study based on February 2002 imagery. Swales often appear as complex networks of channels with a highly variable distribution and density of vernal pools and associated with mound and inter-mound topography. The MMU may be less for some polygons that were retained from the feasibility study. Vernal pools and altered vernal pools greater than 0.01 acre were mapped individually. Occasional blue oaks with less than 3 percent cover may be present.
Vernal Pools	VP	0.01 acres	Vernal pools were mapped using February 2002 imagery as areas within the grassland vegetation matrix with seasonally ponded water. They are distinguished by their rounded shape, as well as their darker color relative to the surrounding vegetation. Occasionally they can have a lighter color relative to the surrounding vegetation due to reflectance off the ponded water.
Altered Vernal Pools	AVP	0.01 acres	Altered vernal pools were mapped using the February 2002 imagery. These features meet the same selection criteria as vernal pools but have been disturbed by farming, roads, ditches, fence lines, or other features or activities.
Stock Ponds	SP	Less than 1 acre	Stock ponds were mapped as point data based on indications of summer ponded water in the October 2005 imagery and may support emergent wetland land cover.
Cottonwood-Willow Riparian Forest	CWRF	1 acre	Deciduous trees along streams and rivers. Differentiated from valley oak riparian forest by the color of trees in summer and by general distribution within Butte County. Can include areas dominated by herbaceous or shrubby riparian vegetation if less than 1 acre in size.
Valley Oak Riparian Forest	VORF	1 acre	Deciduous trees along streams and rivers. Differentiated from cottonwood-willow forest by the color of trees in summer and by general distribution. Can include areas dominated by herbaceous or shrubby riparian vegetation if less than 1 acre in size.
Willow Scrub	WS	1 acre	Scrubby vegetation along streams and at the margins of rivers. Can include areas dominated by herbaceous or shrubby riparian vegetation if less than 1 acre in size.

Table 3–4. Land Cover Type Mapping Criteria (Continued)

Land Cover Type	Symbol	Minimum Mapping Unit (MMU)	Criteria for Designation by Remote Sensing
Herbaceous Riparian and River Bar	HRRB	1 acre	Rock, gravel, and sand bars along the Feather and Sacramento rivers with very low cover (less than 15 percent cover). Can include areas dominated by herbaceous or shrubby riparian vegetation if less than 1 acre in size.
Dredger Tailings with Sparse Herbaceous Vegetation	DT-H	10 acres	Areas formerly dredged for gold mining with regular patterns of tailings and ponds. Areas within tailings with no cover or sparse cover of herbaceous vegetation. Recently regraded mine tailings are mapped as disturbed ground.
Dredger Tailings with Riparian Forest and Scrub	DT-R	10 acres	Areas formerly dredged for gold mining with regular patterns of tailings and ponds. Areas within tailings with dense cover of woody riparian vegetation.
Emergent Wetland	EW	1 acre	Herbaceous emergent wetland vegetation along streams and rivers, and at the margins of ponds with some areas of open water.
Managed Wetland	MW	1 acre	Areas with controlled hydrology and management practices to support wetlands to provide waterfowl and shorebird habitat. In addition to interpretation of aerial imagery, boundaries of state and federal refuges were used. Includes many vegetative land cover categories which are not separated (e.g., emergent wetland, cottonwood-willow riparian forest, willow scrub, etc.).
Managed Seasonal Wetland	MSW	1 acre	Areas with controlled hydrology that are managed to support created wetlands on a seasonal basis to provide habitat for waterfowl. Scraped grassland and vernal pool/swale terrain with field berms.
Open Water	OW	1 acre	Large areas of open water, such as lakes, ponds, and wide perennial portions of rivers.
Major Canal	MC	1 acre	Man-made canals of approximately 70 feet or greater in width. Smaller canals are mapped as part of surrounding cover type.
Chaparral	C	10 acres	Areas of scrubby vegetation in uplands not associated with streams in landscape positions in proximity to oak woodlands or conifer-dominated forest.
Blue Oak Woodland	BOW	10 acres	Areas dominated by naturally occurring deciduous trees not associated with streams. Minimum tree canopy cover 15 percent.
Blue Oak Savanna	BOS	10 acres	Areas dominated by naturally occurring deciduous trees not associated with streams. Tree canopy cover 3 to 15 percent.
Interior Live Oak Woodland	ILOW	10 acres	Areas dominated by naturally occurring evergreen hardwood trees not associated with streams
Mixed Oak Woodland	MOW	10 acres	Areas dominated by naturally occurring evergreen and/or deciduous hardwood trees and/or foothill pine. No single oak species makes up more than 80 percent of the canopy cover.

Table 3–4. Land Cover Type Mapping Criteria (Continued)

Land Cover Type	Symbol	Minimum Mapping Unit (MMU)	Criteria for Designation by Remote Sensing
Conifer-Dominated Forest	CDM	10 acres	Areas are generally dominated by Ponderosa pine (*Pinus ponderosa*), but can include black oak (*Quercus kelloggii*) and incense cedar (*Calocedrus decurrens*). It consists of a relatively dense canopy cover in areas that are generally higher in elevation than the Plan Area.
Nonnative woodlands	NNW	10 acres	Large areas of nonnative trees. Typically plantings associated with ranchette-dominated landscapes.
Orchards / Vineyards	O/V	10 acres	Trees or vines planted in regular rows.
Rice	R	10 acres	Agricultural fields that are designed for periodic flooding, either contour or laser leveled, unusually shaped polygons with berms between fields.
Cropland (Non-Rice)	IC	10 acres	Plowed fields with irrigated or dryland farmed herbaceous crops.
Irrigated Pasture	IP	10 acres	Non-tilled or lightly tilled areas with herbaceous species that are green in the late summer.
Urban	U	10 acres	Developed areas including buildings, parking lots, developed parks, golf courses, airports, and cemeteries.
Ranchettes – Wooded	RW	10 acres	Areas within oak-dominated landscape with houses and ranch structures that cover or disturb at least 20 percent of the ground surface.
Ranchettes – Open	RO	10 acres	Areas within grass-dominated landscape with small agricultural fields, houses, and ranch structures that cover or disturb at least 20 percent of the ground surface.
Disturbed Ground	DG	10 acres	Recently graded areas with bare soil.

3.4.4 Land Cover Type Descriptions

3.4.4.1 Grassland (G)

Grassland, without high densities of vernal swale complex or vernal pools, was mapped at a 10-acre MMU. Grassland generally occurs on slopes and in areas with fallow agricultural fields. As such, it has been subject to varying degrees of disturbance, including activities related to past farming, land clearing, and oak tree removal. On the aerial imagery, grassland is generally uniform in color and lacks naturally ponded water during the wet season. Stock ponds within the grassland land cover were mapped as separate point data or as open water if greater than 1 acre in size. Scattered oak trees as well as clusters of oak trees that do not exceed 10 acres in size were included as were roads, small developments that are less than 10 acres, and other man-made structures. Some grassland polygons support scattered trees (mainly oaks) up to 3 percent cover. Polygons mapped as grasslands support inclusions of vernal swale complex, vernal pool, and altered vernal pool land cover types that are too small or too sparse to meet the mapping criteria for these other land cover types (see descriptions in sections below). Grassland land cover type also has inclusions of small developed areas (e.g., scattered buildings and roads).

3.4.4.2 Grassland with Vernal Swale Complex (G/VSC)

Grassland with vernal swale complex was mapped at 1:12,000 using 2005 NAIP imagery to construct polygons (MMU 10 acres) around areas supporting high densities of vernal swales and vernal pools based on signatures in February 28, 2002 imagery. Mapping of grassland with swale complex used a preliminary mapping effort for BRCP conducted by the Chico Geographic Information Center (GIC) for a mapping feasibility study (see BRCP Appendix I, *Vernal Pool and Other Seasonal Wetland Mapping Methods*). This land cover type is marked by a darker color due to wetter conditions and a different vegetation type than the surrounding vegetation. Swales appear as complex networks of meandering channels with a highly variable distribution and density of vernal pools and are associated with mound and inter-mound topography. The GIC-mapped vernal swale networks were used as a guide to generate larger vernal swale complex polygons that encompassed the GIC mapping units. High density groupings of swales that were separated by more than 100 meters were delineated into separate complexes. Isolated swale complexes that were less than 10 acres and separated by a distance greater than 100 meters from other swale complexes were not included in polygons of grassland with vernal swale complex. Additional areas not identified in the GIC study having dense vernal swale signatures were incorporated within the grassland with vernal swale complex land cover type. The National Hydrography Dataset (NHD)[3] hydrography layer (in particular intermittent streams) was used to provide divisions among the complexes, creating general sub-basin boundaries based on hydrology and geomorphology. For instances where the swale network straddled a NHD mapped stream the vernal swale complex feature was not split but mapped as a single polygon. Polygons of grassland with vernal swale complex land cover type may include occasional blue

[3] U.S. Geological Survey. 2012. National Hydrography High-Resolution Dataset. http://nhd.usgs.gov/index.html.

oaks at less than 3 percent cover and support inclusions of vernal pool and altered vernal pool land cover types. This land cover type also has inclusions of small developed areas (e.g., scattered buildings and roads).

3.4.4.3 Vernal Pool (VP)

Vernal pools were mapped by GIC using the February 28, 2002 aerial imagery. The mapped vernal pools almost exclusively fall within the grassland with vernal swale complex, but are also found in Grassland, and are distinguished by their rounded shape and darker color relative to the surrounding vegetation. These vernal pool features are small inclusions within larger land cover types that encompass them. For this reason the acreages of these features have been incorporated within the acreages of the land cover types within which they occur. The mapped vernal pool features have been used to support the development of species habitat models where it was necessary to incorporate this level of detail. Occasionally they can have a lighter color relative to the surrounding vegetation due to reflectance off the ponded water. The MMU for the vernal pool land cover type is 0.01 acre. Vernal pools smaller than 0.01 acre are mostly found within grassland with vernal swale complex land cover type (Appendix I.1, *Methods Used to Map BRCP Vernal Swale Complex and Vernal Pools and the Resolution of Mapping Issues*). A separate method was used to estimate the extent of vernal pools and other seasonal wetlands using estimates of wetland density within different grassland land cover types (see Section 3.4.5.1, *Vernal Pools and Other Seasonal Wetlands* and Appendix I.2, *USACE-Verified Wetland Delineations Used to Estimate Density of Vernal Pools and Other Seasonal Wetlands in Grassland Land Cover Types*).

3.4.4.4 Altered Vernal Pool (AVP)

Altered vernal pools were mapped by GIC using the February 28, 2002 aerial imagery. These features meet the same identification criteria as vernal pools (see description above), but have some indication of disturbance. Examples of disturbance include evidence of roads or ditches, fence lines, road sides, and other disturbances. This mapping unit includes vernal pools that have been impounded and vernal pools in areas that appear in aerial imagery to have been disked (but with no or little apparent disruption to the duripan). The MMU for altered vernal pool land cover type is 0.01 acre. These vernal pool features are small inclusions within larger land cover types that encompass them. For this reason the acreages of these features have been incorporated within the acreages of the land cover types within which they occur. These features have been used to support the development of species habitat models where it was necessary to incorporate this level of detail. Altered vernal pools smaller than 0.01 acre are mostly found within grassland with vernal swale complex land cover type (Appendix I.1). A separate method was used to estimate the extent of vernal pools and other seasonal wetlands using estimates of wetland density within different grassland land cover types (see Section 3.4.5.1 and Appendix I.2).

3.4.4.5 Stock Ponds/Ponds (SP)

Stock ponds/ponds (ponds) were mapped based on presence of ponded water during the dry season using the 2005 aerial imagery. As defined, these units are smaller than 1 acre and were mapped as point data. Ponds support open water and may include patches of emergent wetland.

3.4.4.6 Cottonwood-Willow Riparian Forest (CWRF)

Cottonwood-willow riparian forest is characterized by deciduous trees of varying size along major streams and rivers mapped to a 1-acre MMU. It includes small areas of river bar and open water areas that are less than 1 acre. Minor roads are also included. Within the Plan Area, cottonwood-willow riparian forest is distributed along the Sacramento River and along the Feather River and its tributaries.

3.4.4.7 Valley Oak Riparian Forest (VORF)

Valley oak riparian forest was identified by the visual signal of dark green deciduous trees growing along stream courses mapped to a 1-acre MMU. In general, valley oak riparian forest occurs along creeks with a smaller extent of surface water and less active flowing channels than cottonwood-willow riparian forest. The trees can be very dense, forming a more or less continuous canopy, or more open. As with cottonwood-willow riparian forest, valley oak riparian forest includes small areas of other riparian land cover types that are less than 1 acre and small roads. Within the Plan Area, valley oak riparian forest is common in remnant floodplains of the Sacramento River and along tributaries to the Sacramento River such Big Chico Creek. At some locations, particularly where it occurs near the foothills, valley oak riparian forest may include sycamore and alder.

3.4.4.8 Willow Scrub (WS)

Willow scrub is characterized by relatively small trees that are scattered along drainage courses with continuous or fairly open canopies (in some cases as low as 5 percent cover) mapped to a 1-acre MMU. Where canopy cover was less than 5 percent, the land cover was characterized as the same type as that of the surrounding land cover. Small inclusions of roads, herbaceous riparian and river bar, and emergent wetland were included where they were smaller than 1 acre.

3.4.4.9 Herbaceous Riparian and River Bar (HRRB)

Herbaceous riparian and river bar land cover occurs along major streams and rivers. These are areas that have been scoured recently or the woody vegetation has been artificially removed, resulting in low cover of vegetation, and are generally above the low flow water level.

3.4.4.10 Dredger Tailings with Riparian Forest and Scrub (DT-R)

Dredger tailings are characterized by excessively uneven ground, typically in a regular pattern of long mounds and depressions with numerous ponds, clumps of riparian vegetation, and

unvegetated ground. Polygons of dredger tailings with riparian forest and scrub are mapped in areas within tailings with dense cover of riparian trees and shrubs (willows, cottonwoods, valley oaks). They typically occur along drainages and natural riparian land cover categories (i.e., cottonwood-willow riparian and valley oak riparian) predominate upstream and downstream. Dredger tailings associated with the Feather River west of Oroville were mapped as a mosaic of dredger tailings with sparse herbaceous vegetation and woody vegetation. Dredger tailings with riparian forest and scrub were mapped using a GIS-driven supervised classification combined with hand-mapped classification DWR developed for the Oroville Facilities Relicensing (Federal Energy Regulatory Commission [FERC] Project No. 2100) provided information to Leidos ecologists.

Dredger tailings with riparian forest and scrub are subdivided into two categories based on the association within streams: 1) dredger tailings riparian – stream-associated and 2) dredger tailings riparian – not stream-associated. Methods for identification of these two types are described below.

3.4.4.10.1 Dredger Tailings Riparian – Stream-Associated

Stream-associated dredger tailings riparian forest and scrub were identified by proximity to an existing waterway as mapped by the NHD. This determination was made by overlaying the NHD dataset and the BRCP GIS Land Cover Database and through visual analysis determining those that were directly associated with an existing waterway.

3.4.4.10.2 Dredger Tailings Riparian – Not Stream-Associated

Dredger tailings riparian forest and scrub not associated with streams were identified by proximity to an existing waterway as mapped by the NHD. This determination was made by overlaying the NHD dataset and the BRCP GIS Land Cover Database and through visual analysis determining those forest and scrub habitats that were not directly associated with an existing waterway. This analysis included both proximity to mapped streams and also inspection of ground contours visible on aerial imagery. Trees and shrubs are typically sparse and understory comprised of grassland.

3.4.4.11 Dredger Tailings with Sparse Herbaceous Vegetation (DT-H)

Dredger tailings are characterized by excessively uneven ground, typically in a regular pattern of long mounds and depressions with numerous ponds, clumps of riparian vegetation, and unvegetated ground. Polygons of dredger tailings with sparse herbaceous vegetation are mapped in areas within tailings with no cover or sparse cover of herbaceous vegetation. Large areas of dredger tailings with sparse herbaceous vegetation are associated with the Feather River west of Oroville. Recently regraded mine tailings are mapped as disturbed ground (see below).

3.4.4.12 Emergent Wetlands (EW)

Emergent wetlands were identified as areas of shallow water that support herbaceous marsh species, such as tules and cattails. Emergent wetlands were generally found along slow-moving portions of streams and rivers. Scattered riparian trees, particularly willows, are sometimes present in emergent wetlands. Where tules and cattails were present along the edges of agricultural fields in drainage and supply ditches they were mapped as the agricultural land cover type.

3.4.4.13 Managed Wetlands (MW)

Managed wetlands were mapped using polygons imported from other data sources and verified by their distinct aerial imagery signature. Managed wetlands have modified surface or berms and artificially controlled water sources and most are flooded in winter for waterfowl habitat. Managed wetlands include a mosaic of open water, emergent wetland, riparian scrub, and riparian forest habitats supported by artificial management.

3.4.4.14 Managed Seasonal Wetlands (MSW)

Managed seasonal wetlands were mapped based on the presence of scraped grassland and vernal pool swale terrain that are flooded in fall/winter periods. Managed seasonal wetlands support a mix of native and non-native plants adapted to seasonally flooded and dry soil conditions.

3.4.4.15 Open Water (OW)

Open water was mapped as areas of standing water with relatively little or no vegetation. Open water is typically found along major low gradient streams and rivers and in medium to large reservoirs. Ponds less than 1 acre were mapped as separate point data. Ponds less than 1 acre within active agricultural lands are included in the relevant agricultural coverage.

3.4.4.16 Major Canal (MC)

Major canals are man-made features in agricultural areas that are used for water for irrigation and for drainage. Canals less than approximately 70 feet wide were mapped as part of the surrounding agricultural cover type (e.g., rice fields).

3.4.4.17 Blue Oak Woodland (BOW)

Blue oak woodland is characterized by canopy cover exceeding 15 percent, as estimated from aerial imagery. It is dominated by blue oaks, which appear blue-grey on the aerial imagery and are deciduous trees that are not restricted to stream courses. It also supports scattered foothill pines, which appear very grey and produce longer shadows than blue oaks. Small developments and structures that cover less than 10 acres are also included. In addition, widely spaced ranchettes with minimal mechanical disturbance to the woodland are included.

3.4.4.18 Blue Oak Savanna (BOS)

Blue oak savanna was mapped where blue oak tree canopy cover varied between 3 percent and 15 percent. Individual blue oak trees are generally widely spaced with non-contiguous canopies. In some cases, widely scattered dense clusters of five to 10 trees were also mapped as BOS. The exterior boundary of blue oak savanna when adjacent to grassland extended approximately three canopy widths into the grassland land cover. Blue oak savanna generally occurs at the lower elevation edge of oak woodland, but it is also present in areas with thinner soil such as rocky areas on the Tuscan Formation and in areas of blue oak woodland that were partially cleared. As was the case for, BOW, this type includes minor development and ranchettes where the BOS appeared to be relatively undisturbed. Polygons of blue oak savanna may have inclusions of grassland with vernal swale complex, vernal pool, and altered vernal pool land cover types that did not meet the criteria for mapping each of these land cover types.

3.4.4.19 Interior Live Oak Woodland (ILOW)

Interior live oak woodland is dominated by interior live oak and generally was mapped on slightly higher elevation and slopes than blue oak. It intergrades with blue oak woodland and blue oak savanna. Interior live oak trees are distinguished from other oak species on aerial photographs because they are darker green and are not deciduous. Interior live oak woodland is more common in the southern foothills of Butte County. Where interior live oak woodland was mapped in the northern foothills, it tended to be mixed with blue oak woodland and blue oak savanna. Included in this category are interior live oak woodland that are primarily dominated by interior live oak (i.e., where at least 80 percent of the canopy cover is interior live oak). In addition, small developments and roads were included when less than 10 acres.

3.4.4.20 Mixed Oak Woodland (MOW)

Mixed oak woodlands are woodlands in which one oak species does not make up at least 80 percent of the tree canopy cover. In many cases, this is due to heavy dominance by foothill pine, although some polygons are mostly a mixture of blue oaks and interior live oaks. As with other oak woodland types, inclusions of minor development, roads, grassland, and ranchettes with intact understory of less than 10 acres were mapped within this land cover type.

3.4.4.21 Chaparral (C)

Various forms of chaparral are present at the upper limit of the occurrence of oak-dominated land cover. The majority of chaparral in Butte County occurs outside of the Plan Area.

3.4.4.22 Nonnative Woodland (NNW)

Nonnative woodlands that are 10 acres or more in size are very uncommon. A few instances of the cover type were found, and they are largely dominated by eucalyptus trees. They typically were mapped on the small farms and ranchettes of the foothills south of Oroville.

3.4.4.23 Rice (R)

The mapping of rice land cover type includes infrastructure for this crop, roads, and irrigation facilities. Rice fields are typically bordered by irrigation ditches that are often as wide as 30 feet and vegetated with emergent wetland vegetation (e.g., tules and cattails). This category also includes fields that were recently fallowed with the expectation that they will be replanted. Rice fields that appear to have been fallow for longer periods of time were mapped as grassland.

3.4.4.24 Irrigated Pasture (IP)

Irrigated pasture was generally mapped at slightly higher elevations than most cropland agriculture. It is irrigated to increase production for grazing livestock. As with other agricultural land cover types, small developments and roads were not included.

3.4.4.25 Cropland (IC)

Cropland included hayfields and other irrigated and unirrigated agriculture that was mapped in low-lying areas with predominately agricultural land cover. As with other agricultural types, IC included areas with minor developments, small irrigation ditches, and roads.

3.4.4.26 Orchards/Vineyards (O/V)

Orchards and vineyards mapping included the infrastructure necessary for growing these crops and included features such as irrigation channels, small ponds, and roads (both farm roads and public roads). Other facilities, particularly houses and other structures, were included where they covered less than 10 acres. Areas that were orchards in 2002, but with different visual signatures in later aerial imagery, were assumed to be orchards in the process of being replanted. This assumption was used because small trees can be difficult to discern on aerial imagery.

3.4.4.27 Urban (U)

The urban land cover type includes developments that exceeded 10 acres and was typically situated around cities and towns. It includes buildings, roads, developed parks, golf courses, landscaped areas, and airports. Developments in more rural areas, such as trailer parks, are also included. Small inclusions(less than 10 acres) of various agricultural types were common at the edges of urban development and were included in the mapping of the type.

3.4.4.28 Ranchettes – Wooded (RW)

Wooded ranchettes were mapped in areas otherwise mapped as oak woodlands. Generally they consist of development, and sometimes landscaping surrounding houses, that are scattered within the woodland. Development comprises greater than 20 percent of the cover in this land cover type. In cases with widely separated ranchettes, minimal landscaping, or other mechanical disturbance of the understory, was mapped as an oak woodland type.

3.4.4.29 Ranchettes – Open (RO)

Non-wooded ranchettes generally were mapped on the alluvial fans above the valley bottom in predominately agricultural areas or between agricultural areas and urban areas. They are characterized by isolated houses and small farms. Development comprises more than 20 percent of the cover in this land cover type. Small inclusions (less than 10 acres) of irrigated agriculture and orchards were common. Polygons mapped as ranchettes – open may have inclusions of grassland, grassland with vernal swale complex, vernal pool, and altered vernal pool land cover types that did not meet the criteria for mapping each of these land cover types. Access roads are also included in this type.

3.4.4.30 Disturbed Ground (DG)

Disturbed ground was mapped as areas that had been recently graded, including mining sites and landfills. These occur in various locations throughout the Plan Area. Areas that were clearly graded for new residential, commercial, or industrial development were mapped as urban. Polygons mapped as disturbed ground may have inclusions of the altered vernal pool land cover type that did not meet the criteria for mapping of this land cover type.

3.4.4.31 Rivers, Streams, and Agricultural Channels

Rivers, streams, and agricultural channels were mapped by clipping the NHD to the Plan Area. The NHD is a feature-based database produced by the U.S. Geological Survey in cooperation with U.S. Environmental Protection Agency, U.S. Forest Service, and other federal, state and local partners. The high-resolution data is generally mapped at a scale of 1:24,000/1:12,000. Data is coded with attributes describing stream segments by type, name, and flow direction. These are linear data only and are included within the two-dimensionally mapped land cover types. As such, the extent of streams and agricultural channels is presented in lineal feet or miles and not in acres as with the other land cover types.

3.4.5 Potential Jurisdictional Wetlands and Other Waters

Jurisdictional waters of the United States, including wetlands, regulated under the CWA section 404 are found in the Plan Area within the various land cover types mapped for the BRCP GIS database. Some land cover types, such as emergent wetlands, are likely entirely or nearly entirely jurisdictional wetlands. Other land cover types include jurisdictional wetlands within a larger matrix of uplands, such as grassland with vernal swale complex. Methods used to estimate the extent of jurisdictional wetlands and other waters are described in this section. The methods used here are for the purpose of estimating U.S. Army Corps of Engineers (USACE) jurisdictional wetlands and other waters; actual jurisdictional areas will be determined during plan implementation (see Chapter 8, *Plan Implementation*).

Jurisdictional streams, lakes, and associated riparian habitats, regulated under the California Fish and Game Code section 1602 are found in the Plan Area within the various land cover types

mapped for the BRCP GIS database. All riparian habitat land cover types and wetlands mapped in the BRCP GIS that are associated in the database with streams and lakes are likely jurisdictional under section 1602 and require streambed alteration agreements with CDFW. The methods used here are for the purpose of estimating CDFW jurisdictional streams, lakes, and associated riparian habitat; actual jurisdictional areas will be determined during plan implementation (see Chapter 8, *Plan Implementation*).

3.4.5.1 Vernal Pools and Other Seasonal Wetlands

Within the BCAG Plan Area there are 68,124 acres of mapped grasslands and 34,110 acres of mapped grassland with vernal swale complex. Individual vernal pools were mapped to a 0.01-acre MMU; however, a significant number of small vernal pools (less than 0.01 acre) were not captured in the BRCP GIS Land Cover Database (see Appendix I). A method was developed and implemented to estimate the relative cover of jurisdictional vernal pools and other seasonal wetlands within grassland natural community. In order to produce estimated density (as percent cover) for seasonal wetlands in grassland and grassland with vernal swale complex land cover types, Leidos sampled verified USACE wetland delineations within the study area to develop an estimate of density of vernal pools and other seasonal wetlands[4] within different land cover types (Appendix I.2).

Vernal pool and other seasonal wetlands densities were estimated for three landscape areas:

- Grassland with vernal swale complex land cover type,
- Grassland land cover type not associated with streams (upland grasslands more than 250 feet from stream centerline), and
- Grassland land cover type associated with streams (within 250 feet on either side of stream centerline).

These landscape areas were selected because they represent three different hydrological conditions that support recognizably different densities of wetlands. The methods for estimating densities of vernal pools and swales are described below.

All USACE delineation information was provided in paper report and map form and digital portable document format files; no GIS-based data was provided. Due to the lack of GIS-based wetlands data and the inconsistent nature of the various USACE delineation information provided, Leidos used two different techniques to produce the wetland density estimates of each sample site. Out of the 20 delineations provided by USACE that overlapped with BRCP mapped grassland and grassland with vernal swale complex land cover type polygons, 13 delineations

[4] The various USACE delineations of wetlands used to develop the wetland density estimates included various classifications of seasonal wetlands. Some of these seasonal wetlands were characterized as vernal pools, some as swales, and some as other types of seasonal wetlands. There was no consistency in classification systems across the different delineations, especially where different individual field delineators were involved. The term “other seasonal wetlands” is used here to group all types of seasonal wetlands other than those that meet the definition of vernal pool (i.e., vernal pool hydrology and species composition).

were detailed enough to use the "summation" method. In this method the delineations included annotated individual wetlands polygons and acreages for each polygon. The data were captured by summing all the wetlands that fell within the grassland or grassland with vernal swale complex land cover type polygons. BRCP grassland polygons were clipped to the study area boundaries of the wetland delineation. Dividing the total acreage of the jurisdictional wetlands that fell within the grassland polygon by acreage of the grassland polygon produced a proportion of wetlands per acre of grassland (e.g., 4 acres of wetlands within 100 acres of grassland yields a 0.04 proportion or 4 percent wetland cover). Any wetlands that crossed multiple land cover types were split and corresponding portions were allocated to each land cover type. Seven of the USACE delineations used did not include itemized acreages for each wetland polygon, but only total acres for each wetland type within the survey boundary. For these sample sites it was necessary to estimate by visual analysis the percentage of each wetland type included within the BRCP mapped grassland polygons. Spot checking of the estimates using digitized samples showed that estimates were within 10 percent of digitized values.

The initial results, using the methods described above, indicated an overestimation of seasonal wetlands in grassland land cover type. This result was due to the fact that stream floodplain corridors are included as part of grasslands land cover type in the BRCP GIS Land Cover Database and the very high density of wetlands within these relatively small areas associated with stream corridors were included with the calculation for wetlands within grassland land cover. There is a bimodal distribution of wetland density in grasslands with much higher densities in grasslands associated with stream corridors. In order to parse out these higher wetland density areas in the grasslands associated with stream corridors from the upland grassland community, the stream corridors were buffered by 250 feet on each side using the GIS and wetland density within these areas associated with streams were calculated separately. The buffer distance of 250 feet was chosen by trial and error to determine the breakpoint where density differences are greatest. All the streams in the USACE delineation sites were buffered by distances ranging from 100 to 800 feet and then analyzed to find the distance that captured the most stream-related wetlands and the distance at which wetland density dropped to low levels associated with the upland grassland community. Once the streams were buffered at 250 feet on each side, the wetland densities within the corridors were estimated using the same two procedures used for the grassland and grassland with vernal swale complex areas.

The total area of all delineated seasonal wetlands (including vernal pools) within each of three land cover types was divided by the total area of that land cover type within delineated sites. Results of the analysis produced the following density estimates for USACE jurisdictional vernal pools and other seasonal wetlands:

- 0.0454 (4.45 percent cover) per acre of grassland with vernal swale complex land cover type,
- 0.0088 (0.88 percent cover) per acre of grassland land cover type not associated with streams, and

- 0.2294 (22.94 percent cover) per acre of grassland land cover type associated with streams.

The mean and standard deviation of density for delineation sites were calculated for each of the three groupings of seasonal wetlands. A decision was made to use density values resulting from dividing the total seasonal wetland acres for all sites by the total acres of all sites rather than the mean density for the sites because of the large variation in the size of delineation sites. Data and results are presented in Appendix I-2. A summary of statistics for seasonal wetlands are:

- Grassland with vernal swale complex. A mean of 5.45 percent seasonal wetland cover per acre of grassland with vernal swale complex land cover type with a standard deviation of 5.19 from a sample of 13 sites. Sample site sizes varied from 2.56 acres to 1598.70 acres and the range of densities from 1.17 to 19.28 percent.
- Grassland not associated with streams. A mean of 1.39 percent cover of seasonal wetlands per acre of grassland land cover type not associated with streams with a standard deviation of 1.14 from a sample of 10 sites. Sample site sizes varied from 27.16 acres to 1317.40 acres and the range of densities from 0.00 to 3.60 percent.
- Grassland associated with stream corridor. A mean of 21.63 percent cover of seasonal wetlands per acre of grassland land cover type associated with streams with a standard deviation of 22.32 from a sample of 13 sites. Sample site sizes varied from 3.94 acres to 47.00 acres and the range of densities from 0.00 to 71.98 percent.

As noted above, these mean values were not used in the calculations estimating total acreage of vernal pools and other seasonal wetlands large range in sample site size and large variance in percent wetland cover.

3.4.5.2 Riparian Habitats

Riparian habitats include the land cover types: cottonwood-willow riparian forest, valley oak riparian forest, willow scrub, herbaceous riparian and river bar, and dredger tailings with riparian forest and scrub. The boundaries of riparian habitats were mapped directly into the BRCP GIS Land Cover Database – see methods described in Section 3.4.3, *Mapping Methods*. Typically some portion of each of these riparian communities will meet the requirements for USACE jurisdiction and other portions will not, depending on the frequency and duration of flooding. Often the lower elevation areas of riparian vegetation closer to the stream channel will meet jurisdictional criteria for hydrology, and portions farther from the stream on higher floodplains will not meet the criteria. No attempt was made to differentiate in the BRCP database and all riparian habitats are identified as potential jurisdictional wetlands. Additionally, all of these riparian habitats, where they are associated with stream, pond, or lake, would likely be considered jurisdictional by CDFW under California Fish and Game Code Section 1602.

3.4.5.3 Permanent Emergent Wetlands

The boundaries of permanent emergent wetlands were mapped directly into the BRCP GIS Land Cover Database – see methods described in Section 3.4.3. All areas within the boundaries of mapped emergent wetlands are assumed to meet USACE criteria for jurisdictional wetlands though on-ground delineations would be of higher resolution and likely vary from these boundaries.

3.4.5.4 Managed and Managed Seasonal Wetlands

The boundaries of managed wetlands and managed seasonal wetlands were mapped directly into the BRCP GIS Land Cover Database – see methods described in Section 3.4.3. The mapping units used for managed wetlands and managed seasonal wetlands have inclusions of upland habitats, therefore the acreage calculations for jurisdictional wetlands are overestimated in these land cover types. In addition, these wetlands are, for the most part, maintained by artificial hydrology (i.e., water applied to the land) and therefore all or portions of these wetlands may not meet USACE jurisdictional criteria for hydrology. The aerial extent of the mapped managed wetlands and managed seasonal wetlands that meets the three-parameter USACE jurisdictional criteria would need to be determined following removal of artificial inputs of water (i.e., the unassisted hydrology of the site would need to be determined). For this reason, including all managed wetlands and managed seasonal wetlands as potentially jurisdictional is an overestimation of USACE jurisdictional acreage.

3.4.5.5 Agricultural Wetlands

Rice lands, irrigated pasture, and irrigated cropland are maintained by artificial hydrology (i.e., irrigation water); therefore, all or portions of these wetlands may not meet USACE jurisdictional criteria for hydrology. The aerial extent of the mapped rice lands, irrigated pasture, and irrigated cropland that meets the three-parameter USAC jurisdictional criteria would need to be determined following removal of artificial inputs of water. One verified delineation was provided by USACE for the rice lands at the Richter site that supported 5.02 percent cover of wetlands (Appendix I.2). USACE could not provide any other representative examples of jurisdictional delineations on rice lands or for any of the other agricultural land cover types in or near the Plan Area. Estimates of the likely proportion of rice lands, irrigated pasture, and irrigated cropland that may support USACE jurisdictional wetlands following cessation of artificial water inputs, based on best professional judgment, are:

- Rice lands land – 5 percent jurisdictional wetlands,
- Irrigated pasture – 1 percent jurisdictional wetlands, and
- Irrigated cropland – 1 percent jurisdictional wetlands.

The boundaries of rice lands, irrigated pasture, and irrigated cropland were mapped directly into the BRCP GIS Land Cover Database – see methods described in Section 3.4.3. The mapped

acreage of these land cover types was multiplied by the percent cover to estimate the potential extent of USACE jurisdictional wetlands.

3.4.5.6 Non-wetland Waters

A wide range of non-wetland aquatic habitats supporting flowing and standing water in the Plan Area are likely jurisdictional waters of the United States. These waters range from Lake Oroville to ponds less than an acre and from the Feather River channel to agricultural drainage channels across rice lands. These waters were mapped in the BRCP GIS Land Cover Database as ponds, open water, dredger tailings–channels and ponds, major canal, rivers, streams, and agricultural channels. The boundaries of these waters (except for small ponds and the channels and ponds within dredger tailings) were captured for the BRCP GIS Land Cover Database using the methods described in Section 3.4.3.

Small ponds (under 1 acre) were mapped as points in the GIS database. To estimate the total extent of jurisdictional waters across all of these small ponds, an average size was estimated by sampling the area of 30 ponds. A mean size of 0.48 acres (standard deviation of 0.65) was multiplied by the 465 ponds in the Plan Area to estimate a total extent of 223.20 acres.

3.5 COVERED NATURAL COMMUNITIES

The natural communities proposed for coverage under the BRCP include oak woodland and savanna, grassland, riparian, wetland, aquatic, and agriculture. Each of the natural communities is comprised of the land cover types shown in Table 3-5, *Extent of Natural Communities and Other Land Cover Types in the Plan Area (acres)*. Developed/disturbed land cover types (see Table 3-3) are not proposed as a natural community because they provide low-value habitat for native species and are subject to ongoing human disturbances. Chaparral and conifer-dominated forest, although natural land cover types, are not proposed as natural communities, because the BRCP is focused on conservation of lowland communities, and chaparral and conifer-dominated forest are higher elevation communities located primarily outside of the Plan Area and occurring in the Plan Area only as relatively small inclusions.

The distribution of the natural communities and land cover types in the Plan Area is presented in Figure 3–11, *Distribution of Natural Communities in the Plan Area* and Figure 3–12, *Distribution of Land Cover Types in the Plan Area* (see separate files), respectively, and the extent of natural communities and land cover types is presented in Table 3-5. Agriculture is the most extensive natural community, comprising over 49 percent of the total extent of natural communities in the Plan Area and 44 percent of all land cover types. The following sections describe physical and biological attributes associated with each natural community.

Table 3-5. Extent of Natural Communities and Other Land Cover Types in the Plan Area (acres)

Natural Community and Constituent Land Cover Types[1]	Acres
Oak Woodland and Savanna	
Blue oak savanna	10,581
Blue oak woodland	34,735
Interior live oak woodland	2,382
Mixed oak woodland	44,893
Subtotal	***92,590***
Grassland	
Grassland	68,124
Grassland with swale complex	34,110
Subtotal	***102,234***
Riparian	
Cottonwood-willow riparian forest	7,509
Valley oak riparian forest	4,331
Willow scrub	2,995
Herbaceous riparian and river bar	1,658
Dredger tailings with riparian forest/scrub	
stream-associated	5,489
non-stream-associated	167
Subtotal	***22,148***
Wetland	
Emergent wetland	4,440
Managed wetland	25,486
Managed seasonal wetland	2,097
Subtotal	**32,024**
Aquatic	
Open water	8,401
Major canal	1,897
Pond[2]	465 ponds
Subtotal	***10,298***
Agriculture	
Rice	120,316
Irrigated cropland	20,413
Irrigated pasture	1,160
Orchard/vineyard	108,698
Nonnative woodland	48
Subtotal	***250,634***
Total Natural Communities	***509,929***
Other Land Cover Types	
Chaparral	
Chaparral	8,317
Subtotal	***8,317***
Developed	
Urban	25,445
Ranchettes – wooded	6,406
Ranchettes – open	7,654
Disturbed ground	3,534
Dredger tailings with sparse herbaceous vegetation	2,918
Subtotal	***45,958***
Conifer-dominated forest	
Conifer-dominated forest[3]	*15*
Total All Land Cover Types	***564,219***[4]

[1] Vernal pool and altered vernal pool features were mapped separately and used to support species habitat model development. These features are small inclusions within larger land cover types that are subsumed within the total acreages of these land cover types.
[2] Recorded as point data in the GIS database and not shown in Figure 3–12.
[3] Not visible in Figure 3–12 because of its limited extent in the Plan Area.
[4] Note that this number is 16 acres more than the total Plan Area acreage shown in Section 3.2. This 0.005 percent difference is attributed to the difference between calculating the sum acreage of several thousand polygons and the total acreage of one polygon.

3.5.1 Oak Woodland and Savanna

The woodland and savanna natural community is comprised of the following land cover types: blue oak woodland, blue oak savanna, interior live oak woodland, and mixed oak woodland. All are tree-dominated and have a minimum tree canopy cover of 3 percent. The minimum cover value for oak savannas was established to distinguish tree-dominated habitats from those dominated by herbaceous species (e.g., grassland). Tree-dominated habitats have different implications for wildlife from those dominated by herbaceous species. The distribution of the oak woodland and savanna community and its constituent land cover types in the Plan Area are shown in Figure 3–13, *Distribution of the Oak Woodland and Savanna Natural Community in the Plan Area* (see separate file) and the extent of the community and land cover types are presented in Table 3-5. Mixed oak woodland is the dominant land cover type (comprising about 48 percent of the community), followed by blue oak woodland (comprising 38 percent of the community).

3.5.1.1 Environmental Conditions

Oak woodland and savanna is a community with a relatively constant species composition. Blue oaks, the dominant oak species, are very slow-growing and can live for several centuries. Understory vegetation during succession in oak woodlands typically comprises the same grassland understory species through all seral stages with a change in structure as trees establish over time. Natural or artificial clearing, such as by fire or mechanical clearing, returns the community to grassland. A lack of recruitment of blue oak trees has been observed in oak woodlands across much of California and long-term survival of this natural community may be limited in some locations (Bartolome et al. 2002a, Swiecki and Bernhardt 1998, Mensing 1991, Muick and Bartolome 1987). In particular, the age structure of these stands suggests that saplings are a limiting stage in recruitment (Muick and Bartolome 1987). Potential causes for low or lack of recruitment include grazing by deer and livestock, competition with nonnative annual grasses, increased rodent populations, changes in fire regime, and inappropriate climate conditions for recruitment (McCreary 2001). The other dominant oak species in the Plan Area, interior live oak and canyon live oak, have not been found to have the same problems with recruitment.

3.5.1.1.1 Land Use

Oak woodlands and savanna are used for a variety of purposes, including livestock grazing, particularly of cattle and sheep. Oak woodlands have historically been used as a source of firewood. They also support small developments such as rural ranchettes, particularly on the east side of Oroville. Ranchettes are discussed as a land cover type in Section 3.4.4, *Land Cover Type Descriptions*.

3.5.1.1.2 Physical Environment

The oak woodland and savanna natural community occurs along the eastern edge of the Plan Area in the foothills of the Sierra Nevada and Cascade Mountains. Foothills topography includes flat to very steep slopes, terraces, steep ridges, and wide, flat hilltops and valleys. The elevation of occurrence ranges from approximately 800 to 1,500 feet above mean sea level, but elevational extent varies north to south (see Section 3.5.1.2, *Environmental Gradients* for a complete description of distribution patterns).

The oak zone generally includes the foothill volcanic rock and mudflow features with variable slopes. Soils are generally shallow to moderately deep and moderately well-drained from alluvial and colluvial origins associated with their respective ranges. The aspect of the slopes generally faces west to southwest towards the valley within the Plan Area. Soil types that predominately support oak woodland and savanna cover types are presented in Table 3–6, *Soil Types Supporting Woodland and Savanna*.

Table 3–6. Soil Types Supporting Woodland and Savanna

Soil Grouping* Soil Complex	Blue Oak Woodland	Blue Oak Savanna	Mixed Oak Woodland	Interior Live Oak Woodland
Thermic Soils on Volcanic Cascade Foothills				
Lucksev-Butteside-Carhart	X	X	X	X
Doemill-Jokerst	X	X	X	X
Xerorthents, Shallow-Typic Haploxeralfs-Doemill	X	X	X	X
Thermic Soils on Metamorphic Sierra Nevada Foothills				
Dunstone-Loafercreek-Argonaut Taxadjunct	X	X	X	X
Dunstone-Loafercreek-Oroshore	X	X	X	X
Mounthope-Hartsmill	X	X	X	X
Ultic Haploxeralfs, Thermic, High Terrace	X	X	X	X

Source: Modified from NRCS (2006).
*A description of specific soil complexes is presented in Table 3–2.

3.5.1.1.3 Vegetation

Oak woodlands and savannas in the Plan Area are comprised of an overstory of a mixture of oak species, including blue oak, canyon live oak, interior live oak, and foothill pine. In general, the midstory is very open without much vegetation. In more mesic sites, poison oak, toyon, and buckeye are present in the mid-layer. Nonnative grasses and forbs dominate the understory, but native forbs are common. Plant species that are associated with woodland and savanna land cover types in California are listed in Appendix D, *Native Species Supported by BRCP Natural Communities*.

Oak trees are able to tap deeper water and maintain photosynthesis during the dry season at a time when the shallow-rooted herbaceous understory annuals die and turn brown. Blue oak is winter deciduous; however, it is also well-suited to extreme drought and will shed its leaves in the late dry season to enhance moisture retention during extreme drought (McCreary 1990).

Sudden Oak Death (SOD) is an emerging forest disease that has killed tens of thousands of oaks in California (Rizzo and Garbelotto 2003). While the current extent of SOD is restricted to coastal counties, it has the potential to become more widespread. Using a rule-based model, Meentemeyer et al. (2004) created a map of California counties to determine varying levels of risk of spread. The majority of Butte County's woodlands were ranked in the very low and low risk category (882.5 square kilometers [km^2] and 3320.2 km^2, respectively), but it had regions in the high and moderate risk category (5.3 km^2 and 135.7 km^2, respectively). The regions in the higher risk categories, however, tended to be at higher elevations outside the Plan Area, in communities containing black oak with co-occurring species of tanoak, bay laurel, and madrone.

3.5.1.1.4 Wildlife

Oak woodlands and savannas in the Plan Area are diverse and biologically rich. These communities are essential to the maintenance and sustainability of wildlife populations in the eastern portion of the Plan Area. Oak communities provide habitat for over 330 species of wildlife, including reptiles, small and large mammals, and birds (California Partners in Flight 2002). These areas function as breeding, foraging, nesting, denning, protection, and migration habitats. Among the most productive and diverse wildlife habitats in the state (Verner 1980, Barrett 1980, Block and Morrison 1998, Giusti et al. 2004), oak woodlands and savannas are valuable because they provide abundant nesting, roosting, and cover opportunities for wildlife species in association with grassland foraging habitats. They also support large decadent trees that are important because they provide abundant cavities that provide nesting sites for birds and foraging opportunities for insect-eating birds. Oak trees are particularly valuable because of the production of acorns, which are an abundant high quality food for many birds and mammals. Downed wood from oak trees also provides food and cover for a variety of arthropods, fungi, and wildlife species (Standiford et al. 2002).

Common wildlife associated with the oak woodland and savanna natural community within the Plan Area include Columbian black-tailed deer, acorn woodpecker, barn owl, wild turkey, California quail, big brown bat, cottontail, and many other mammal, reptile, and bird species (Butte County 2005). Wildlife associated with the oak woodland and savanna community are listed in Appendix D.

Bird Populations

Many bird species are dependent on oak woodland habitats for food and nesting. Maintenance of healthy, intact oak woodland habitats is essential to provide the necessary habitat elements (e.g., nesting cavities, acorn crops, standing dead trees, down wood, shrub layer, etc.) for these species. Concern regarding the health of oak woodlands in California has resulted in efforts to monitor bird populations and to develop conservation strategies to protect and enhance woodland habitats. In addition to a continuing loss and fragmentation of oak woodlands from urbanization and agricultural expansion, a variety of other factors, including loss of habitat structure (e.g., dead standing trees, trees with cavities, intact shrub layer), lack of oak regeneration, and the spread of SOD, has further raised concerns about the long-term status of dependent bird

populations (California Partners in Flight 2002). To assess the possible effects on bird populations, California Partners in Flight (2002) conducted a 10-year monitoring study using 120 monitoring sites across California. Of the seven "focal" species selected to represent bird populations in oak woodlands, six experienced population declines. Four of these experienced significant population declines, local extirpations, or both. Loss of habitat structure was implicated as the likely cause of decline of five of these species. This study and others emphasize the importance of oak woodlands to birds and other wildlife species and the need for conservation and enhancement in order to maintain the value of oak woodlands and sustain dependent wildlife populations. This study also provides recommendations and strategies for conservation and enhancement of oak woodland habitats that could potentially be applied to the BRCP during implementation.

Deer Herds

Black-tailed deer are common in Butte County and the County's oak woodland and savanna communities provide important winter range for migratory and resident deer herds. Oak woodland and savanna is used by three separate migratory herds, the East Tehama, Bucks Mountain, and Mooretown herds, which occupy the eastern foothills and mountains in Butte County and depend on these areas for all or part of their habitat requirements. Resident deer herds in Butte County are the Camp Beale and Sacramento Valley herds. A detailed description of deer herds in the Plan Area is presented in Section 3.8.

3.5.1.2 Environmental Gradients

Oak woodlands and savanna are bordered on the east (upslope) by chaparral and conifer forests dominated by ponderosa pine. At higher elevations, California black oak is found as an understory to conifer forests or as a dominant in seral stands to conifer-dominated communities. The gradation from oak woodlands to chaparral manifests itself differently in the southern part of the county (Sierran foothills) than the northern part (Cascade foothills). In the southern part of the County, from approximately Lake Oroville south, the transition to chaparral occurs as a decrease in the stature of oaks and an increase in the density of chaparral species (most commonly manzanita). In the northern part of the County, chaparral and oak-dominated land covers are more distinct and do not typically intergrade. The change to chaparral is in mosaics of the two types with chaparral becoming more abundant and occupying a greater extent of the habitat upslope.

The transition to chaparral is apparently due to several factors. Chaparral occurs on steeper, south-facing slopes, and thinner soils in the transition zone. Lack of foothill oak species at higher elevation may be due to lower winter temperatures at those elevations. The range of elevations at which foothill oak species are absent is highly variable, from approximately 800 to 1,500 feet. However, where these oaks disappear at lower elevations in the Plan Area, it is in steep canyons that are surrounded by lands of substantially higher elevation. Cold air flows from higher elevation locations downsloping into canyons (a process called cold air drainage or frost pockets) may be a factor limiting oaks in these locations. The process works as follows: air at

higher elevation cools faster than lower elevation areas after sunset. The cooler air has a higher density than the warmer air at lower elevation, and cold air flows downslope until it reaches an impediment or air that is either equally or more dense. For that reason, low elevation locations can have lower night time and early morning temperatures than adjacent areas of higher elevation. Oaks occur at higher elevation areas primarily in the southern part of the county. Exposure, soil, or other factors may increase survivability for oak trees at this location.

The downslope limit of foothill oak woodlands and savannas is determined by soil depth and water retention qualities of the soil and by artificial clearing. Soils of the valley are deeper, and in some locations a hardpan layer restricts water percolation. In areas with hardpan, rooting depth is restricted and the soils retain water for extended periods, making them largely unsuitable for oak trees. This transition occurs gradually downslope, with oak woodlands and savannas becoming less dense and grassland and vernal pool grassland land cover becoming dominant. In addition to natural factors that limit the extent of oak woodlands, humans have historically cleared oak trees for a variety of purposes such as range management, firewood, and land conversion. Because blue oaks are long-lived and take a time long to reestablish, cleared areas generally remain so for decades to centuries.

3.5.1.3 Invasive Species

Nonnative invasive species can impact the condition of many natural communities, altering fundamental ecological processes and threatening biodiversity. Nationally, invasive species rank as the second-greatest threat to endangered species, after habitat destruction (Pimentel et. al. 2005).

In oak woodlands and savanna, invasive species can alter soil moisture levels, change fire cycles, impede oak regeneration, and transform the composition of the understory. It is thought that California grasslands have undergone a major shift in the last two centuries from perennial-dominated (native) grassland to annual-dominated (nonnative, invasive) grassland. Increases in nonnative invasive annual grasses have often been cited as an interfering factor in oak woodland regeneration in California (McCreary 2001, Jackson and Roy 1986). Research suggests that invasive annual grasses and forbs, such as the yellow starthistle, may compete with oak seedlings for water and light, or may harm them indirectly through subsidizing high densities of small mammals (Gordon and Rice 2000).

Numerous invasive plants that are unpalatable to native and domestic grazers may also be locally abundant in oak woodlands and savannas, particularly in areas with past or current inappropriate livestock management practices. These species may include grasses such as Medusa-head, barbed goatgrass, cheatgrass, and invasive forbs like yellow starthistle, and several species of mustard. Cheatgrass and barbed goatgrass, in particular, have also been shown to promote shorter fire cycles in ecosystems (D'Antonio and Vitousek 1992). In a myriad of ways, invasive plants can have large-scale changes in the oak woodland and savanna community.

3.5.1.4 Ecosystem Functions

Intact, functioning woodland and savanna communities provide many ecosystem services and benefits to humans. Important functions of these communities range from water and air filtration, nutrient cycling, carbon storage, and soil formation and prevention of erosion, to forage and shade for domestic livestock and support for wildlife habitats. Additionally, they provide open space and recreational benefits as well as symbolic value. Oaks in particular span many of California's diverse climatic zones and define the landscape for many of its residents.

Unique benefits provided by the woodland and savannas for Butte County residents include recreational opportunities such as hiking, hunting and wildlife viewing, and aesthetic benefits, including rural and open space views. Woodlands and savannas in the Plan Area are predominantly found on private lands grazed by domestic livestock, thereby fostering and supporting working landscapes that harbor low-intensity agricultural uses such as ranching. Additionally, woodlands and savanna provide important watershed protection for Butte Creek and Big Chico Creek and other open water bodies in the Plan Area.

The woodlands and savanna ecosystems of Butte County are part of the California Floristic Province, a globally recognized conservation hotspot. In California, oak woodland and savanna is one of the most biologically diverse communities, providing habitat for approximately 2,000 plant, 5,000 insect, 80 amphibian and reptile, 160 bird, and 80 mammal species (Merenlender and Crawford 1998). This high biodiversity is partly due to the provisioning of oak mast, a critically important food for many wildlife species.

Many important wildlife habitat elements occur in oak woodlands, including wetlands, riparian corridors, rock outcrops, dead and downed logs and other woody debris, brush piles, and snags. Oaks provide woody substrate for insect prey, important nesting and roosting habitat for birds, and buffered temperatures and cover from predators for bird, mammal, amphibian, and reptile species.

Adding to their value to wildlife and domestic livestock, understory plant communities beneath oak canopies are often more productive relative to adjacent plant communities as a result of natural soil enhancement, which results in enhanced forage benefits. Dahlgren et al. (1997) describe soils beneath oak canopy as "islands of fertility" because of greater carbon, nitrogen, and phosphorous reserves relative to adjacent open grassland sites. In an investigation of soil conditions under different tree species canopy and in open grassland sites, Frost and Edinger (1991) found higher organic carbon levels, greater cation exchange capacity, lower bulk density, and greater concentrations of some nutrients (at a soil depth of 0 to 5 centimeters [cm]) under blue oak canopies than in open grassland. These increases are attributed in part to leaf fall and decomposition (Firestone 1995).

Several factors threaten the integrity of intact, functioning woodland and savanna communities. Blue oak woodlands and savannas are compromised by nonnative species, habitat fragmentation, poor sapling recruitment, and disruption of natural fire and grazing regimes. The lack of

regeneration by blue oaks is a long-term issue for maintaining the integrity and wildlife value of this habitat type (Swiecki and Bernhardt 1998). As previously discussed, control of invasive species may be an important aspect of successful oak restoration. In addition, changes in fire frequencies, in particular fire suppression, may impact restoration. McClaren and Bartolome (1989) showed that higher fire frequency might have favored oak regeneration.

3.5.2 Grassland

The grassland natural community is comprised of the following land cover types: grassland, grassland with vernal swale complex, vernal pools, and altered vernal pools. Grassland within the Plan Area typically occurs on relatively level valley basin soils, alluvial fans between the basins and the foothills, and gently sloping terraces along the base of the Sierra Nevada foothills. Some areas of grassland are the result of oak woodland clearing and not natural processes or conditions. Grassland was also used as a land cover type classification for areas dominated by low-growing, herbaceous vegetation (grasses, forbs, and grass-like plants) in disturbed areas such as abandoned agricultural land.

For the purpose of developing the BRCP Conservation Strategy, grassland is divided into two mapped types: “grasslands” and “grasslands with vernal swale complex.” Grasslands are dominated by upland vegetation and support only scattered occurrences of vernal pools and swales. Grasslands with vernal swale complex support high densities of seasonal wetlands defined by their unique, hydrology, soils, and vegetation as vernal pools and swales within a matrix of upland grassland vegetation. More description of vernal pools and swales is provided in this section.

The great majority of valley grassland is dominated by nonnative annual species, but some small areas support high densities of native grasses and forbs and can be considered native grasslands or California Prairie type. This native community was not mapped separately, however, because native grasslands occur as small inclusions in valley grassland that were not discernible on the aerial imagery used. The distribution of the grassland community and its constituent land cover types is shown in Figure 3–14, *Distribution of the Grassland Natural Community in the Plan Area* (see separate file) and the extent of the community and land cover types is presented in Table 3–5.

3.5.2.1 Environmental Conditions

Grassland is generally bordered by oak woodland and savanna to the east (upslope) and by various types of agriculture and urban development to the west. Grassland habitats in California have been significantly modified as a result of nonnative and invasive species, agricultural

conversion, and loss and fragmentation from urbanization. Within the Central Valley, grasslands occur primarily around the perimeter of the valley at the interface between woodland habitats and the valley floor. These areas have been and continue to be subject to loss and fragmentation due to expanding urban and rural development and conversion to agriculture, most recently vineyard expansion.

3.5.2.1.1 Land Use

The primary use of grasslands in the Plan Area is livestock grazing with some areas of grassland swale complex and vernal pools set aside for preservation.

3.5.2.1.2 Physical Environment

The grassland natural community occurs between, and sometimes intergrades with, the higher elevation woodland and savanna community along the eastern edge of the Plan Area and lower elevation agricultural lands that dominate the central and western portion of the Plan Area. Grassland occurs on a wide range of soil types within the Plan Area. Grassland with swale complex, vernal pools, and altered vernal pools is restricted based on geology, hydrology, and soil type, which integrates characteristics of geology and hydrology. Soil types that predominantly support grassland cover types are presented in Table 3-7, *Soil Types Supporting Grassland*.

Table 3-7. Soil Types Supporting Grassland

General Soil Unit Soil Complex[1]	Grassland	Grassland with Vernal Swale Complex	Vernal Pools and Altered Vernal Pools
Thermic Soils Formed in Cascade Alluvium on Fan Terraces in the Sacramento Valley			
Redsluff-Redtough-Redswale-Anita-Hamslough-Durixeralfs-typic petraquepts	X	X	X
Thermic Soils on Volcanic Cascade Foothills			
Lucksev-Butteside-Carhart	X	X	X
Doemill-Jokerst	X	X	X
Xerorthents, Shallow-Typic Haploxeralfs-Doemill	X	X	X
Thermic Soils Formed in Sierra Nevada Alluvium on Intermediate and High Fan Terraces in the Sacramento Valley			
Thompsonflat-Oroville-Vistarobles	X	X	X
Thermic Soils on Lovejoy Basalt and Ione Sediments on Sierra Nevada Foothills			
Palexerults-Rock Outcrop, Basalt-Coalcanyon-Elsey-Beatsonhollow-Campbellhills-Thermalrocks	X	X	X

Source: Modified from NRCS (2006).

[1]A description of specific soil complexes is presented in Table 3–2.

3.5.2.1.3 Vegetation

The grassland community in Butte County is species-rich. The majority of upland grassland in all of the grassland land cover types mapped is valley grasslands, which are typically dominated

by low-growing nonnative annual grasses interspersed with a diverse assemblage of native perennial grasses, nonnative forbs, and native forbs. Vernal pools and vernal swales found within the grassland matrix contain a unique and diverse vegetation community distinct from valley grasslands; these are discussed below.

Valley grassland throughout California, including in the northeastern Sacramento Valley where the Plan Area is located, has been heavily invaded by nonnative species, especially Mediterranean annual grasses; however, on some unfarmed sites the native component typically includes the majority of plant species diversity. While the percent cover of native species is variable at the landscape scale, a site (e.g., pasture, ridgeline) with as little as 10 percent native species cover can be categorized as distinct native perennial grassland community types (hereafter native grasslands). Native grasslands are typically found in isolated patches, smaller than the mapping unit for this BRCP, but contain higher resource values than valley grassland. Native grassland is considered a rare natural community by CDFW (California Natural Diversity Database [CNDDB] 2006).

In valley grassland, including grassland in the Plan Area, soft chess, ripgut brome, and two species of filaree, *Erodium botrys* (in more mesic sites) or *E. cicutarium* (in drier sites), are typically common and dominant. Slender wild oats, wild oats, and Italian rye-grass can be locally abundant and dominant (Bartolome et al. 2007).

Native grasslands within the valley grassland matrix may be dominated or co-dominated by the same species as valley grassland, but contain higher percent cover of native species. Several unique vegetation community subtypes can be identified within the native grasslands. Subtypes found in Butte County uplands likely include the foothill needlegrass series recognized by the presence of *Nassella lepida* and the purple needlegrass series recognized by presence of *Nassella pulchra* (Sawyer and Keeler-Wolf 1995). Numerous native wildflowers are found within these habitats. Examples of common native wildflowers occurring in valley grassland include butter and eggs, miniature lupine, California poppy, turkey mullein, tarweeds, Itherial's spear, and clovers.

Grassland in upland areas surrounding vernal pools is typically similar to grassland without pools, and may contain patches of native grassland. Vegetation of vernal pools and vernal swales is described below in Section 3.5.2.2, *Vernal Pools and Vernal Swales.*

In all types of valley grasslands occasional oak trees can be present. In the BRCP Land Cover GIS Database, sites supporting occasional oak trees at less than 3 percent cover in a 10-acre unit were classified as valley grassland and not as oak woodland or savanna.

3.5.2.1.4 Wildlife

Grassland provides essential habitat for a variety of wildlife species in the Plan Area. Grassland-associated wildlife species include California ground squirrel, California vole, Botta's pocket gopher, western harvest mouse, coyote, burrowing owl, savannah sparrow, western meadowlark,

ring-necked pheasant, western rattlesnake, gopher snake, and western fence lizard. Grassland also provides foraging habitat for turkey vulture and raptors, including Swainson's hawk, red-tailed hawk, northern harrier, and white-tailed kite (Butte County 2005, DFG 1988). Native grasslands provide habitat for native bees and other economically important pollinators for crops in the agricultural lands of the county (Kremen et al. 2004). Grassland with vernal pools and vernal swales seasonally support crustaceans (e.g., fairy shrimp) and other invertebrates and provide foraging and resting habitat for shorebirds, waterfowl, and other migrant birds. Wildlife species associated with the grassland community are listed in Appendix D.

Although transformed from their native condition, grassland habitats continue to provide essential habitat to many birds and other wildlife species. Many bird species are dependent on grassland habitats for nesting, foraging, and cover. Continuing loss of grassland can result in significant declines in dependent bird populations, however, available information on grassland-dependent bird populations is insufficient (California Partners in Flight 2000) to adequately examine population trends relative to the extent and condition of grassland habitats. Nonetheless, The California Partners in Flight 2000 study examines the status and distribution of seven selected representative focal bird species and provides recommendations and strategies for further assessment, conservation, and enhancement of grassland habitat.

Vernal pools and swales, discussed below, commonly occur in the grassland in the Plan Area. Several special-status invertebrates are known to occur in the vernal pool, vernal swale, and other seasonal wetlands in the Plan Area, including vernal pool tadpole shrimp, vernal pool fairy shrimp, and Conservancy fairy shrimp. As a result of the significant loss of vernal pool and vernal swale habitats in the Central Valley from urbanization and agricultural conversion, populations of these species have declined throughout their range. Collectively, these species occur within a range of specific environmental conditions that include soil type, vegetation characteristics, water depth, water temperature, inundation duration, and water quality.

3.5.2.2 Vernal Pools and Vernal Swales

Vernal pools and vernal swales are found within the grassland in areas with shallow soils on relatively flat areas that are underlain by bedrock, hardpan, and claypan. The geologic formations that support vernal pool and swale terrain are shown in Figure 3–15, *Geologic Formations Supporting Vernal Pools in the Plan Area* (see separate file). Vernal pools are shallow depressions that seasonally fill with rain water during the wet season and are completely dry by late spring or early summer. Vernal swales are similar, except that they generally form individual or a network of drainages that meander through the landscape. Organisms that thrive in this unique, harsh habitat co-evolved with the geologic and climatic conditions that formed vernal pools and vernal swales and, consequently, these features contain a high number of endemic and rare species of plants, animals, and invertebrates. Vernal pools and swales contain a unique assemblage of native herbaceous forbs and grasses including Fremont's goldfield, valley goldfield, tidy tips, white navarretia, pogogyny, and yellow carpet in the Plan Area.

Several species found in the Plan Area are listed under the federal ESA and CESA, including Hoover's spurge, Butte County meadowfoam, hairy Orcutt grass, slender Orcutt grass, and Greene's tuctoria (USFWS 2005). Numerous native vernal pool plant species are associated with essential pollinators. Examples include specific relationships between certain ground bee species and corresponding vernal pool plants. Protection of upland pollinator habitat is necessary to maintain vernal pool plant populations. Fragmentation of vernal pool habitat can reduce the availability of habitat for pollinator species, resulting in decrease or cessation of seed production in many vernal pool plants (Thorp and Leong 1998).

Three types of vernal pools in the Plan Area are identified in CNDDB as rare natural communities: Northern Basalt Flow Vernal Pools, Northern Hardpan Vernal Pools, and Northern Volcanic Mudflow Vernal Pools. Northern Basalt Flow Vernal Pools occur on flat mesas in the Table Mountain region formed by the Lovejoy Basalt (California Department of Conservation 1992), and are slightly higher in elevation (approximately 1,000 feet) than other vernal pools and vernal swales in the Plan Area. The thin, low-fertility soils are underlain by impervious volcanic basalt rock that results in a perched water table and typically small hydrologically "flashy" vernal pools. These shallow, low-nutrient (especially low-nitrogen) soil conditions are less suitable to nonnative grasses, resulting in improved growth and survival of native grasses and wildflowers. Northern Basalt Flow Vernal Pools are geographically restricted. They are typically small in area (less than 100 square meters [m^2]) and may fill with water and dry multiple times during the rainy season (Keeler-Wolf et al 1998). Because they are underlain by bedrock and found on more uneven terrain, agricultural conversion has had much less of an impact than it has on some other types of vernal pool and vernal swale grasslands.

Northern Hardpan Vernal Pools are the most common type in the Plan Area. They occur on Pleistocene and older valley alluvial plains and terraces with an underlying cemented layer in the soil that restricts percolation. Northern Hardpan Vernal Pools are found on the Modesto, Riverbank, Red Bluff, and Laguna Formations in the Plan Area (California Department of Conservation 1992). The vernal pools and vernal swales can be larger than the other two types in the region (1 acre or more) and tend to remain inundated longer in late spring and summer. Much of this habitat is privately owned land and may be subject to more intensive land use and agriculture (Keeler-Wolf et al. 1998).

Northern Volcanic Mudflow Vernal Pools occur on volcano clastic-derived substrates such as lahars (volcanic mudflows), volcanic conglomerate, and pumiceous tuff of the Cascadian foothills in the Plan Area. Northern Volcanic Mudflow Vernal Pools are found on the Tuscan Formation in the Plan Area (California Department of Conservation 1992). Similar to Northern Basalt Flow Vernal Pools, these vernal pools tend to be small in area, irregularly spaced, and with flashy hydrology. They are characterized by very shallow, low-nutrient soils (less than 30 cm deep) and are underlain by impervious mudflow welded tuff (Keeler-Wolf et al 1998).

3.5.2.3 Environmental Gradients

Naturally occurring grasslands typically occur on the deeper soils of the valley bottoms. Oak trees increase in abundance with elevation, slope, and thinner soil depths. Vegetation transitions upslope at the east side of the Plan Area are therefore typically into blue oak savanna and woodland. The most visible difference between the oak-dominated communities and pure grasslands is the absence of oak trees. Understory species composition and structure changes with increasing canopy cover and shade. Soil nutrient and water cycles under the oak canopy of savanna and woodland are different from grasslands, and the extensive root system in the understory tends to result in soils higher in quality and fertility than in pure grassland stands. Naturally occurring grassland communities in the Plan Area typically grade into oak savannah in the east.

The western boundary of grassland types in the Plan Area is typically agricultural land or urban development. Many grasslands historically intergraded with floodplain dominated by riparian woodland and valley basin dominated by tule marsh, which contain prime soil types for flood-irrigated rice and other agricultural crops. The cities of Chico and Oroville are within and adjacent to grassland communities. As a result of human activities, the transition to agriculture or urban land cover is typically abrupt. In some cases ranchettes or other dispersed development forms a mosaic with grasslands in a transition zone with more contiguous urban development.

3.5.2.4 Invasive Species

California annual grasslands are considered one of the most dramatic examples of plant invasions worldwide (Mooney et al. 1986). Numerous invasive plant species are unpalatable to native and domestic grazers and may also be locally abundant. These species may include grasses such as Medusa-head, barbed goatgrass, cheatgrass, and invasive forbs such as yellow starthistle, as well as several species of mustard (D'Antonio et al. 2007). Medusa-head in particular produces seeds and seedheads that are noxious to livestock; its palatability is low because of high levels of silicon dioxide, and its rate of decomposition is low, resulting in the build-up of thick thatch layers.

As Mediterranean annual grasses dominate most upland grasslands in the Plan Area, they also encroach on shallow vernal pools and vernal swales and threaten native species. In longer duration vernal pools, low mannagrass or waxy mannagrass can become dominant, impacting native plant species and the invertebrate community by altering the physical and chemical characteristics of the vernal pools (Gerlach et al. 2009, Gerlach unpublished data 2011).

3.5.2.5 Ecosystem Functions

In addition to their habitat value for wildlife, diverse, functioning natural communities provide an array of services and benefits to humans. These include provisioning services such as drinking water, irrigation water, and forage for domestic livestock; regulating services such as water filtration, flood abatement, and agricultural crop pollination from wild insects; supporting

services such as soil nutrient cycling and soil formation; and an array of cultural benefits including space for recreational activities (Millennium Ecosystem Assessment 2005).

Unique benefits provided by the grasslands and vernal pools and vernal swales for Butte County residents include both aesthetic (rural and open space views) and recreational (hunting, hiking, and wildlife and seasonal wildflower viewing). Grassland and vernal pool and vernal swale habitat in the Plan Area is predominantly found on private lands grazed by domestic livestock; these working landscapes currently provide sufficient livestock forage to maintain a rural livelihood and associated culture. Vernal pools and vernal swales may also link hydrologically via ephemeral and intermittent streams to larger perennial streams and rivers, wetlands, and other bodies of water, which provide additional recreational and cultural values, as well as a water and food supply.

Functioning, intact grasslands, vernal pools, and vernal swales in the Plan Area are important habitat for a host of plant and wildlife species. These include species in all trophic levels, from primary producers (plants, including native grasses and wildflowers), to terrestrial and aquatic invertebrates, to secondary consumers and carnivores including mammals, amphibians, reptiles, and birds. Some species depend entirely on these habitats throughout their lifecycle, others for only a portion of their lifecycle (e.g., breeding habitat or food source). Vernal pools and vernal swales provide important habitat for several species of threatened and endangered crustaceans (e.g., vernal pool fairy shrimp, vernal pool tadpole shrimp, and Conservancy fairy shrimp); these species are able to persist in vernal pools and vernal swales because the seasonal water bodies are disconnected from free-flowing waterways that would otherwise serve as a corridor for invasive predatory fish.

The grassland, vernal pool, and vernal swale ecosystems of Butte County are part of the California Floristic Province, a globally recognized conservation hotspot. These ecoregions are recognized for their exceptional biodiversity, particularly the high degree of endemism; and degree of threat from habitat loss and degradation (Myers et al. 2000). Grasslands, vernal pools, and vernal swales throughout the Central Valley have been heavily impacted by conversion to agriculture and development, as well as invasion of nonnative species, which can have a negative impact on native species, community structure, and wildlife habitat. Invasive species can also affect natural ecosystem functions and/or benefits such as soil nutrient cycling, water infiltration and cycling (leading to erosion or sedimentation), and wildfire (D'Antonio et al. 2007, Reever-Morghan et al. 2007).

Past management strategies for vernal pools and vernal swales have sometimes excluded livestock grazing based on the assumption that trampling, herbivory, and soil churning by livestock negatively impact habitat quality and vernal pool and vernal swale function. Recent research in California vernal pools shows, however, that for some types of vernal pools and under specific local conditions, appropriate grazing may help maintain native species habitat by slowing the encroachment of dense, highly competitive nonnative species, particularly the Mediterranean annual grasses that dominate most upland grasslands (Marty 2005). Livestock

grazing practices in valley grasslands and the native grasslands results in variable community responses. These communities are typically more strongly influenced by soil conditions, historical land use practices (heavy grazing, tilling, or other soil disturbance) and annual weather patterns than light to moderate cattle or sheep grazing. Residual dry matter standards recommended by the University of California Cooperative Extension facilitate conservation of existing native species within grasslands while still providing forage for wildlife and livestock and erosion control (Bartolome et al. 2002b). However, grazing animals do not use the landscape uniformly and tend to concentrate on palatable forage and wetland features so stocking rate alone is not an accurate indicator of their impacts on vernal pools (George et al. 2007, Gerlach unpublished data 2011).

Fire has variable and short-lasting effects in grassland relative to environmental variables and historical land use practices. Aboveground biomass removal is the primary effect. An increase in cover of forbs relative to grasses has occurred after fire in some cases. Prescribed fire, sometimes in combination with grazing prescriptions, is sometimes used to control certain invasive species or reduce the chances of larger, uncontrolled wildfires (Bartolome et al. 2007).

3.5.3 Riparian

The riparian natural community is made of the following land cover types: cottonwood-willow riparian forest, valley oak riparian forest, willow scrub, herbaceous riparian and river bar, and dredger tailings with riparian forest/scrub. The distribution of the riparian community and its constituent land cover types are shown in Figure 3–16, *Distribution of the Riparian Natural Community in the Plan Area* (see separate file) and the extent of the community and land cover types is presented in Table 3–5. These cover types are found along streams and rivers throughout the Plan Area. Major creeks (e.g., Rock, Pine, Big Chico, Butte, Dry, Cottonwood, and Honcut creeks) support cottonwood-willow riparian forest or valley oak riparian forest. The Sacramento and Feather Rivers support the largest stands of cottonwood-willow riparian forest, with tributaries and terraces adjacent to the Sacramento River supporting valley oak riparian forest. Willow scrub occurs in smaller creeks or disturbed areas in creeks and rivers that have not had sufficient time to develop a more substantial forest overstory. Herbaceous riparian and river bar occurs within or adjacent to the active channels of the Sacramento and Feather Rivers.

3.5.3.1 Environmental Conditions

The riparian natural community occurs in north-south and northeast-southwest trending long linear patches bisecting other natural communities (oak woodland and savanna, grassland,

agriculture, managed wetlands) and urban land within the Plan Area. Riparian ecosystems provide disproportionately higher ecosystem services and wildlife habitat compared to other terrestrial ecosystems (NRC 2002). Existing riparian land cover represents a small proportion of the historical distribution in the Plan Area with losses of riparian vegetation throughout California estimated at between 85 percent and 98 percent removed for agricultural, mining, and urban development (RHJV 2004).

3.5.3.1.1 Land Use

The primary use of the riparian community in the Plan Area is for the provisioning of wildlife habitat for hunting and non-consumptive use.

3.5.3.1.2 Physical Environment

The riparian natural community occurs throughout the Plan Area associated with active rivers and streams (and tributaries), remnant hydrologic features, and other areas of relative topographic lows where local hydrology can support the community through high water table and periodic flooding. Within the foothills, the riparian community occurs as part of hillside swales or drainages that flow from the foothills generally west into the agricultural areas or major hydrologic features. Because the riparian communities are associated with hydrologic features, the associated soils are generally the result of a high water table, recent fluvial events (high or low energy flood events), and dense canopy; however, this community does not require a specific soil type to exist and occurs over all soil types within the Plan Area.

The largest areas of the riparian natural community are associated with the Sacramento and Feather River systems in the Plan Area. Topography and geology of this area are generally dominated by broad, flat areas with the major creeks flowing north to south. The rivers have created wide river channels with steep banks and associated belts of riparian species. The riparian natural community occurs associated with soils on floodplains including Parrott, Gianella, and Farwell series within the Plan Area. A general description of floodplain soils in the Plan Area is provided in Figure 3–8.

3.5.3.1.3 Vegetation

The riparian community is made up of a variety of overstory and understory species. Common overstory species include Fremont cottonwood, red willow, Gooding's willow, valley oak, sycamore, and white alder. Valley oak typically forms a dense, continuous canopy that extends beyond the creek bank. In some locations, particularly in the foothills of the Cascades, valley oak mixes with other riparian trees, such as alder, sycamore, willow and cottonwood. Cottonwood-willow riparian forest is typically dominated by a very dense canopy of cottonwoods and willows. In some circumstances, sycamores and other riparian species are also present. The understory can be made up of immature overstory plants in addition to woody shrubs and vines such as narrow-leafed willow, blackberry brambles, wild rose, wild grape, and herbaceous species.

3.5.3.1.4 Wildlife

Significantly reduced in extent since initial European settlement (Katibah 1984), riparian habitats continue to support the greatest diversity of wildlife species of any wildlife habitat in California. The diverse and complex vegetation and vegetative structure present in riparian communities provides habitat for over 225 birds, mammals, and reptiles in California (RHJV 2004). It is estimated that over 80 percent of all wildlife species in the Sacramento Valley use riparian areas during a part of their life cycle (RHJV 2004). Riparian communities are also considered the most important habitats to land bird species in California (Manly and Davidson 1993, Davidson 1995) and provide habitat for an estimated 83 percent of amphibians and 40 percent of the reptiles in California (Brode and Bury 1984). Loss of riparian habitat is directly linked to population declines and range reduction of many dependent species (RHJV 2004).

Significant riparian resources in the Plan Area occur along the Sacramento River, Feather River, Butte Creek, Big Chico Creek, and several other smaller drainages. These habitats support numerous wildlife species including several special-status species such as Swainson's hawk, Cooper's hawk, western yellow-billed cuckoo, yellow-breasted chat, yellow warbler, and ringtail. High species diversity in riparian habitats is due in part to the multi-stratified vegetative structure present in woody riparian communities. For example, mature cottonwood and valley oak riparian forests, such as along portions of Sacramento and Feather Rivers and Big Chico Creek, provide habitat for nesting common egrets, great blue herons, and several raptor species in the upper canopy; numerous other bird species such as Nuttall's woodpecker, scrub jay, and oak titmouse in the mid-canopy; and many other bird species such as yellow-breasted chat, California towhee, and wrentit in the shrub layer. In addition to nesting birds, riparian systems provide essential habitat for many wintering and neotropical migrant birds that migrate through the Plan Area each year (Humple and Geupel 2002).

Riparian systems also function as important wildlife movement corridors, providing some of the last remaining overstory cover habitat in much of the Central Valley. While today riparian communities generally occur only as narrow corridors of vegetation along watercourses compared with the vast historical riparian forests of the Central Valley, watercourses with generally intact riparian habitat continue to provide linear connectivity that allows for seasonal movements and dispersal corridors for many wildlife species. The Sacramento and Feather rivers and Butte and Big Chico creeks are all important features in this regard, providing for habitat connectively throughout much of the Plan Area.

Where riparian corridors are within open habitats (e.g., grassland and agricultural fields), the structure provided by riparian shrubs and trees provides perches from which flycatchers and other birds forage into open habitats. Riparian vegetation also moderates air temperatures, providing thermal cover for many species of wildlife during hot or cold weather, and shading provided by vegetation overhanging stream channels maintains cooler water temperatures for native fishes. Common riparian-associated wildlife include deer, striped skunk, woodrats, flycatchers, sparrows, swallows, towhees, raptors, sparrows, warblers, garter snakes, lizards, and

frogs (Butte County 2005). Wildlife associated with the riparian community are listed in Appendix D.

3.5.3.2 Environmental Gradients

Riparian communities occur along gradients of flood frequency and groundwater depth within floodplains. Different riparian species are tolerant of or require more or less frequent flooding and a shallower or deeper groundwater. In all cases, riparian communities occur where flooding is more frequent and groundwater is higher than adjacent terrestrial communities such as oak woodlands and grasslands.

Cottonwood-willow riparian occurs in most parts of the Plan Area with frequent flooding and shallow groundwater (e.g., the Feather and Sacramento rivers). Streams in the foothills support riparian forest and scrub adjacent to and typically intergrading with oak woodland communities. Where these same streams cross the grasslands the associated riparian forest and scrub presents a sharp transition from the open grassland community. The riparian forest has been removed in much of the grassland landscape. Except on the major rivers, nearly all of the riparian forest has been removed from streams traversing agricultural lands, with the riparian community relegated to mostly riparian scrub within channelized streams and artificial drainages. The gradient from these riparian communities to agricultural fields and orchards is typically abrupt.

As streams and waterways lose elevation, tributaries converge, with concomitant flow increase and, consequently, the riparian corridors typically widen. Hydrologic conditions and climatic differences influence vegetation community species composition as well, so riparian corridor habitat is functionally and structurally different along its length, however, the water linkage between upper and lower reaches of a waterway mean that disturbances to upper reaches of a waterway are also likely to impact downstream structure and function. Likewise, if downstream riparian areas are disturbed, fish and other aquatic and terrestrial wildlife that travel upstream for food or breeding may be restricted or adversely affected. An additional issue that impacts riparian communities is lowered groundwater levels associated with urban and agricultural pumping, as well as incised stream channels. As the groundwater level lowers, it is increasingly difficult for riparian species to establish new recruits, and the age structure of the riparian forest can shift to mature trees only. This is a significant problem for Big Chico Creek west of Chico.

3.5.3.3 Invasive Species

Nonnative invasive species can damage native riparian natural communities. Giant reed, considered the state's most invasive riparian weed, can grow in dense monocultures, crowding out native species and causing changes to hydrologic regimes (Dudley 2000). Salt cedar is another invasive found in the Plan Area. Both of these highly invasive plants can cause channel changes and increases in fire danger. The introduced bullfrog is an important riparian invasive in the Plan Area. This species has been implicated as a primary driver of native Ranid frog declines in Butte County (Hayes and Jennings 1986). In addition, feral cats can impact many native bird species in the Plan Area, for example tricolored blackbird.

3.5.3.4 Ecosystem Functions

Riparian communities provide a variety of ecosystem functions including regulating runoff, reducing erosion, providing important fish and wildlife habitat, and providing corridors of habitat through other cover types that are less suitable for wildlife (e.g., urban and agricultural lands). Riparian areas confer benefits to water quality by processing nutrients from uplands and groundwater, and trapping sediments from uplands that could enter streams. The dense vegetation along riparian corridors can slow flood waters and dissipate the energy of stream flows, reducing the potential for erosion and downstream flash flooding. Shade associated with riparian areas reduces algae growth, which can negatively impact oxygen levels and pH levels. In addition, roots help hold soil in place, which reduces erosion and downstream turbidity that can be detrimental to fish, aquatic invertebrates, and wildlife.

Riparian habitats perform many functions that are necessary to support wildlife species; they provide shade, water, food and forage, and nutrients that form the basis of the food web, in a concentrated area. The dense canopy, coupled with available water, provides crucial habitat for a variety of invertebrates and insects, aquatic and terrestrial. More than 225 species of birds, mammals, amphibians and reptiles depend on riparian habitat in California. Of particular note, numerous species of resident and neotropical migratory birds use riparian habitat during the breeding season; many of these species are declining throughout their range, and maintaining adequate habitat across California is critical to their continued survival (Riparian Habitat Joint Venture [RHJV] 2004).

Riparian vegetation along stream corridors also provides a number of benefits to aquatic biota, including fish. In general, the plants stabilize the banks and provide instream cover through roots, overhanging vegetation (shade and visual cover from terrestrial predators), and fallen woody debris (logs). Logjams and coarse woody debris within riparian corridors also form important habitat and food sources for fish, amphibians, and aquatic insects. Riparian vegetation provides food and nutrients for all trophic levels in the adjacent aquatic community through falling leaves and insects. Large shrubs and trees provide shade that helps to moderate upper daytime temperatures and reduce algal growth in the aquatic community. In addition to stabilizing the banks, the vegetation slows flood waters that overtop the banks and can provide temporary refuge for fish during floods.

3.5.4 Wetlands

Wetlands are common throughout Butte County. Three types of wetlands are mapped in the Plan Area: emergent wetlands (commonly called marshes), managed wetlands, and managed seasonal wetlands. Vernal pools and vernal swales, types of ephemeral spring wetlands, are mapped in association with grasslands and are described in Section 3.5.2, *Grassland*. The distribution of the wetland community and its constituent land

cover types are shown in Figure 3–17, *Distribution of the Wetland Natural Community in the Plan Area* (see separate file) and the extent of the community and land cover types is presented in Table 3–5.

3.5.4.1 Environmental Conditions

Emergent wetlands are in scattered locations throughout the Plan Area, generally near creeks, rivers, or areas that receive agricultural runoff. Adjacent communities include all other mapped types. Emergent wetlands can occur in woodlands, grasslands, urban areas, or agriculture. Emergent wetlands not specifically mapped for the BRCP Land Cover GIS Database occur associated with agriculture and ranching practices throughout the valley in irrigation channels, drainages, stock ponds, and other water features. Because these are specific to managed practices and can change from year to year, wetlands associated with agriculture have been subsumed within the mapping of that agricultural community. In some locations, wetlands complexes are actively being restored from historical rice production, to support local species and wetland ecosystem functions.

Managed wetlands occur primarily in the western part of the Plan Area, associated with the Butte Basin and Sacramento River. Managed wetlands in the Plan Area are associated with federal and state wildlife refuges (e.g., Sacramento River National Wildlife Refuge [NWR], Llano Seco NWR, Gray Lodge Wildlife Area), nongovernmental organization lands (e.g., Ducks Unlimited management at Esquon Ranch), and private hunting clubs. These wetlands are supported by water delivery systems that allow for the conveyance of water and regulation of water levels in the wetlands. Managed wetlands include delivery and drainage channels and pond areas that support a mix of open water aquatic, marsh, and riparian scrub and forest habitats. Some areas are perennially flooded to support year-round habitat for nesting and brood rearing of resident waterfowl and other waterbirds (e.g., wood duck, mallard, cinnamon teal, and gadwall, pied-billed grebes, coots, gallinules and American bitterns).

Managed seasonal wetlands mapped in the BRCP Land Cover GIS Database are areas converted from grassland and grassland with vernal swale complex land cover types that have been hydrologically modified by berm construction and soil scraping to provide habitat for winter migratory waterfowl and shorebird foraging and resting habitat. Other areas of managed seasonal wetlands are mapped as part of the irrigated cropland and pasture land cover types, since agriculture is the primary use.

3.5.4.1.1 Land Use

The primary uses of wetlands in the Plan Area are the provisioning of wildlife habitat for hunting and nonconsumptive use.

Emergent wetlands provide primarily nonconsumptive recreational uses year-round, such as bird watching.

Managed wetlands in the Plan Area provide consumptive and nonconsumptive uses such as hunting and bird watching. Recreational activities at several state and federal wildlife and resource management areas and on private lands are predominately waterfowl and upland game bird hunting and wildlife watching. Recreational fishing may also occur pursuant to the purpose and regulations of land management agencies. In addition to controlling water levels and inundation, landowners may plant crops to support wintering waterfowl. The management of private hunting clubs includes grading and vegetation manipulation to create, maintain, or enhance waterfowl habitat, including the management of irrigation and conveyance canals, and the creation of permanent wetlands to provide reproductive habitat for resident wetland species. In addition, controlled flooding of interstitial areas on a seasonal basis contributes to the resource and habitat values. Private rice-producing farmland has been returned to managed wetlands through grading and vegetation management techniques at several locations in Butte County. Many property owners in Butte County lease their rice fields to hunters during the fallow fall and winter months.

Managed seasonal wetlands mapped in the BRCP Land Cover GIS Database are used for hunting. Agricultural lands (e.g. cropland, irrigated pasture) that are secondarily managed as wildlife habitat are seasonally flooded to attract and support waterfowl.

3.5.4.1.2 Physical Environment

Emergent wetlands occur associated with wetland hydrologic and hydric soil features throughout the Plan Area and large complexes of wetlands occur in the southwestern and western section of the Plan Area. Wetlands are supported where soils are ponded or saturated for significant portion of the growing season, creating an anoxic or very low oxygen rooting environment suitable for hydrophytes.

The large, managed wetlands within the Plan Area are associated with the historical natural flood basin of the Sacramento Valley, which dominates the southwestern portion of the Plan Area. Portions of the basin historically flooded frequently for long durations and supported extensive tule and cattail marshes. Today this region is dominated by and managed wetlands and rice farming. Managed wetlands are flooded perennially or seasonally by irrigation conveyance structures.

Managed seasonal wetlands mapped in the BRCP Land Cover GIS Database are areas of grassland and grassland with vernal swale complex that have been modified to increase the frequency and duration of flooding to promote use by waterfowl. Underlying soils are natural seasonal wetland soils (i.e., soils of the vernal pools and swales modified to create the managed seasonal wetland) and terrestrial, non-hydric soils that may develop anoxic characteristics during the period of seasonal inundation.

The primary soil types supporting emergent wetland, managed wetland, and managed seasonal wetland types are presented in Table 3–8, *Soil Types Supporting Wetland Communities*.

Table 3–8. Soil Types Supporting Wetland Communities

Soil Grouping[1] Soil Complex	Emergent Wetland	Managed Wetland	Managed Seasonal Wetlands
Sacramento Flood Plain Thermic			
Parrott-Gianella-Farwell	X	X	
Xerorthents, Tailings-Gianella	X	X	
Sacramento Flood Basin Thermic			
Lofgren-Blavo	X	X	
Esquon-Neerdobe	X	X	
Bosquejo-Galt	X	X	
Gridley Taxadjunct-Subaco Taxadjunct	X	X	
Thermic Soils That Formed in Sierra Nevada Alluvium; on Low Fan Terraces in the Sacramento Valley			
Eastbiggs-Duric Xerarents-Kimball			X

Source*:* Modified from NRCS (2006).
[1]A description of specific soil complexes is presented in Table 3–2.

3.5.4.1.3 Vegetation

Emergent wetlands can be found in low-lying areas adjacent to creeks and rivers, areas receiving runoff from agricultural areas, and areas intentionally dammed to pond water for livestock or agricultural uses. They are characterized by a high water table, and remain ponded or saturated through part or all of the year. Common plants include cattails, sedges, tules, and bulrushes. The margins often support low-growing willows and blackberries. For a list of wetland species that occur in the Plan Area see Appendix D.

Managed wetlands occupy 25,486 acres in the Plan Area. Many of the managed wetlands were previously used for agricultural production. The time period since they were used for agricultural production varies from location to location, resulting in a mosaic of successional stages. The major managed wetland areas are the Gray Lodge Wildlife Area (southwestern section of the Plan Area), Oroville Wildlife Area (encompassing large areas of riparian and wetland habitat along the Feather River), and the Sacramento River National Wildlife Refuge (several areas including Llano Seco Unit and Riparian Sanctuary). Managed wetlands include a mix of many of the common wetland, aquatic, and riparian land cover types: cottonwood and willow forest, willow scrub, ponds, freshwater marsh, and blackberry-dominated areas. Managed wetlands on properties managed by USFWS and CDFW generally include crop establishment to reduce the depredation of neighboring agriculture by waterfowl and other wildlife and to enhance habitat within the managed areas. Managed wetland properties owned by duck clubs do not typically include crops. Other management activities include the flooding of wetlands and farmed fields to enhance foraging habitat for waterfowl, cranes, and other wetland species; and periodic drawdown of wetlands and ponds to control vegetation and perform other habitat maintenance activities. Crops may be planted in managed wetlands to reduce foraging pressure by waterfowl on adjacent lands. Frequent crops include millet, rice, milo, wheat, barley, safflower, sunflower, corn, and suda (Cowan 1999). Irrigation and conveyance infrastructure in managed wetlands support emergent vegetation (usually cattails and bulrushes) and the combination of moist soil plants and emergent vegetation provide an abundance of seeds, aquatic invertebrates, and cover for wintering waterbird species. Although residual grains may

also be used by wintering birds, the primary value of managed wetlands is the high nutrients found in moist soil vegetation and invertebrates. The primary factors affecting the composition and abundance of moist soil plants are the timing of the spring drawdown and the successional stage of the wetland (i.e., the time since disturbance through disking or farming), which varies across the Plan Area, thereby creating a mosaic of moist-soil habitats during the time when migratory and wintering species are present.

Managed seasonal wetlands have been created primarily in the southeast part of the Plan Area associated with private lands. Managed seasonal wetlands are created wetlands in which areas of existing seasonal wetlands and grasslands are scraped and sculpted and impounded to establish an area that temporarily ponds during the wet season from natural runoff. Management of these areas employs moist-soil management (to benefit migratory waterfowl and wading birds). Species that benefit from such management are primarily migratory waterfowl and shorebird species that rely heavily on exposed mudflats and shallow areas during drawdown periods, but also migratory raptors that prey on these species (e.g., American peregrine falcon). Seasonal wetlands are generally flood in the fall, with standing water through most or all of the winter until drawdown occurs in the spring. This management supports a variety of annual plants on exposed mudflat that produce seeds, browse, or tubers used by waterfowl.

3.5.4.1.4 Wildlife

More waterfowl come to winter in the upper Sacramento Valley than anywhere else along the Pacific Flyway (Cowan 1999). Both natural and managed wetlands in the Plan Area provide valuable nesting, foraging, cover, and breeding habitat for many bird, reptile, amphibian, and mammal species. Common observed birds at the Gray Lodge Wildlife Area include grebes, several species of geese, dozens of duck species (equating to hundreds of thousands of individuals annually), gadwalls, swans, cranes, herons and egrets, cormorants, raptors, and owls. Other common wildlife includes deer, coyote, rabbits, gray fox, and ground squirrels. Fish are also supported within fringe and backwater wetlands associated with creeks and river systems, providing cover and protection from predators and changes in water temperature, and refuge from flood events. Wildlife associated with the natural and managed wetlands within the Plan Area are listed in Appendix D.

Emergent wetlands are typically used by wildlife year round and seasonally by nesting waterfowl. Reptiles are dependent on the availability of water during most of the year for breeding and foraging. Western pond turtles and giant garter snakes, among other reptile species, use emergent wetlands extensively during their active period for foraging and cover. Managed wetlands fulfill similar functions for covered and other wildlife species as emergent wetlands. Backwaters of the Sacramento and Feather Rivers and Butte Creek support patches of emergent marsh that provide essential wetland habitats for nesting and wintering birds and mammals. Remaining patches of natural wetlands or emergent marsh wetlands that have developed in idle agricultural fields also can support abundant wildlife. These patches of wetland provide habitat for many marsh nesting birds such as red-winged blackbird, tricolored

blackbird, marsh wren, and American bittern. Larger patches also support nesting black-crowned night herons and snowy egrets.

Managed wetlands vary in the number and type of species that use them, depending upon depth, size, emergent vegetation, bank substrate, pollutant loads, and other factors. The management of these wetlands determines the conditions and hence the species that are present. Managed wetlands within the Plan Area are associated with areas where agricultural lands (mainly ricelands) have been restored to wetlands. State and federal managed wetlands at Gray Lodge Waterfowl Management Area, Llano Seco Wildlife Refuge, Sacramento River National Wildlife Refuge, and Upper Butte Wildlife Area and others managed wetlands on private lands provide a large area of suitable habitat for both migratory and resident birds along the Pacific Flyway. Millions of birds representing over 225 species, including more than a million ducks and hundreds of thousands of geese, use Gray Lodge Wildlife Area and other wetland features within the Plan Area (DFG 2006).

Species that depend on perennial wetlands are typically absent from managed seasonal wetlands (e.g., western pond turtle, giant garter snake, most amphibians), because seasonal flooding typically does not meet the life history requirements of these species, which require summer flooding. In general, the management practices of managed seasonal wetlands support migratory species, and those that move seasonally from seasonally flooded lands to other wetland habitats in the area (e.g., waterfowl).

3.5.4.2 Environmental Gradients

Emergent wetlands occur as inclusions in all other natural communities in the Plan Area where appropriate hydrologic conditions exist and their locations and boundaries are determined by the presence of frequently ponded water and saturated soils for long duration. They may be filled by rainwater, runoff, or overbank flow or occur with natural or artificial waterways. In natural systems, wetlands are typically transitional between aquatic systems and upland communities. In agricultural and urban areas, wetland boundaries are often abrupt with the adjacent land use.

Managed wetlands in the Plan Area are most commonly bounded by agricultural areas, particularly rice fields. Some managed wetlands, especially larger ones, are bounded by major rivers. The transition zones with adjacent land cover types may be abrupt where narrow berms or levees are used to maintain the wetlands.

Managed seasonal wetlands in the Plan Area are interspersed into the upland grassland and agricultural landscape. Gradients within managed seasonal wetlands are related to the duration of inundation that affects soil moisture and vegetative characteristics.

3.5.4.3 Invasive Species

Nonnative invasive species can damage wetland natural communities, including emergent and managed wetlands. Giant reed, considered the state's most invasive riparian weed, can grow in

dense monocultures, crowding out native species and causing changes to hydrologic regimes (Dudley 2000). Giant reed is found at both Gray Lodge Wildlife Area and at Llano Seco NWR, where removal efforts are ongoing. Bullfrogs and nonnative fishes can be a significant mortality factor for a variety of wetland species, including giant garter snake and western pond turtle. Feral cats are also an important nonnative invasive that can impact many native bird species in wetland communities, such as the tricolored blackbird. A wide variety of common agricultural and ruderal weed species are the prevalent invasive species in managed wetlands and managed seasonal wetland.

3.5.4.4 Ecosystem Functions

Wetlands perform a variety of ecosystem functions including food web support, habitat for insects and other invertebrates, fish and wildlife habitat, filtering of waterborne and dry-deposited anthropogenic pollutants, carbon storage, water flow regulation (e.g., flood abatement), groundwater recharge, and other human and economic benefits.

Wetlands provide habitat for insects and other invertebrates that are critical food sources to a variety of wildlife species, particularly birds. There are species that depend on wetlands during all parts of their lifecycle for food, overwintering, and reproductive habitat. Other species use wetlands for one or two specific functions or parts of the lifecycle, most commonly for food resources. In addition, wetlands produce substantial plant growth that serves as a food source to herbivores (wild and domesticated) and a secondary food source to carnivores.

Wetlands slow the flow of water through the vegetation and soil, and pollutants are often held in the soil. In addition, because the water is slowed, sediments tend to fall out, thus improving water quality and reducing turbidity downstream.

Decomposition of dead plant material in wetlands can be very slow due to anaerobic (non-oxygen) conditions. Thus, the organic material contained in wetlands can remain for many years to decades as peat and muck. The live and dead plant material “holds” the carbon for extended periods, preventing release into the atmosphere. Carbon held in the environment can slow the effects of environmental changes associated with greenhouse gases and global climate change.

Other economic and human benefits of wetlands include stream bank stabilization; nonconsumptive recreation, including wildlife and seasonal wildflower viewing; and consumptive recreation, including hunting and fishing. Wetlands stabilize stream banks by slowing water flow at the edges of major streams and rivers with roots and stems, as described in the riparian section (Section 3.5.3, *Riparian*).

3.5.5 Aquatic

The aquatic natural community is comprised of the perennial, intermittent, and ephemeral streams and channels[5], open water, major canal, agricultural conveyance and drainage canals, and pond land cover types. The distribution of the aquatic community and its constituent land cover types are shown in Figure 3-18, *Distribution of the Aquatic Natural Community in the Plan Area* (see separate file) and Figure 3–9, and the extent of the community and land cover types is presented in Table 3–5.

3.5.5.1 Environmental Conditions

3.5.5.1.1 Land Use

The primary land uses associated with the aquatic community are water storage, conveyance and drainage for agriculture and other uses and recreation, and fish and wildlife habitat. Ponds are primarily used for watering livestock, either directly or as a reservoir for an associated gravity-fed drinker or trough.

3.5.5.1.2 Vegetation

The active high flow portions of rivers and streams, and other perennial open water areas typically have little or no emergent vegetation. Filamentous green algae, however, can be common to abundant where water is clear and shade is moderate to light. Slower moving areas with shallow water can support emergent aquatic vegetation where fine sediments are present. Overall, flow velocity and flow regimes are the driving factors in determining how much and what types of plants will establish within the stream channel. Within perennial streams, sand and gravel bars may be colonized by willows and other species, and aid in anchoring substrate and reducing erosion.

In intermittent streams, vegetation within the channel may include algal communities, which are resistant to repeated drying and wetting. Other plants that are tolerant to intermittent flooding, such as willows, may also establish within the channel of intermittent streams.

In ephemeral streams, vegetation is typically comprised of upland vegetation types that are tolerant of the occasional flooding event, such as grasses and shrubs. Many plant species are adapted to an ephemeral lifestyle, in which they spend most of the year or longer as seeds before conditions are right for a brief period of growth and reproduction.

The presence of vegetation in streams is influenced by the substrate and thus may indicate the level of erosion and depositional activity. Dense, long-lived perennial vegetation (e.g., shrubs or

[5] Note that most streams and channels are mapped as one-dimensional linear features rather than two-dimensional polygons in the BRCP GIS database.

trees) suggests a low energy environment with little deposition, probably occurring over a long period of time. Annual vegetation (e.g., grasses and forbs) may also indicate a low energy environment but stability is generally of a shorter duration. The most active streams often lack vegetation due to scour or repeated frequent burying of vegetation. Vegetation cover, type, and density also influence the surface resistance to erosion of stream banks and bed. Disturbance by high rainfall events is coupled with runoff and sedimentation and stream beds may cut down or bank walls may collapse, leading to a high diversity and mobility of stream bed substrate. The characterization of stream vegetation as an indicator of flow, energy and erosional processes also applies to artificial drainage canals and irrigation conveyances, but maintenance activities may result in less in-channel vegetation than what could be supported under a given flow regime.

3.5.5.1.3 Fish and Wildlife

Fish

The following discussion of fish in the Plan Area focuses on the species inhabiting or seasonally using streams. Because activities potentially affecting the Sacramento River are not included in the BRCP, fish of the Sacramento River are not discussed except where they move into streams within the Plan Area.

Big Chico Creek. A variety of native and nonnative fish inhabit the streams of the Big Chico drainage basin within the Plan Area (Big Chico Creek Watershed Alliance 1999). Native species include Chinook salmon (Central Valley spring-run and fall-/late fall-run ESUs), steelhead and rainbow trout, Sacramento pikeminnow, California roach, Sacramento sucker, hardhead, riffle sculpin, and Pacific lamprey, while nonnative species include smallmouth bass, green sunfish, and brown trout.

Steelhead and Chinook salmon are anadromous and migrate into the Big Chico Creek drainage from the Sacramento River for spawning, egg incubation, and juvenile rearing (Table 3–9 *Spawning Times for Nongame and Anadromous Fish in Big Chico Drainages*). Spring-run Chinook salmon spawn in Rock Creek and Big Chico Creek. The adult spring-run Chinook salmon run in Big Chico Creek was estimated based on snorkel surveys for years 1995–2011 as shown in Table 3–10 *Adult Spring-Run Chinook Salmon Run in Big Chico Creek, 1995–2011*.

Adult salmon die after spawning while steelhead can return to the ocean. The young of both species spend from less than one year to several years in streams before migrating to the ocean. Juvenile Chinook salmon, spawned in the Sacramento River, enter the lower reaches of creeks in the Big Chico Creek watershed for rearing. Rainbow trout and brown trout are resident species. Rainbow trout occur in Big Chico Creek from the east side of Chico upstream into Tehama County, in the foothill and mountain zones of Rock Creek, and in Mud Creek for a short distance above the falls at Richardson Springs. Brown trout occur in Big Chico Creek from Iron Canyon upstream into Tehama County (Big Chico Creek Watershed Alliance 1999). A fish ladder is present in Iron Canyon to allow salmonids access to the upstream reaches.

Table 3–9. Spawning Times for Nongame and Anadromous Fish in Big Chico Drainages

Species	Scientific Name	Spawning Period
Pacific Lamprey	*Lampetra tridentate*	March–May
Rainbow Trout (Steelhead)	*Oncorhynchus mykiss*	February
Central Valley Spring-Run Chinook	*Oncorhynchus tshawytscha*	Mid-September–October
Central Valley Fall-Run Chinook	*Oncorhynchus tshawytscha*	Late October–December
Central Valley Late Fall-Run Chinook	*Oncorhynchus tshawytscha*	January–February
Brown Trout*	*Salmo trutta morpha fario* and *S. trutta morpha lacustris*	October–November
Sacramento Sucker	*Catostomus occidentalis*	January–March
Sacramento Pikeminnow	*Ptychocheilus grandis*	February–April
California Roach	*Hesperoleucus symmetricus*	May–June
Hardhead	*Mylopharodon conocephalus*	April–June
Riffle Sculpin	*Cottus gulosus*	March–April

Source: Existing Conditions Report (Big Chico Creek Watershed Alliance 1999)
* Nonnative species

Table 3–10. Adult Spring-Run Chinook Salmon Run in Big Chico Creek, 1995–2011

Year	Number	Year	Number
1995	200	2004	0
1996	2	2005	37
1997	2	2006	299
1998	369	2007	0
1999	27	2008[1]	0
2000	27	2009[1]	6
2001	39	2010[1]	2
2002	0	2011[1]	124
2003	81		

Source: GrandTab.xls, 4/23/12 update, J. Azat, California Department of Fish and Game
[1] Data were preliminary as of 11/5/12.

The Sacramento sucker, Sacramento pikeminnow, and hardhead are also migratory and move into the Big Chico Creek drainages from the Sacramento River to spawn, primarily in streams that become intermittent during the dry season. Some individuals of these species can also be residents. Riffle sculpins inhabit Big Chico and Rock creeks, and California roach are present in all three streams. Pacific lamprey is another migratory species that is not as limited by natural barriers as are other fish. Smallmouth bass are present in a portion of Mud Creek and in Big Chico Creek below Iron Canyon. This species along with green sunfish prey upon the roach and greatly reduce its population in dry years (when conditions favor smallmouth bass) (Big Chico Creek Watershed Alliance 1999).

Butte Creek. At least 32 species of fish have been reported from Butte Creek and its tributaries with about half of these being nonnative species (CSU Chico 1998). Chinook salmon (fall-run and spring-run) and steelhead migrate into Butte Creek to spawn, moving as far upstream as Centerville Head Dam. Spring-run Chinook salmon spawn between Parrott-Phelan Dam and Centerville Head Dam as do the secondary and late fall-run Chinook. Adult spring-run Chinook enter the creek from March through June, and estimates of the number spawning over the period

1956 through 1997 ranged from 10 to 7,500. The estimated adult spring-run Chinook salmon run in Butte Creek based on snorkel surveys for years 1995–2011 is presented in Table 3–11. *Adult Spring-Run Chinook Salmon Run in Butte Creek, 1995–2011*.

Table 3-11. Adult Spring-Run Chinook Salmon Run in Butte Creek, 1995–2011

Year	Number	Year	Number
1995	7,500	2004	7,390
1996	1,413	2005	10,625
1997	635	2006	4,579
1998	20,259	2007	4,943
1999	3,679	2008[1]	3,935
2000	4,118	2009[1]	2,059
2001	9,605	2010[1]	1,160
2002	8,785	2011[1]	2,130
2003	4,398		

Source: GrandTab.xls, 4/23/12 update, R. Azat, California Department of Fish and Game
[1] Data were preliminary as of 11/5/12.

Using a mark-recapture carcass survey, the estimated number of spring-run Chinook salmon spawners was 18,312 with a pre-spawning mortality of 0 in 2001; 12,897 with a pre-spawning mortality of 3,431 in 2002; and 6,603 with a pre-spawning mortality of 11,231 in 2003 (DFG 2004).

Juveniles emigrate primarily as fry in December through March. The primary fall-run Chinook spawn between Western Canal and Parrott-Phelan Dam. Steelhead enter the creek from August through Marsh and spawn from December through April (CSU Chico 1998).

The other native fish are distributed according to their habitat preferences and interactions with nonnative species. Nonnative species are primarily warm water fish that are found in warmer, slower moving water in the lower reaches of Butte Creek. Many of these species are also present in irrigation canals that are connected to the creek and in stock ponds where they have been introduced for recreational purposes.

Feather River. The Feather River Fish Hatchery is located adjacent to the Thermalito Afterbay (Figure 3–10). This hatchery was built as mitigation for loss of spawning habitat in the Feather River resulting from the construction of Oroville Dam. A portion of the Chinook salmon and steelhead returning to spawn are directed to a fish ladder into the hatchery. This hatchery can accommodate approximately 8,000 spawning fish. Fish reared at this facility are released into the Feather River, Sacramento River, Delta near San Francisco Bay, and Lake Oroville. In addition, salmon are also reared at the Thermalito Facility on the west side of Thermalito Afterbay for planting in the Central Valley river system. The capacity of this facility is 2.5 million fingerlings a year. Approximately 20 percent of the salmon and steelhead returning to spawn use the hatchery and 80 percent use the river below the dam.

Many of the fish species reported for Big Chico Creek are also present in the Feather River along with a number of additional native and nonnative species. Many other species are dependent on aquatic habitats but are generally found only where these habitats occur in association with

certain upland habitat types, such as riparian woodlands and emergent wetlands. Kingfishers use aquatic habitats to forage and are found commonly where riparian or other available perching habitat is present. Other birds, such as wood duck, require aquatic habitats for foraging and cover while nesting in adjacent woodlands. Many other waterfowl, grebes, and other water birds require emergent vegetation for cover and breeding. Several mammals, such as river otter, muskrat, and beaver are also dependent on an aquatic habitat and occur where riparian woodlands, riparian scrub, or emergent vegetation provide cover or other needed resources. Many other species are dependent on aquatic habitats but are generally found only where these habitats occur in association with certain upland habitat types, such as riparian woodlands and emergent wetlands. Kingfishers use aquatic habitats to forage and are found commonly where riparian or other available perching habitat is present. Other birds, such as wood duck, require aquatic habitats for foraging and cover while nesting in adjacent woodlands. Many other waterfowl, grebes, and other water birds require emergent vegetation for cover and breeding. Several mammals, such as river otter, muskrat, and beaver are also dependent on an aquatic habitat and occur where riparian woodlands, riparian scrub, or emergent vegetation provide cover or other needed resources.

Table 3–12. *Fish in the Feather River in Butte Count*y. Thermalito Forebay is stocked with catchable-sized rainbow trout.

Several smaller permanent and ephemeral creeks flow through the Plan Area, including Little Chico Creek, Mud Creek, Rock Creek, and Little Dry Creek, that support one or more life stages of a number of native and nonnative fish species (Walther 2009). These smaller waterways can be important nonnatal rearing grounds for salmonids, providing ample food for rapid growth rates of salmonids that improve juvenile survival during their downstream migration towards the ocean (Limm and Marchetti 2009).

Wildlife

Aquatic habitats are essential in maintaining the diversity of wildlife found in the Central Valley and in the Plan Area. Most wildlife species use aquatic habitats at least incidentally for drinking water, some to meet essential life requirements, and others to meet all of their life requirements of nesting, foraging, and cover. In addition to the open water component, most aquatic communities in the Plan Area consist of other adjacent and associated habitats, such as riparian woodlands or scrub, emergent wetlands, or grasslands. These adjacent natural communities greatly enhance the value of the aquatic community by providing habitats that support species that rely on both aquatic and associated habitat types.

Some species are primarily aquatic, although adjacent uplands are also used for some element of their life history. For example, while nesting in adjacent upland sites, western pond turtle requires lakes, large ponds, or perennial watercourses for foraging and cover. This covered species may be found in aquatic habitats along Butte Creek, Big Chico Creek, and other creeks, sloughs, and waterbodies in the Plan Area. Giant garter snake, also a covered species, requires slow-moving streams or channels that support submergent and emergent vegetation and an

upland component for hibernaculae. Amphibian species, such as Pacific tree frog, also rely on these habitats. Foothill yellow-legged frogs rely on streams or ponded habitats and are primarily found at higher elevations at the eastern edge of the Plan Area.

Many other species are dependent on aquatic habitats but are generally found only where these habitats occur in association with certain upland habitat types, such as riparian woodlands and emergent wetlands. Kingfishers use aquatic habitats to forage and are found commonly where riparian or other available perching habitat is present. Other birds, such as wood duck, require aquatic habitats for foraging and cover while nesting in adjacent woodlands. Many other waterfowl, grebes, and other water birds require emergent vegetation for cover and breeding. Several mammals, such as river otter, muskrat, and beaver are also dependent on an aquatic habitat and occur where riparian woodlands, riparian scrub, or emergent vegetation provide cover or other needed resources.

Table 3-12. Fish in the Feather River in Butte County

Common Name	Scientific Name	Notes
Green sturgeon	*Acipenser medirostris*	Resident all year downstream of Afterbay Outlet
White sturgeon	*Acipenser transmontanus*	Resident all year downstream of Afterbay Outlet
Central Valley steelhead	*Oncorhynchus mykiss*	Present all year; juveniles primarily Afterbay to Fish Barrier Dam; adults from Afterbay to Honcut Creek in spring and fall
Central Valley Spring-run Chinook salmon	*Oncorhynchus tshawytscha*	Adults March through December primarily at or below Feather River Hatchery
Central Valley fall-/late fall-run Chinook salmon	*Oncorhynchus tshawytscha*	Adults October through February primarily below Feather River Hatchery
Hardhead	*Mylopharodon conocephalus*	Residents all year downstream of Fish Barrier Dam
Sacramento pikeminnow	*Ptychocheilus grandis*	Residents all year downstream of Fish Barrier Dam
Sacramento splittail	*Pogonichthys macrolepidotus*	February through May for spawning downstream of Afterbay Outlet
American shad	*Alosa sapidissima*	May through December for spawning, primarily downstream of Afterbay
Hitch	*Lavinia exilicauda*	Resident all year downstream of Afterbay Outlet
Pacific lamprey	*Lampetra tridentate*	April through July downstream of Fish Barrier Dam
River lamprey	*Lampetra ayresi*	April through July downstream of Fish Barrier Dam
Sacramento sucker	*Catostomus occidentalis*	Resident all year below Fish Barrier Dam
Tule perch	*Hysterocarpus traski*	Resident all year, primarily downstream of Afterbay Outlet
Spotted bass*	*Micropterus punctulatus*	Resident all year, primarily downstream of Afterbay Outlet
Largemouth bass*	*Micropterus salmoides*	Resident all year, primarily downstream of Afterbay Outlet
Smallmouth bass*	*Micropterus dolomieu*	Resident all year, primarily downstream of Afterbay Outlet
Red-eye bass*	*Micropterus coosae*	Resident all year, primarily downstream of Afterbay Outlet
Bluegill*	*Lepomis macrochirus*	Resident all year, primarily downstream of Afterbay Outlet
Green sunfish*	*Lepomis cyanellus*	Resident all year, primarily downstream of Afterbay Outlet
Redear sunfish*	*Lepomus microlophus*	Resident all year, primarily downstream of Afterbay Outlet
Black crappie*	*Pomoxis nigromaculatus*	Resident all year, primarily downstream of Afterbay Outlet
White crappie*	*Pomoxis annularis*	Resident all year, primarily downstream of Afterbay Outlet

Source: SWRI 2003a, Moyle et al. 2004, FERC 2006
* Nonnative species

Larger water bodies, such as Thermalito Afterbay, and other large open water habitats, such as those found at Gray Lodge Wildlife Refuge, are particularly important for roosting and foraging waterfowl and other water birds. These sites are also important foraging habitats for bald eagle and osprey. Many insectivorous birds such as swallows, swifts, and flycatchers forage for insects that congregate over open water habitats.

Ponds are small impoundments mostly created by ranchers or other livestock managers to improve the distribution and availability of water on the landscape. These provide a year-round supply of water and serve as refugia for many native species including California tiger salamander, California red-legged frog, western pond turtle, and foothill yellow-legged frog. They also serve as habitat for nonnative species such as bullfrogs and nonnative fish species (USFWS 2006a).

3.5.5.2 Environmental Gradients

Environmental gradients associated with aquatic communities are primarily dependent on bank slope. If open water is associated with gently sloping banks, the open water typically will grade to emergent vegetation in shallow water and near shore-wetted soils and then to riparian vegetation. The width of these adjacent communities is dependent on bank slope (steeper sloping banks will tend to support narrower bands of wetland and riparian vegetation than gentler sloping banks) and the availability of sufficient surface and subsurface soil moisture relative to the rooting depth of wetland and riparian vegetation.

Floodplains within the Plan Area support an environmental gradient based on small-scale elevation patterns. Floodplains associated with the Sacramento River, Feather River, Big Chico Creek, and Butte Creek have the most pronounced floodplain gradient conditions. Assuming equal access to water, low elevation portions of floodplains inundate more frequently, providing more habitat for aquatic species. Higher elevation portions of floodplains inundated less frequently and support riparian vegetation and wildlife species. Even higher elevation portions inundate so infrequently that they support upland species.

Waterways within the Plan Area contain an environmental gradient that begins upstream with the smallest “first order” streams – most are upslope of the Plan Area. These streams usually occur in steep-sloped areas and move quickly downstream. As waterways move downslope, they combine with others to create larger order streams. Ultimately, all streams in the Plan Area drain to the Sacramento River. Most smaller order streams, such as Little Chico, Mud, and Little Chico Creeks, begin upstream of the Plan Area in the western slopes of the Cascade Range and Sierra Nevada. As these streams move downslope and through the Plan Area, they empty into larger streams such as Big Chico and Butte Creeks, which in turn empty into the larger higher order Sacramento River. Stream order often defines the plants and wildlife supported by the stream because physical characteristics, such as flow speed, flow volume, and sediment load, change along a gradient from lower to higher order streams. These physical characteristics can

drive other physical characteristics, such as bank slope, sediment scour, and light levels, that influence the types of aquatic species supported along the gradients.

3.5.5.3 Invasive Species

There are multiple nonnative invasive fish species in the waterways of the Plan Area (Many other species are dependent on aquatic habitats but are generally found only where these habitats occur in association with certain upland habitat types, such as riparian woodlands and emergent wetlands. Kingfishers use aquatic habitats to forage and are found commonly where riparian or other available perching habitat is present. Other birds, such as wood duck, require aquatic habitats for foraging and cover while nesting in adjacent woodlands. Many other waterfowl, grebes, and other water birds require emergent vegetation for cover and breeding. Several mammals, such as river otter, muskrat, and beaver are also dependent on an aquatic habitat and occur where riparian woodlands, riparian scrub, or emergent vegetation provide cover or other needed resources.) Many of these fish were introduced for sportfishing or to provide forage for sport fish. In addition, Thermalito Afterbay is specifically managed for nonnative black bass (largemouth, smallmouth, and spotted) populations to support recreational fishing by the public (Southwest Research Institute [SWRI] 2003b).

The effects of nonnative fish on native fish are generally in the form of predation and competition for food and habitat. For example, many centrarchids (sunfish, crappie, and black basses) are voracious predators and are known to eat a variety of native invertebrate and fish species. Although no introduction of a nonnative fish species has unambiguously caused the extinction of a native species, it is thought that their introduction has contributed to the decline of many native species (Cohen and Carlton 1995). For example, smallmouth bass have been associated with the decline in the native hardhead in the Plan Area. Also, introductions of multiple species of centrarchids have been associated with the extirpation of Sacramento perch from the Sacramento River watershed, including waterways within the Plan Area.

There are also several nonnative invasive species other than fish found in aquatic natural communities that can damage such communities. Giant reed, considered the state's most invasive riparian weed, and salt cedar can grow in dense monocultures along riparian areas, crowding out native species and causing changes to hydrologic regimes in aquatic communities (Dudley 2000). The introduced bullfrog is an important riparian invasive in the Plan Area. This species has been implicated as a primary driver of native Ranid frog declines in Butte County (Hayes and Jennings 1986).

3.5.5.4 Ecosystem Functions

Seasonal high and low flows in streams shape the channel cross-section through scour and deposition of sediments. These processes provide for building and maintaining floodplains and associated communities (i.e., wetland and woody and herbaceous riparian vegetation) as channels meander across the landscape. These processes are muted in locations where channel banks are protected or leveed and in waterways with dams that control releases for power

generation, water supply, and flood control. Sediments eroded and transported by streams also create and maintain salmonid spawning habitats. Organic material carried into streams by runoff or by receding overbank flows support foodweb processes by providing nutrients that support plankton, zooplankton, and invertebrate production, both instream as well as in downstream rivers and the Sacramento-San Joaquin River Delta. As described above, open water areas, including reservoirs and canals, also support habitat for fish and wildlife.

3.5.6 Agriculture

The agricultural natural community type is made up of the following land cover types: orchards and vineyards, rice, irrigated cropland, irrigated pasture, and nonnative woodland. Nonnative woodland is included in the agriculture community because this land cover type is comprised of eucalyptus plantations that are planted for commercial purposes (e.g., pulp production). The distribution of the agriculture community and its constituent land cover types are shown in Figure 3–19, *Distribution of Agricultural Lands in the Plan Area* (see separate file) and the extent of the community and land cover types are presented in Table 3–5. The agricultural community dominates the western half of the Plan Area. Adjacent communities are generally riparian-dominated communities associated with the Feather and Sacramento Rivers, urban, or grassland at the eastern limit of primary agricultural development.

3.5.6.1 Environmental Conditions

3.5.6.1.1 Land Use

The primary land use associated with the agriculture community is farming for rice and other crops and maintaining orchards for fruit and nut production.

3.5.6.1.2 Physical Environment

Agriculture within the Plan Area occurs where the soils and topography are most suitable. The western section of the Plan Area is associated with the north Central Valley, where most of the agricultural production occurs. The Valley is flat and generally well-drained, and therefore well-suited for many crops; however, soil function changes from north to south. Rice production dominates the southwestern section of the Plan Area, where the existing hydric soils formed in association with an internally draining flood basin. To the north, rice production ceases and orchards and vineyards become the dominant cover type. Although orchards and vineyards occur in several parts of the Plan Area, specific crops are generally focused by geographic and topographic region (i.e., almonds are grown in the northwestern Plan Area, walnuts dominate the south central Plan Area, and olives occur peppered throughout the southeastern Plan Area in the

foothills of the Sierra Nevada). The primary soil types supporting agricultural land cover types are presented in Table 3–13, *Soil Types Supporting Agriculture*.

Table 3–13. Soil Types Supporting Agriculture

Soil Grouping[1] Soil Complex	Orchard/ Vineyard	Rice	Irrigated Cropland	Irrigated Pasture	Nonnative Woodland
Sacramento Flood Plain Thermic					
Parrott-Gianella-Farwell	X	X	X	X	X
Xerorthents, Tailings-Gianella	X	X	X	X	X
Sacramento Flood Basin Thermic					
Lofgren-Blavo	X	X	X	X	X
Esquon-Neerdobe	X	X	X	X	X
Bosquejo-Galt	X	X	X	X	X
Gridley Taxadjunct-Subaco Taxadjunct	X	X	X	X	X
Sacramento Valley Alluvial Fan Thermic					
Olashes	X	X	X	X	X
Conejo-Almendra-Vina	X	X	X	X	X
Haploxerolls-Durixerolls	X	X	X	X	X

Source: Modified from NRCS (2006).
[1]A description of specific soil complexes is presented in Table 3–2.

3.5.6.1.3 Crops and Cropping Patterns

Table 3–14, *Extent of Agricultural Lands by Major Crop Type in Butte County in 2005* presents the extent of agricultural crops reported for Butte County in 2005. Important crops include nonirrigated pasture (i.e., grassland and savanna), rice, almonds, walnuts, and plums (Butte County 2006). Approximately 50 percent of agriculture production within the Plan Area is rice. Table 3–14 lists crops from the Agricultural Commissioner's Report.

Table 3–14. Extent of Agricultural Lands by Major Crop Type in Butte County in 2005[1]

Land Cover and Crop Type	Acreage
Rice	96,400
Irrigated pasture	15,500
Alfalfa	1,885
Wheat	1,600
Other field crops	5,697
Subtotal Field Crops	***121,082***
Almonds	41,478
Olives	2,424
Peaches (all types)	2,987
Dried plums	12,297
Walnuts (English)	32,080
Other orchard/vineyard crops	3,258
Subtotal Orchards and Vineyards	***94,524***
Total	**215,606**

[1] The acreages in this table cannot be directly compared to the agricultural acreages from the land cover mapping, because the numbers in this table are based on reported production and the numbers from the land cover mapping include both producing and non-producing agricultural land. For example, fallow rice fields and abandoned orchards are included in the agricultural land cover mapping.
Source: Values derived from the Agricultural Crop Report (Butte County 2006).

Rice practices consist of ripping or tilling the field. The field is then laser-leveled approximately every seven years. Planting is typically done in April and May, although it can go into June. The field is wetted and the seed is moistened and then applied by air (University of California [UC] Cooperative Extension 2004). Following seeding is an approximately 120-day growing season. Herbicides and pesticides are applied to control weeds, insects, and disease. Following harvest, rice farmers may leave the field fallow or they may burn or flood the field for the winter season. Burning is allowed under regulation to control plant diseases that reduce the value of production of rice. Occasionally, burning is mandated to control a specific pest outbreak. Rice fields can be burned as frequently as every four years, but practically, some farmers burn more frequently by purchasing credits from other farmers who do not burn. Some farmers choose not to burn at all. Flooding is also done to control disease. Many farmers also use flooded fields for duck club use. The timing of flooding is dictated by the rainy season and varies from one year to the next (Price 2006).

Orchards and vineyards are long-term crops that remain relatively constant from year to year. Occasionally, orchards are leveled because of pest problems or crop changes. Typically orchards are replanted as soon as possible, several months, after previous orchards are removed. The largest orchard crop by land area occupied in the Plan Area is almonds. Almonds are most commonly grown in the northwestern part of the Plan Area. Fields used for almonds are typically ripped and leveled prior to planting (UC Cooperative Extension 2006). The site is fumigated prior to planting (Connell pers. comm.). Tree density ranges from 75 to 180 per acre with at least two varieties of almonds with similar blooming periods planted in close proximity, as they require cross-pollination to produce fruit. Weeds are controlled by a variety of methods including disking, spraying with RoundUp, and mowing. Several insecticides are used to control a variety of pests including peach twig borer and mites. Hives of honey bees are used to facilitate pollination. Bait and bait stations are used to control various small mammals including gophers and ground squirrels (UC Cooperative Extension 2006).

Practices for walnut growing are similar to almond growing (Connell pers. comm.). Variations from almond growing practices are described below. Common types of walnuts grown in the region include Chandler, Hartley, Tulare, and Howard and they are grown on Paradox rootstock. Fungicides are used to control walnut blight. Tree density is much lower than for almonds, typically about 56 trees per acre. Insecticides are applied to control mites, codling moth, husk fly, aphids, and scale (UC Cooperative Extension 2002).

Olives were traditionally grown in the foothills south of Oroville. Olive profits have gone down in recent years due to infestation by the olive fly, canned fruit, and a change in the marketability of the particular olive varieties grown in the Plan Area. The olive fly lays eggs on the fruit of the olive and the larvae eat the meat of the olive and proceed toward the stone, making the fruit unmarketable. Most abandoned olive orchards have been left in place and are used for cattle grazing; however, there has been an increased interest in the production of olive oil and the introduction of new olive varieties that are not susceptible to olive fruit fly damage. Olive trees

are very long-lived and will persist without watering or maintenance, although they do not produce much fruit (Connell pers. comm.).

3.5.6.1.4 Wildlife

Agricultural lands in the Central Valley represent an extremely altered landscape that retains little resemblance to the historical (pre-European settlement) condition. Formerly consisting of extensive wetlands, open grasslands, broad riparian systems, and oak woodlands, the conversion to agriculture has removed most of these native habitats. However, while generally supporting a less diverse community of wildlife compared with most native habitats, agricultural systems continue to support abundant wildlife and provide essential breeding, foraging, and roosting habitat for many resident and migrant wildlife species.

Ricelands, for example, have become important "surrogate" wetland habitats for over 235 wildlife species in the Central Valley (Jones & Stokes 1995). Approximately 500,000 acres of land in the Central Valley, nearly one-fifth of which occurs in the Plan Area, are planted in rice each year (Jones & Stokes 1995). With the extensive loss of wetland habitats, ricelands provide essential breeding and wintering habitat for waterfowl, shorebirds, wading birds, as well as providing food and cover for some reptiles, amphibians, and mammals (Elphick and Oring 1998). Most significant is the value ricelands provide to waterfowl and other waterbirds using the Pacific Flyway. With less than 300,000 acres of natural wetlands remaining in the Central Valley (*Central Valley Joint Venture Habitat Implementation Plan* 1990), the wetland functions provided by ricelands are an important component of waterfowl management in the Pacific Flyway. Ricelands also play an important role in providing cover, foraging, and roosting habitat for several special-status species, including the state and federally listed giant garter snake and the greater sandhill crane, both covered species in the BRCP. As a result, conversion of rice to orchards may be of significant concern to certain wildlife species, particularly as it pertains to total loss of farmed wetland acres and alternate habitat for many wetland-dependent species.

Agricultural lands also provide essential upland habitat for many wildlife species. Crop patterns that include a variety of hay, grain, and row crops support abundant rodent populations. Field edges, woodlots, and watercourses that support riparian habitat also provide breeding sites and refugia for prey species and other wildlife. Because of this abundance of food, the Central Valley supports one of the largest concentrations of raptors during the winter and breeding seasons. Raptors such as red-tailed hawk, Swainson's hawk, and white-tailed kite nest throughout the Central Valley and forage in a variety of agricultural crop types including hay, grain, row crops and irrigated pastures. Swainson's hawk, a state-listed and covered species in the BRCP, is largely dependent on agricultural foraging habitats in the Central Valley and increasingly throughout its range (Estep 1989, England 1997). Breeding density in the Central Valley between Butte County and Stanislaus County is among the highest within the range of the species and due to highly conducive crop patterns in many areas, likely higher than they were historically (Estep in preparation). As such, conversion of grassland to orchards to grow such crops as olives may also be of concern for grassland-dependent

species. Conversion of pastures, row crops, and similar agricultural lands to orchards has been noted as a factor impacting Swainson's hawk.

Native and nonnative vegetation growing along field margins and riparian vegetation growing along permanent agricultural ditches also provides habitat for migrant and resident songbirds, raptors, and small mammals. Filter strips of vegetation planted in agricultural areas to improve water quality also provide wildlife habitat. Marsh wetlands associated with agricultural drainage and irrigation channels provide habitat for a large number of wildlife and fish species (see description of wetland wildlife in Section 3.5.4, *Wetlands*). Wildlife associated with the agriculture community is listed in Appendix D.

3.5.6.2 Environmental Gradients

Transitions from agricultural land cover to other natural communities tend to be very abrupt, as the limit of a given agricultural field is determined by substantial ground surface modification on one or both sides of the transition. These transitions generally result from very different land uses (e.g., from farmed field to development) or changes in soil suitability for supporting crop production. Along the western edge of the community, agricultural lands generally transition to managed wetlands (e.g., Gray Lodge Wildlife Area) or riparian communities associated with the Sacramento River. To the east, agricultural lands generally transition to developed lands (e.g., City of Chico) or grassland communities.

3.5.6.3 Invasive Species

A wide range of invasive plant species are found in the agricultural lands of the Plan Area and many are considered a threat to surrounding natural communities. Examples of agricultural weeds include yellow starthistle (*Centaurea solstitialis*), mustards (*Brassica* spp.), Dallisgrass (*Paspalum dilatatum*), poison hemlock (*Conium maculatum*), and cheeseweed (*Malva parviflora*), to name just a few.

3.5.6.4 Ecosystem Functions

The primary ecological function of agricultural lands is to provide foraging habitat for agriculture-associated species and limited nesting, cover, and other habitat functions associated with habitats provided by riparian and other vegetation growing along ditch and field margins. Ditches and drains associated primarily with rice fields provide functions similar to those described for wetlands under Section 3.5.4, except for carbon-storing functions, which are limited as a result of periodic clearing of vegetation to maintain water flow.

3.5.7 Biological Diversity

California is considered a global hotspot for biological diversity, where species diversity, endemism, and threats to this diversity are particularly high (Myers et al. 2000, Stein et al. 2000). California is

particularly rich in unique plant species and contains globally important sites of plant diversity (Davis et al. 1997).

By most measures of biological diversity, California stands out as unique in North America. For example, California contains more native biological diversity than any other state, including more endemic species than any other state (1,295 species) (Stein 2002). Compared to other states, California is ranked first in the United States in the number of endemic species of vascular plants, amphibians, reptiles, mammals, and freshwater fish (Stein et al. 2000). In terms of total species, California supports approximately one-third of all species of vascular plants and reptiles in the United States, 47 percent of mammal species, and 56 percent of bird species (DFG 2003).

The Plan Area represents less than 0.6 percent of the land area of California but contains a high amount of the state's biological diversity. Some of the elements contributing to this high diversity are the region's diversity of natural communities (including foothill oak woodland, valley grassland, large marsh wetlands, and several types of vernal pool), the elevation range spanned within the Plan Area, and the diversity of geology and topography. In addition, the region is part of the Pacific Flyway, one of the major north-south migratory routes for avifauna in the Americas. Surveys of the California Central Valley document that it is one of the most important regions in western North America for migratory and wintering shorebirds (Shuford et al 1998).

One measure of the degree of biological diversity within the Plan Area is the number of species known to inhabit the Plan Area. Based on information presented in Appendix D, an estimated 1,400 species of vascular plants and vertebrates could occur in natural communities of the Plan Area, representing approximately 17 percent of all the plant and vertebrate species known to occur in California. Table 3–15, *Number of Vertebrate and Vascular Plant Species that Could be Present in the Plan Area* also demonstrates the percentage of species potentially found in the Plan Area compared to the entire state based on taxonomic group. This shows, for example, that close to 70 percent of all of California's bird species use the Plan Area, a testament to its importance as part of the Pacific Flyway. By this measure, the Plan Area also has a high diversity of mammal species (37.4 percent), and reptile species (27.5 percent). It also potentially supports 21 percent and 22.5 percent of California's amphibians and fish species, respectively.

Although species counts and analyses specific to the Plan Area have not been performed, these national and statewide studies strongly suggest that the biological diversity within the Plan Area is high in most plant and animal groups relative to other parts of California and the United States.

Table 3-15. Number of Vertebrate and Vascular Plant Species that Could be Present in the Plan Area

Taxonomic Group	Number of Species in Plan Area	Number of Species in California	Percent of California Species in Plan Area
Mammals[1]	68	182	37.4%
Birds[1,2]	253	368	68.8%
Reptiles[1]	22	80	27.5%
Amphibians[1]	13	62	21.0%
Fish[3]	25	111[4]	22.5%
Total Vertebrates	**381**	**803**	**47.6%**
Vascular Plants[5]	1,018	7,660 (6008)[6]	13.3%
Total Vertebrates and Vascular Plants	**1,400**	**8,463**	**16.5%**

Sources:
[1] From CWHR for species regularly occurring in California (see Appendix D for list of species in Butte County)
[2] Shuford, D. W., G. W. Page, and J. E. Kelmyr. 1998. Patterns and Dynamics of Shorebird Use of California's Central Valley. *The Condor* 100: 227–244.
[3] Moyle, P. B. 2002. *Inland Fishes of California*, Revised and Expanded. Berkeley: University of California Press.
[4] 51 nonnative and 60 native (approximately) (Moyle 2002).
[5] Calflora 2006: http://www.calflora.org/topMission.html. Includes all plant taxa (species and subspecies; native and nonnative) (see Appendix D for list of species in the Plan Area).
[6] Jepson Manual of Higher Plants of California (Hickman 1993). Native plant taxa, only.

3.6 PROPOSED COVERED SPECIES

Species identified for coverage under the BRCP ("covered species") are those for which incidental take authorizations may be required under the ESA and NCCPA to implement the covered activities over the term of the BRCP. An evaluation was conducted starting with a larger list of species that was vetted to identify the proposed covered species.

3.6.1 Species Considered for Coverage

Species considered for coverage in the evaluation were special-status species that could be present in the BRCP Plan Area. Consideration for coverage of nonlisted species was limited to special-status species because, by definition, they are recognized by federal and state wildlife agencies as declining and, therefore, are more likely than other nonlisted species to become listed at some time during implementation of the covered activities. Special-status species are defined as species that meet one of the following criteria:

- Listed as threatened or endangered under ESA;
- Proposed or candidates for listing under ESA;
- Listed as threatened or endangered under the California Endangered Species Act (CESA);
- Candidates for listing under CESA;
- California species of special concern (SSC) as identified by CDFW;[6]

[6] http://www.dfg.ca.gov/wildlife/nongame/ssc/

- Plants listed as rare under the California Native Plant Protection Act; or
- Plants ranked in the California Native Plant Society (CNPS) California Rare Plant Rank as 1A, 1B, or 2.

Sources of information used to identify the special-status species that could be present in the Plan Area were:

- CDFW's CNDDB;[7]
- USFWS' list of endangered and threatened species that occur in or may be affected by projects in Butte County;[8]
- Butte County General Plan Background Report; and
- Recorded observations of special-status species provided by local resource experts.

A total of 108 special-status species (61 animals and 47 plants) were identified as being present or having the potential to be present in the Plan Area based on the sources of information described above (Appendix B, *Evaluation of Species Considered for Coverage*). The special-status animals evaluated for coverage under the BRCP are provided in Table B–1 and the special-status plants evaluated for coverage under the BRCP are provided in Table B–2.

3.6.2 Selection of Proposed Covered Species

Four criteria were used to evaluate the potential covered species identified in Tables B–1 and B-2 (Appendix B). All four of the criteria had to be met for the species to be proposed for coverage under the BRCP.

1. **Occurrence in the Plan Area**. The species is known to occur in the Plan Area or could occur based on presence of habitat in the Plan Area and known occupied habitat near the Plan Area.
2. **Potential for Listing**. The species is listed threatened or endangered under ESA or CESA or is reasonably likely to become listed under these laws during the term of the permit, or is fully protected under the California Fish and Game Code. Nonlisted species are considered likely to become listed in the future if they meet one of the following criteria:
    - They are currently proposed for listing under ESA or are candidates for listing under ESA or CESA, or
    - They are a California species of special concern or CNPS California Rare Plant Rank 1A, 1B, or 2 plant species whose populations or habitats are continuing to decline and

[7] Source: CNDDB RareFind 3 database (2006) and http://imaps.dfg.ca.gov/viewers/cnddb_quickviewer/.
[8] Source: http://www.fws.gov/sacramento/es_species/Lists/es_species_lists-form.cfm.

a substantial proportion of their population is located in the Plan Area that could be substantially affected by covered activities.

3. **Potential to be Affected**. The species or its habitats could be affected by the types of activities anticipated to be covered under the BRCP.
4. **Sufficient Information**. Sufficient scientific information and data are available to determine the likely impacts of the covered activities on the species and to formulate conservation measures that could effectively mitigate and conserve the species.

The evaluation process and results of the process for each of the special-status animal and plant species considered are presented in Table B–1 and Table B–2, respectively. A total of 38 of these species met all four of the selection criteria and are proposed for coverage under the BRCP. The proposed covered species are shown in Table 1–1, *BRCP Covered Species*.

3.6.3 Status of Proposed Covered Species

The ecological requirements, status, threats and stressors, distribution maps, and models of potential habitat for each of the proposed covered species are presented in Appendix A.

3.7 LOCAL CONCERN SPECIES

In addition to the covered species, there are other species known to occur in the Plan Area that are rare, declining, or potentially threatened by land use changes in the Plan Area. While many of these species have special-status designations, they do not meet one or more of the criteria used in the covered species selection process. The BRCP Stakeholder Committee designated 17 of these species as "Local Concern Species" (see Table 1–2, *Local Concern Species*). While Local Concern Species are not the focus of the BRCP, the conservation measures (see Chapter 5, *Conservation Strategy*) for covered species and natural communities are designed to consider the habitat needs of the Local Concern Species. This section summarizes the status, distribution, and habitat and local concern species. Expected outcomes for these local concern species with full BRCP implementation are described in Appendix N, *Benefits of Conservation Measures for Local Concern Species.*

3.7.1 Greater Roadrunner (*Geococcyx californianus*)

Status. No federal or state status. No other special status.

Description. The greater roadrunner is a medium-sized bird (50–60 cm) with relatively short, broad wings (43–61 cm). The head, neck, back, and wings are dark brown-black and heavily streaked with white, and the breast is mostly white. The legs and beak are blue. The eyes are bright yellow and there is a postocular streak of blue and red skin. Other notable features include the crest of black feathers, which can be raised or lowered, and a long tail that may be carried at an upward angle (Famolaro 2002).

Distribution. The current distribution in California extends the length of the Central Valley and Sierra foothills, Coast Ranges and valleys, and throughout Southern California. Few confirmed breeding locations have been reported in California, all of which are in Southern California (Famolaro 2002). The species is considered rare in northern California and in Butte County (Snowden 2001).

Habitat Associations. Greater roadrunner is found in arid, semi-open scrub habitat, primarily chaparral and coastal scrub communities. In Northern California, it is associated with a mix of open grasslands and chaparral, and occasionally with oak savanna habitats with patches of shrubs and thickets. It is generally found in flat to semi-flat terrain.

Habitat Availability in the Plan Area. The grassland and chaparral communities on the east side of the Plan Area provide suitable habitat conditions for the greater roadrunner. While the species could potentially occur further westward onto the valley floor, the intensive agricultural and increasing development-related fragmentation preclude regular use of this area.

Occurrence/Distribution in the Plan Area. There are no recent records of breeding greater roadrunners in Butte County; however, Snowden (2001) considers it a potentially breeding bird. Reportedly fairly common during the first half of the twentieth century, it is currently considered rare and declining. While there are insufficient records to establish a current distribution of the species in the Plan Area, the grassland and chaparral communities and the oak woodland/grassland communities on the east side of the Plan Area are considered potential habitat.

3.7.2 Northern Harrier (*Circus cyaneus*)

Status. The northern harrier is designated by CDFW as a state species of special concern (Remsen 1978). The northern harrier currently has no special federal status.

Description. The northern harrier is a medium-sized hawk (46–50 cm) with a slight build and relatively long tail and wings (102–118 cm). Adult males are pale gray, while juveniles and females are brown. All plumages show a distinctive white rump patch in flight (Sibley 2003).

Distribution. In California, this species is a permanent resident of the northeastern plateau, coastal areas, and the Central Valley. It is also a widespread winter visitor and migrant in suitable habitat. While declines in the California population have been noted for many years (Grinnell and Miller 1944, Remsen 1978), the species can be locally abundant where suitable habitat remains free of disturbance, especially from intensive agriculture. Breeding populations have declined from destruction of wetland habitats, native grasslands, and moist meadows, and in agricultural areas from burning and plowing of nest sites during early stages of the breeding cycle (MacWhirter and Bildstein 1996).

Habitat Associations. Throughout its range, northern harriers occur primarily in open wetland, grassland, and agricultural habitats. The northern harrier is a ground-nesting raptor, constructing

rudimentary nest sites on the ground in marsh, grassland, and some agricultural habitats, particularly grain fields. They forage in seasonal wetland, grassland, and agricultural habitats for voles and other small mammals, birds, frogs, and small reptiles, crustaceans, and insects. They also roost on the ground, using tall grasses and forbs in wetlands, or along wetland/field borders for cover (MacWhirter and Bildstein. 1996).

Habitat Availability in the Plan Area. Nesting and foraging habitat for northern harriers occurs throughout most of the Plan Area. The large wetland habitats in the western and southwestern portions of the Plan Area, such as Llano Seco and wetlands associated with Gray Lodge Wildlife Area, probably represent the most intact, least disturbed, and highest value nesting and foraging habitat. Also, the row- and grain-crop agricultural lands throughout the western and central portions of the Plan Area provide suitable foraging habitat and can provide suitable nesting habitat; however, as noted above agricultural practices in these habitats can result in the destruction of active nests. Finally, the grasslands, grassland/vernal pool complexes, and grassland meadows in the eastern portion of the Plan Area also provide suitable foraging habitat and occasional nesting opportunities.

Occurrence/Distribution in the Plan Area. Nesting records of northern harriers are not well documented, due in part to the difficulty locating and confirming nests. The species likely breeds in all suitable habitat areas noted above, but the largest and most secure nesting areas are those with a marsh component and are relatively undisturbed, such as the Gray Lodge and Llano Seco wetland areas. The species is considered an uncommon breeder (Snowden 2001) and has likely declined in Butte County as a result of agricultural conversion, particularly incompatible crop types such as orchards. Foraging activity occurs throughout all suitable habitats and is particularly important during the winter season when northern migrants are present in the Plan Area (Snowden 2001).

3.7.3 Golden Eagle (*Aquila chrysaetos*)

Status. Currently designated by CDFW as a fully protected species (DFG 2011); the golden eagle is also protected under the federal Bald and Golden Eagle Protection Act and is designated by the USFWS as a federal species of concern.

Description. The golden eagle is a large bird of prey (70–84 cm in height) with very long and broad wings (185–220 cm). They are light brown in color with dark brown eyes and a faintly banded tail. Adults have a golden mantle. Females are somewhat larger, but otherwise the sexes are similar (Kochert et al. 2002).

Distribution. In North America, golden eagles breed from Alaska to Mexico and from the west coast east to Texas. In California, the species breeds throughout the mid- to higher elevation portions of the state and throughout the Southern California deserts (Kochert et al. 2002).

Habitat Associations. In California, golden eagles are generally found in open country, including open woodlands and coniferous forests, grasslands, chaparral habitats, and deserts.

They forage primarily on lagomorphs and ground squirrels (Olendorff 1976). They nest on cliff ledges, large outcrops, and where these habitats are limited they will readily nest in a variety of trees (Bruce et al. 1982).

Habitat Availability in the Plan Area. Available nesting habitat is found in the far eastern portion of the Plan Area. Cliff faces associated with steep canyons provide potential nesting substrates. Large oak trees, foothill pine, and other conifers also provide potential nesting habitat. Suitable foraging habitat includes grassland and chaparral areas in the eastern portion of the Plan Area, and cultivated farmland and pasturelands in the interior and western portions of the Plan Area.

Occurrence/Distribution in the Plan Area. There are no recent records of nesting golden eagles from the Plan Area. A south-facing cliff-site nest has been recorded just west of Table Mountain, but there has been no recently recorded activity at this site. Golden eagles are known to nest on the Sutter Buttes, just south of the Plan Area. Golden eagles are occasionally observed in the Plan Area (http://chicobirding.com).

3.7.4 Prairie Falcon (*Falco mexicanus*)

Status. The prairie falcon is designated by the USFWS as a federal species of concern, and is on the CDFW Watch List.

Description. The prairie falcon is large falcon (37–47 cm) with long, pointed wings (90–113 cm) (Steenhof 1998). It has a pale brown back, whitish chest with brown spots and bars, and brown head and facial markings, including a distinctive dark “mustache” mark on the face. The female is larger than the male but otherwise the sexes are similar.

Distribution. The prairie falcon is distributed throughout the arid west, ranging from southern Canada to northern Mexico and east to Texas. In California, the species is found primarily in the coastal ranges, Great Basin deserts of northeastern California and east of the Sierra Nevada, and the Southern California deserts. Prairie falcons are also found, although rarely, along the western slope of the Sierra Nevada and is considered a rare breeding bird in Butte County (Snowden 2001).

Habitat Associations. The Prairie falcon nests almost exclusively on cliff ledges and protected large rock outcrops. They forage in grasslands, prairies, and in cultivated fields and pasture habitats.

Habitat Availability in the Plan Area. Available nesting habitat is restricted to the cliff faces associated with steep canyons on the eastern edge of the Plan Area. Available foraging habitat includes the grassland and open chaparral and woodland habitats on the east side and to a lesser extent cultivated habitats in the interior and western portions of the Plan Area.

Occurrence/Distribution in the Plan Area. There are no recent records of nesting prairie falcons in the Plan Area. Snowden (2001) considers the species a rare breeder along the eastern edge of the Plan Area. The species is more frequently observed during the winter, when it can be found hunting in agricultural, grassland, and scrub habitats throughout the Plan Area.

3.7.5 Merlin (*Falco columbarius*)

Status. The merlin was previously designated as a state species of special concern by CDFW (Remsen 1978); however, the species is not included on the recently published revision of CDFW's Bird Species of Special Concern (Shuford and Gardali 2008). Currently, it is on CDFW's Watch List. The merlin currently has no special federal status.

Description. The merlin is a small falcon (24–30 cm) with long, pointed wings (53–68 cm) and a long, banded tail. It is the least distinctively marked falcon in North America with a faint mustache mark, brown streaking on the chest and belly, and with an unmarked gray or brown back (Sodhi et al. 1993). The sexes are similar, but the male is smaller and with a gray back; the female has a brown back.

Distribution. The merlin's breeding range extends across Alaska and Canada and southward to the most northern United States. The species also occurs across northern Eurasia. The merlin does not breed in California. Merlins winter from southern Canada to northern South America (Sodhi et al. 1993). In California, it is an uncommon winter migrant from September to May, occurring throughout most of the western half of the state below 1,500 meters (Zeiner et al. 1990).

Habitat Associations. In California, merlins winter in open woodland, grasslands, open cultivated fields, marshes, estuaries, and along the coast. In the Central Valley, merlins are generally associated with agricultural and open grassland or savannah habitats, particularly when associated with seasonal or permanent marsh habitats (Sodhi et al. 1993). They are generally not found in heavily wooded areas (Garrett and Dunn 1981). They prey primarily on birds, but also take small mammals, reptiles, and insects.

Habitat Availability in the Plan Area. Within the Plan Area, available habitat includes non-orchard agricultural fields, grasslands and vernal pool grasslands, and seasonal and permanent marshes and wetlands. Merlins may benefit from rice fields because these areas concentrate shorebirds and other avian prey (Jones & Stokes 2005).

Occurrence/Distribution in the Plan Area. Merlins are occasionally reported in Butte County during the nonbreeding season. The species occurs uncommonly throughout the non-orchard agricultural, grassland, vernal pool grassland, and wetland communities.

3.7.6 Long-Eared Owl (*Asio otus*)

Status. The long-eared owl is designated by CDFW as a state species of special concern. Currently, it has no special federal status.

Description. The long-eared owl is a medium-sized owl (35–40 cm) with long, rounded wings (90–100 cm). It is mostly brown, but is cryptically marked with brown and black, streaking and barring on the breast and belly, which makes it difficult to detect in dense vegetation. It has large conspicuous "ear" tufts and an orange facial disk and distinctive white markings on the face that form and "x" between the eyes. It has fully feathered legs and feet. The sexes are similar; however, males are somewhat smaller and often slightly paler than females (Marks et al. 1994).

Distribution. The breeding distribution extends throughout most of southern Canada, northern and eastern United States, the Great Lakes region, and throughout much of the northern prairie and western United States. In California, the species occurs throughout much of the state with reported historic concentrations in the Sacramento Valley, San Joaquin Valley, and in the San Diego area, where it is now rare, and more current concentration areas at various locations on the east side of the Sierra, such as the Susan River, and in desert oases in Southern California deserts (Marks et al. 1994). While thought to be extirpated in many locations, including the Sacramento Valley, the species is very secretive and potentially more common than recorded observations would suggest.

Habitat Associations. The long-eared owl requires dense wooded areas for daytime roosting and nesting with adjacent open areas where they hunt for small rodents and occasionally small birds. Long-eared owls are often associated with coniferous forest edges or patches of conifers, riparian woodland, and oak woodland habitats where sufficient cover is available. Snowden (2001) reports a preference for riparian vegetation dominated by box elder or willow. They do not construct their own nest, instead, they use stick nests built by other species, including American crows and various hawk species. Adjacent foraging habitats include grasslands, shrublands, open woodlands, cultivated farmland, and other open habitats. Habitat requirements are similar during breeding and wintering seasons (Marks et al. 1994).

Habitat Availability in the Plan Area. Available nesting and roosting habitat includes dense riparian woodlands along the Sacramento River, Feather River, Big Chico Creek, and Butte Creek, willow and box elder thickets along smaller drainages, and woodlands along the edges of grassland and chaparral habitats in the eastern portion of the Plan Area.

Occurrence/Distribution in the Plan Area. Considered rare by Snowden (2001) and an uncertain breeder, there are no recent reported breeding occurrences of long-eared owls from the Plan Area. Historical breeding sites include a Sacramento River oxbow near the former M&T Ranch west of Chico and near Hamlin Canyon, south of Butte Creek on the east side of the Plan Area (Snowden pers. comm.). Occurrences reported by Altacal Audubon and others are winter occurrences.

3.7.7 Short-Eared Owl (*Asio flammeus*)

Status. The short-eared owl is designated by CDFW as a state species of special concern. Currently, it has no special federal status.

Description. The short-eared owl is a medium-sized owl (34–43 cm) with relatively long (85–103 cm) rounded wings. Its ear tufts are small and appear as ridges that begin above the bill and curve up and over the forehead and crest. It has a large, round off-white facial disk with fine brown tinges and black around the eyes. Underparts are white to buffy with dark brown streaks and the back is dark brown with white mottling (www.owling.com). The female is slightly larger than the male but otherwise the sexes are similar (Holt and Leasure 1993).

Distribution. The breeding range extends from Alaska to Central California in the west and Northern Quebec and Newfoundland to Northern Virginia in the east. The winter ranges includes all of southern United States to southern Mexico (Holt and Leasure 1993). In California, the historic breeding range included most of the lowland portions of the state. The current breeding distribution includes remaining open wetland, marsh, and prairie habitats in the Central Valley and coastal areas. The species winters primarily in the Central Valley, Sierra Nevada foothills, and Southern California.

Habitat Associations. Short-eared owls are usually found in open areas with few trees, including annual and perennial grasslands, prairies, meadows, freshwater emergent marshes, dunes, and irrigated pasturelands where it nests and roosts on the ground in dense vegetation and forages on small rodents and birds.

Habitat Availability in the Plan Area. Potential nesting habitat for short-eared owls in the Plan Area is similar to the northern harrier. Probably the highest value potential nesting habitat occurs in the wetland habitats of Llano Seco and the Butte Creek watershed in and around Gray Lodge Wildlife Area. Irrigated cropland and the grassland and grassland/vernal complexes in the eastern portion of the Plan Area also provide suitable wintering habitat.

Occurrence/Distribution in the Plan Area. Few breeding records for Butte County are available. Snowden (2001) reports the short-eared owl as a rare breeder in Butte County. Potential breeding habitat includes the Llano Seco and Butte Creek watershed area in and around Gray Lodge Wildlife Area. Wintering birds could potentially use this area and grassland habitats in the eastern portion of the Plan Area.

3.7.8 Willow Flycatcher (*Empidonax traillii*)

Status. State Endangered. Of the three subspecies present in California, *E. t. brewsteri* is the most likely to occur in the Plan Area. All subspecies are state-threatened, but *E. t. brewsteri* has no federal status. It is designated by the USFWS as a federal species of concern.

Description. The willow flycatcher is a small flycatcher (13–17 cm) similar in appearance to other *Empidonax* flycatchers. Its upper parts are drab olive to brownish gray and underparts are light gray washed with yellow on the belly during spring. It has two whitish wingbars, and a white throat contrasting with a dull brownish breast band. It has a short, wide bill and a medium-long tail. The sexes are similar (Craig and Williams 1998).

Distribution. The breeding range extends across southern Canada and throughout most of the United States with the exception of the southeast United States. It winters in Central and South America (Sedgewick 2000). In California, Grinnell and Miller (1944) reported nesting willow flycatchers throughout the state wherever deciduous shrubs, mainly thickets of willows, occurred. Currently, the species is considered a rare to locally uncommon summer resident in wet meadows and montane riparian habitats from 600 to 2,440 meters and a common spring and fall migrant at lower elevations (Craig and Williams 1998). *E.t. brewsteri* is currently found primarily in isolated Sierra Nevada and Cascade meadows, but has more recently been detected in several new locales such as along the Klamath River (Craig and Williams 1998).

Habitat Associations. Breeding habitat is typically moist meadows with perennial streams; lowland riparian woodlands dominated by willows (*Salix* spp.), primarily in tree form, and cottonwoods (*Populus* spp.); or smaller spring-fed or boggy areas with willow or alders (*Alnus* spp.) (Serena 1982, Harris et al. 1988 [in Craig and Williams 1998]). Riparian deciduous shrubs or trees, such as willow or alder, are essential elements on willow flycatcher territories (Sanders and Flett 1989, Harris et al. 1988 [in Craig and Williams 1998]). During migration, the species can be observed along riparian corridors at lower elevations.

Habitat Availability in the Plan Area. There is no extensive wet meadow-riparian breeding habitat within the Plan Area. Riparian habitat along the Sacramento and Feather Rivers, Butte Creek and Big Chico Creek, and other smaller drainages, provides suitable cover and roosting habitat during the fall and spring migratory periods.

Occurrence/Distribution in the Plan Area. There are no recent breeding occurrences of willow flycatcher from the Plan Area. Snowden (2001) reports breeding activity at a few wet meadow-riparian areas in northern Butte County, but outside of the Plan Area. Dawn Garcia of CSU Chico reports several migratory occurrences along Butte Creek in 2006. Other occurrences during the spring and fall migratory periods are periodically reported by local birders.

3.7.9 Loggerhead Shrike (*Lanius ludovicianus*)

Status. The loggerhead shrike is designated by the USFWS as a federal species of concern and by CDFW as a state species of special concern.

Description. The loggerhead shrike is a medium-sized (20–23 cm), stout, short-winged passerine that is often seen perched on barbed wire fences. The underparts and back are grey and the throat and upper breast is white, which distinctly contrasts with the black tail, wings and facemask (Sibley 2000).

Distribution. The breeding range extends from central prairie provinces and the Canadian border southward to Florida, west to California, and southern Mexico (Yosef 1996). In California, the loggerhead shrike is a permanent resident and winter visitor in foothills and lowlands throughout California, where it is considered a fairly common resident (Small 1994).

Habitat Associations. Shrikes prefer open habitats with scattered trees, shrubs, posts, fences, utility lines, or other perches. It nests in small trees and shrubs and forages for small rodents and insects in pastures and agricultural lands.

Habitat Availability in the Plan Area. Most of the Plan Area is considered potential habitat for loggerhead shrike, particularly the lower elevation pasture and non-orchard agricultural lands with small trees and shrubs for nesting. Highest value lands may occur in the open pastures and irrigation croplands in the southwestern portion of the Plan Area, and in the open grassland habitats on the eastern side of the Plan Area.

Occurrence/Distribution in the Plan Area. Nest sites are infrequently reported and documented, likely due to the difficulty locating nests; however, occurrences of individual birds are regularly, although infrequently, reported by local birders. Snowden (2001) considers the species uncommon in Butte County and notes that populations may be declining as a result of the loss of potential nest sites (small trees and shrubs).

3.7.10 Yellow-Billed Magpie (*Pica nuttalli*)

Status. The yellow-billed magpie is designated by the USFWS as a federal species of concern. It currently has no special state status. The species is included here due to its sensitivity to the effects of the West Nile virus. Recent information regarding the susceptibility of magpies to the virus and the low survivability of infected magpies has led to concern regarding the future status of yellow-billed magpie populations.

Description. The yellow-billed magpie is a medium-sized corvid (43–50 cm) with a black head and chest, white shoulders and belly, iridescent blue wings, and a long tapered black tail. The bill is bright yellow. Males are slightly larger than females; otherwise, the sexes are alike.

Distribution. The species is endemic to California west of the Sierra Nevada. Its range includes Sacramento and San Joaquin valley floors and foothills, and valleys of the Coast Ranges from San Francisco Bay south to Santa Barbara County (Reynolds 1995).

Habitat Associations. Yellow-billed magpie inhabits open country with tall trees for nesting and roosting. It usually forages on the ground in agricultural fields, grasslands, pastures, and around farmyards and other disturbed sites. It nests high in trees, usually in valley oak, black walnut, and other tall trees. Yellow-billed magpies are highly social, foraging and roosting together often in large numbers. They nest individually or in loose colonies (Reynolds 1995).

Habitat Availability in the Plan Area. Suitable habitat is found throughout the lower elevation portions of the Plan Area. All agricultural types are used, including orchards. Pasturelands and grasslands also provide suitable habitat for magpies. Magpie nests are commonly found along all of the major watercourses, including the Sacramento and Feather Rivers, along roadside trees, and in isolated oak trees.

Occurrence/Distribution in the Plan Area. Yellow-billed magpie is widely distributed throughout the mid- and lower-elevation portions of the Plan Area. Populations have reportedly declined during the last two years (Altacal Audubon Society records) presumably as a result of West Nile Virus infestation.

3.7.11 California Lark (*Eremophila alpestris*)

Status. The California horned lark is currently on CDFW's Watch List. It currently has no special federal status. Of the numerous subspecies of horned lark, *E.a. rubea* is the locally breeding race within the Plan Area (Snowden 2001); however, other subspecies likely occur in the Plan Area during the migratory and wintering periods.

Description. Horned larks are small, sparrow-sized ground-dwelling birds. They are pale sandy-brown, with a yellowish chin and throat, black mask and breast band, and two small black tufts ("horns") on the head.

Distribution. Horned larks breed widely throughout North America, from northern Alaska to southern Mexico. They winter from southern Canada southward across the United States and Mexico (Beason 1995).

Habitat Associations. Throughout their range, horned larks are associated with open desert scrub, grasslands, montane meadows, and similar open habitats (Beason 1995). Grinnell and Miller (1944) describe horned lark breeding habitat as level or gently sloping shortgrass prairie, montane meadows, "bald" hills, open coastal plains, fallow grain fields, and alkali flats. More recently in California, they are commonly found in open grasslands and rangelands in the Sierra Nevada foothills, Coast Ranges, and Southern California. Horned larks are also considered an agricultural pest as they increasingly find available foraging habitat in newly planted fields, particularly those near open grassland breeding habitat (Internet Center for Wildlife Damage Management 2011).

Habitat Availability in the Plan Area. Breeding habitat for horned larks occurs throughout the foothill grassland and valley grassland/vernal pool habitats. Irrigated croplands also provide available foraging habitat; however, Snowden (2001) reports migratory subspecies likely use the valley floor habitats while *E.a. rubea* apparently remains within its foothill grassland breeding habitat.

Occurrence/Distribution in the Plan Area. Snowden (2001) reports horned larks are a common breeding and wintering species in the Plan Area. Distribution includes all foothill

grassland and lower elevation grassland and non-orchard irrigated cropland; however, the breeding distribution is limited largely to the non-cultivated grassland habitats in the eastern portion of the Plan Area.

3.7.12 Purple Martin (*Progne subis*)

Status. The purple martin is designated by CDFW as a state species of special concern. It currently has no special federal status. Three subspecies of purple martin are currently recognized with *P. s. arboricola*, the only one found in California.

Description. Purple martin is the largest (15 cm) North American swallow. They are bluish-blackish above in all plumages, with females having paler underparts (Sibley 2003).

Distribution. The purple martin breeding range extends from central Alberta to the Gulf of Mexico east of the dry western section of the Great Plains. Disjunct populations are found in the southern Rocky Mountain region, Baja California, northern and central Mexico, and along the Pacific coast from Vancouver, British Columbia to central California. Smaller populations are found on the Modoc Plateau, Sacramento area, northern Sierra Nevada, and in the mountains of Southern California. The winter range is primarily in central South America (Brown 1997).

Habitat Associations. Purple martins develop colonial nests in cavities of large trees in oak or riparian woodlands and low-elevation coniferous forests. Nests are in old woodpecker cavities in dead snags and are often in residual snags in burned or logged forests (Brown 1997). With the extensive loss of mature riparian trees throughout much of their range in California, purple martins have begun using man-made structures such as buildings, bridges and highway overpasses for nesting (Airola and Grantham 2003).

Habitat Availability in the Plan Area. Potential breeding habitat is available in oak woodland and savanna habitats along the eastern edge of the Plan Area. Currently, potential man-made nesting habitat is unavailable at most freeway overcrossings or bridges where vertical “weep” holes could be present (Airola and Grantham 2003). Future construction, however, could create these nesting opportunities.

Occurrence/Distribution in the Plan Area. Snowden (2001) reports the possible extirpation of purple martins from Butte County. Available and otherwise suitable nesting habitat is unoccupied likely as a result of nest cavity competition from European starlings (*Sturnus vulgaris*).

3.7.13 California Thrasher (*Toxostoma redivivum*)

Status. The California thrasher has no federal or state status and no other special status; however, the species is of local concern and thought to be declining (Snowden 2001).

Description. The California thrasher is a large thrasher (28–33 cm) with a long, deeply curved bill. It is dark brown above with lighter gray-brown breast and buff-brown to orange undertail coverts. It has dark brown eyes, indistinct light brown eyebrow and dark "mustache." The sexes are alike (Cody 1998).

Distribution. Endemic to California and northern Baja California, the species is found in chaparral and coastal scrub communities along the coast and Coast Ranges, western Sierra Nevada, and Southern California and Baja California deserts (Sibley 2003).

Habitat Associations. The California thrasher is found primarily in chaparral and other shrub communities from sea level to montane chaparral. It will also breed in adjacent oak woodlands, pine-juniper scrub, and occasionally in parks and gardens, but only if dense cover is available (Cody 1998).

Habitat Availability in the Plan Area. Chaparral habitats on the eastern edge of the Plan Area provide suitable habitat for thrashers.

Occurrence/Distribution in the Plan Area. There are few nesting records of California thrasher in Butte County; however, it has been regularly (although infrequently) reported during the breeding season. Snowden (2001) reports the species as possibly declining in Butte County as a result of rural urbanization and predation by house cats. The distribution likely is directly associated with the distribution of chaparral vegetation in the Plan Area.

3.7.14 Yellow Warbler (*Dendroica petechia*)

Status. The yellow warbler is designated by CDFW as a species of special concern and is designated by the USFWS as a federal species of concern.

Description. The yellow warbler is a small (12–13 cm), plain yellow wood-warbler with few distinguishing marks. It is the only bright yellow wood-warbler with yellow spots on the tail. The fresh-plumaged adult males have distinctive small red streaks on the underparts (Sibley 2003).

Distribution. The breeding distribution extends from northern Alaska and Canada southward to the central United States and west into Mexico. The species winters in Mexico and Central and South America. Throughout California, yellow warbler is summer resident and transient in suitable riparian habitats (Small 1994, Lowther et al. 1999).

Habitat Associations. In California, yellow warblers nest primarily in riparian habitats (Grinnell and Miller 1944), but in some montane areas they also nest in a variety of shrub habitats (e.g., manzanita, ceanothus) far removed from water (Grinnell et al. 1930, Beedy and Granholm 1985). Migrants prefer edges to the interior of forests and broad-leaf trees to conifers. They can be found in a variety of habitats, including riparian, oak woodland, and suburban parks and gardens (Dunn and Garrett 1997).

Habitat Availability in the Plan Area. Available breeding habitat includes riparian woodlands association with the Sacramento River, Feather River, Butte Creek, Big Chico Creek, and other small drainages with suitable riparian vegetation.

Occurrence/Distribution in the Plan Area. Snowden (2001) notes that yellow warblers nest in riparian and chaparral habitats in the montane zone, presumably outside of the Plan Area, and are a rare breeding bird in valley riparian habitats within the Plan Area. Heath (1998) reports breeding occurrences in the Plan Area along the Sacramento River. Dawn Garcia of CSU Chico reports several migratory occurrences along Butte Creek and several possible breeding occurrences along Butte Creek and Big Chico Creek from 2006 and 2007.

3.7.15 Hitch (*Lavinia exilicauda*)

Status. Hitch have no federal or state status and no other special status. Moyle (2002) identifies them as a 1D "watch list" species.

Description. Hitch are native cyprinids (minnows) with laterally compressed, moderately deep bodies, moderately large scales, and a small head. The body tapers to a narrow caudal peduncle. They have a large forked tail and long anal fin, which distinguishes this species from most other California cyprinids. Individuals can reach up to 35 cm (standard length).

Distribution. Hitch are native to the Sacramento-San Joaquin River Delta and upstream tributaries, Clear Lake and associated lakes, the Russian River, and Pajaro-Salinas Rivers and major upstream tributaries. They have been introduced into upstream reservoirs within their native range and are found in the San Luis Reservoir in Merced County and in Los Angeles County, presumably by introduction via the California Aqueduct.

Habitat Associations. Hitch are found in warm, low elevation lakes, sloughs, and slow-moving portions of rivers and clear, low-gradient streams. Individuals are generally found in streams with sandy bottoms but can live in urbanized channels with high turbidity and silt loads.

Habitat Availability in the Plan Area. Most creeks and rivers in the Plan Area have stretches of slow-moving water that are potential habitat for hitch.

Occurrence/Distribution in the Plan Area. The Central Valley subspecies of hitch (*L. e. exilicauda*) is found most commonly in undisturbed reaches in the Plan Area (M. Marchetti pers. comm.). Hitch are found occasionally in the Feather River and in other waterways in Butte County (McReynolds pers. comm.). It is likely that hitch are found in other waterways with appropriate habitat throughout the Plan Area.

3.7.16 Hardhead (*Mylopharodon conocephalus*)

Status. Hardhead have no federal status, but are identified as a California species of special concern by CDFW. Moyle (2002) identifies them as a 1D "watch list" species.

Description. Hardhead are large, native cyprinids (60 cm or greater standard length) that have an elongate body, forked tail, and a shape similar to pikeminnow. Juveniles are silver colored, turning brown to dark bronze with maturity.

Distribution. Hardhead are widely distributed in undisturbed stretches of low- to mid-elevation streams in the Sacramento-San Joaquin River watershed. In the Sacramento drainage, hardhead are typically found in larger tributary streams as well as the mainstem Sacramento River.

Habitat Associations. Hardhead prefer clean, deep pools and runs with well-oxygenated water, substrate with a mix of sand, gravel, and boulders, and slow flows.

Habitat Availability in the Plan Area. There are several moderately large creeks and rivers in the Plan Area that support or could support hardhead populations.

Occurrence/Distribution in the Plan Area. Hardhead are found in scattered populations in waterways throughout the Plan Area. They have been seen in high numbers in Big Chico Creek (T. McReynolds pers. comm.) and the Feather River (A. Seesholtz pers. comm.). Hardhead are considered "plentiful" upstream of Lake Oroville (Oroville Facilities FERC Relicensing Project 2004). It is likely that hardhead are found in other waterways with appropriate habitat throughout the Plan Area.

3.7.17 Tule Perch (*Hysterocarpus traski*)

Status. Tule perch have no federal or state status and no other special status. Moyle (2002) identifies them as a 1D "watch list" species.

Description. Tule perch are medium-sized (less than 15 cm total length), deep-bodied embiotocids (surfperch). Their color is highly variable, but is generally dark blue or purple on their backs and white or yellow on their undersides. There are three color variants of side barring: unbarred, broad-barred, and narrow-barred. Only unbarred and narrow-barred individuals are found in the Plan Area. Adults often have a hump on their back between their head and dorsal fin. Both dorsal fin rays and anal fin rays extend to the caudal peduncle.

Distribution. The Sacramento-San Joaquin subspecies of tule perch (*H. t. traski*) is found in Central Valley rivers up to major canyons or waterfalls. It also occurs in the Delta, Suisun Marsh, the Napa River, and other creeks in the San Francisco Bay Area. The Russian River subspecies is found throughout the Russian River and lower reaches of its tributaries. The Clear Lake subspecies is found in Clear Lake and nearby lakes. Tule Perch have established in Silver and Pyramid reservoirs, presumably carried there from the Delta via the California Aqueduct.

Habitat Associations. Tule perch are typically found in lowland lakes, estuarine sloughs, and clear rivers and streams. They require cool, well-oxygenated water and have a high salinity tolerance. As their name suggests, they are commonly associated with tules (*Schoenoplectus* spp. and *Scirpus* spp.)

Habitat Availability in the Plan Area. There are a number of creeks and rivers in the Plan Area that support or could support tule perch populations.

Occurrence/Distribution in the Plan Area. The Sacramento-San Joaquin River subspecies of tule perch is found in Big Chico Creek and tributaries (T. McReynolds pers. comm.) and the Feather River (A. Seesholtz pers. comm.). It is likely that tule perch are found in other waterways with appropriate habitat conditions throughout the Plan Area.

3.8 MIGRATORY DEER HERDS IN THE PLAN AREA

Descriptions of deer herds in Butte County were developed primarily from the Butte County General Plan (Butte County 2005). A deer herd is defined as a breeding population of deer that occupies a range common to that population. Many covered natural communities, including oak woodland and savanna, grassland, and riparian communities provide important winter range for migratory and resident deer herds in Butte County. Herds of black-tailed deer are common in Butte County (Figure 3–20, *Deer Herds and Habitat Ranges in the Plan Area* [see separate file]).

Migratory deer use different areas for summer and winter activities and migrate between these areas to meet their year-round needs. Deer that remain in a restricted area on a year-round basis are considered resident populations. Migratory and resident deer that use the Plan Area are primarily associated with oak woodland and savanna and riparian communities. Three separate migratory deer herds, the East Tehama, Bucks Mountain, and Mooretown herds, occupy the eastern foothills and mountains in Butte County and depend on these areas for all or part of their habitat requirements. Resident deer herds in Butte County are the Camp Beale and Sacramento Valley herds.

Migratory Deer Herds. Migratory deer populations are less tolerant of humans and their pets, requiring a greater distance from areas of human habitation and use. They migrate mainly to take advantage of the availability of food. Migratory deer can occupy areas that will not support resident deer on a year-round basis. The majority of migratory deer habitat in Butte County is winter range. Winter range is considerably less abundant than summer range and is considered the limiting portion of the deer habitat because of its small size relative to summer range and its location in areas where land is in demand for other uses. The black-tailed deer winter range within Butte County extends from the valley floor to nearly 4,000 feet in elevation. The critical winter range generally extends from 1,000 to 3,000 feet in elevation.

The main factors limiting populations of migratory deer in Butte County are the quantity and quality of habitat. Habitat values include food-producing areas in summer and winter, water, thermal cover, fawning areas (protection from predation during critical periods), and areas that allow for freedom of movement. Availability of food and water for deer varies seasonally and the amount of food available in winter may be the most limiting factor to deer populations, as they must meet their minimum energy requirements during the winter to survive. The necessary

winter range components preferred by deer include a good interspersion of vegetative cover, abundant browse and herbaceous forage, limited residential development, and southerly aspect.

Eastern Tehama Deer Herd. The Eastern Tehama deer herd is the largest migratory deer herd in the county and occupies a range considered to be the most extensive in the state. The range of the herd includes portions of Tehama, Plumas, Lassen, Shasta, and Butte counties. Winter range is approximately 520,000 acres; migratory and summer ranges total approximately 920,500 acres and migration routes to and from seasonal ranges are the longest in the state, covering a distance of 50 to 100 miles. Approximately 40 percent of the critical winter range in Butte County has been severely impacted due to residential encroachment since the mid-1960s (Butte County 2005).

Bucks Mountain Deer Herd. The Bucks Mountain deer herd range extends from eastern Butte County to western Plumas County. Winter range is approximately 200,600 acres; migratory and summer ranges total approximately 265,600 acres. Approximately 28 percent of the critical winter range in Butte County has been lost to residential encroachment since the mid-1960s (Butte County 2005).

Mooretown Deer Herd. Mooretown deer herds occupy a range extending from the southern boundary of the Bucks Mountain deer herd into northwestern Sierra and northeastern Yuba counties. Winter range is approximately 232,000 acres; migratory and summer ranges total approximately 217,950 acres. Approximately 50 percent of the critical winter range in Butte County has been lost to residential encroachment since the mid-1960s (Butte County 2005).

3.8.1 Land Use Conflicts with Migratory Deer

Residential development in the foothills of the western Sierra Nevada Mountains has increased substantially since the early 1960s and has been a major factor in the loss of winter range habitat for migratory deer. This habitat loss has seriously threatened the welfare of migratory deer. Most of the deer winter range in California is on private land. Subdivision and development of parcels allow land use changes, which result in a permanent loss of deer habitat. Habitat losses are due to the elimination of forage and cover plants; disturbance from noise, traffic, and domestic dogs; and public use as a result of improved road access and subdivisions. One of the direct effects of residential development in deer winter range is development of barriers that interfere with deer movement in and out of winter range and separate food and water source areas from shelter sites. Barriers to deer movement include areas with high housing densities, deer-proof or deer-resistant fencing, reservoirs, major streams or rivers, and major roads and highways.

Houses arranged in linear corridors through migratory pathways and rows of houses on small lots along roadways and streams present the greatest barriers to migratory deer. In addition, predation and harassment of deer by domestic dogs accompanies increased residential development in rural areas. Deer generally do not come within 1,000 or more feet of an

occupied dwelling with dogs. Migratory deer appear to be far less tolerant of the presence of dogs than are resident deer.

Construction of large reservoirs and canals can block migratory deer movement and result in loss of habitat. Due to its size and location, Oroville Reservoir is a major obstacle to movement of migratory deer. Certain fence designs are barriers to deer movement, particularly to does and fawns. Landowners occasionally construct unusually high fences around large acreages to purposefully exclude deer and prevent damage to their horticultural plantings or crops. Deer-proof or deer-resistant fences around large acreages in winter range and across critical deer migration corridors adversely affect deer populations. Highways and roads are a source of deer mortality.

3.9 EXTENT OF POTENTIAL JURISDICTIONAL WETLANDS AND OTHER WATERS IN THE PLAN AREA

The extents of wetlands and other waters of the United States in the Plan Area were estimated using the methods described in Section 3.4.5, *Potential Jurisdictional Wetlands and Other Waters*. Table 3–16, *Potential Jurisdictional Wetlands and Other Waters in the Plan Area* (see separate file) provides a summary of the extent of jurisdictional wetlands and other waters in the Plan Area and a summary of the methods used for estimation. Table 3–17, *Existing Extent of Potential Jurisdictional Wetlands and Other Waters in the Plan Area by Watershed Unit* (see separate file) presents a calculation of the potential extent of jurisdictional wetlands and other waters by HUC 10 watersheds in the Plan Area. Table 3–18, *Estimated Extent of Potential Jurisdictional Wetlands and Other Waters in the Plan Area by CAZ* and UPA (see separate file) presents a calculation of the potential extent of jurisdictional wetlands and other waters by CAZ. Table 3–19, *Acreage of Vernal pools and Other Seasonal Wetlands within CAZs and UPAs* (see separate file) presents a calculation of the potential existing acreage of vernal pools and other seasonal wetlands in the Plan Area. Ecological characteristics of the different types of wetlands and aquatic habitats in the Plan Area are described in Section 3.5.2, 3.5.3, 3.5.4, and 3.5.5, *Aquatic*.

CHAPTER 4. IMPACT ASSESSMENT AND ESTIMATED LEVEL OF TAKE

4.1 INTRODUCTION

The Butte Regional Conservation Plan (BRCP) impact assessment describes the adverse impacts of implementing the covered activities described in Chapter 2, *Covered Activities*, including implementation of the conservation measures described in Chapter 5, *Conservation Strategy* on natural communities and covered species. The analysis of impacts reflects changes relative to the existing conditions described in Chapter 3, *Ecological Baseline Conditions*.

The assessment of impacts on each covered natural community identifies the potential acreage of the community that could be permanently and directly impacted (i.e., removed) as a result of implementing the covered activities as well as impacts on associated vegetation, wildlife, and ecosystem functions. The assessment of impacts on each covered species identifies the estimated level of incidental take[1] (take) and, if applicable, potential effects on designated critical habitat.

The quantification of effects on covered species habitats is limited by the known distribution of covered species within the Plan Area. Where information on a covered species' occurrences and occupied habitat is not available, the estimated impact is based on the loss or reduction in function of areas assumed to provide habitat for the species using the habitat models presented in Appendix A, *Covered Species Accounts*.

4.2 IMPACT ASSESSMENT APPROACH

The approach to the impact assessment relies on application of the best available information regarding implementation of the BRCP covered activities (see Chapter 2, *Covered Activities*), the distribution and acreage of natural communities and covered species habitats in the Plan Area, known occurrences of covered species in the Plan Area (see Chapter 3, *Ecological Baseline Conditions*, and Appendix A), and the ecological requirements and behaviors of covered species (see Appendix A). Impacts are assessed based on an evaluation of the likely responses of the natural communities and covered species to impact mechanisms associated with implementing covered activities. The approach to analyzing impacts is, by necessity, at a landscape level because of the large size of the Plan Area, the broad range of activities covered, and the long duration of BRCP implementation. The impact assessment represents approximate impacts rather than precise numbers; however, the acres of impacts on natural communities and covered

[1] Take is defined under the Endangered Species Act (ESA) regulations as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect or attempt to engage in any such conduct" as it applies to federally listed species (ESA §3[19]); see glossary for definitions of "harm" and "harass"). Take is defined under the California ESA as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill (California Fish and Game Code section 86).

species habitat presented in this chapter specifies the total impacts on natural communities and covered species habitats allowable under the BRCP.

The impact assessment addresses the impacts of the following major categories of covered activities described in Chapter 2, *Covered Activities*, and listed below.

- Permanent Development Projects and Recurring Maintenance Activities within Urban Permit Areas (UPAs)
  - Residential, commercial, public, industrial, and recreational facilities
  - Recreational facilities
  - Transportation facilities
  - Pipeline facilities
  - Utility services facilities, waste and wastewater management facilities, and flood control and stormwater management facilities
  - Vegetation management
- Permanent Development Projects and Recurring Maintenance Activities outside UPAs
  - Wastewater management facilities
  - Transportation facilities
  - Flood control and stormwater management
  - Agricultural services facilities
  - Vegetation management
- Permanent Development Projects and Recurring Maintenance Activities within Water and Irrigation Districts
- Activities within BRCP Conservation Lands
  - Habitat restoration
  - Enhancement and management of protected lands
  - Aquatic habitat improvements
  - Establishment of covered plant species occurrences

4.2.1 Impact Category Definitions

Impacts are defined as adverse effects on biological resources that result from the covered activities, specifically adverse effects on natural communities and the covered species habitat they support, agricultural lands that support covered species habitat, and covered species occurrences and populations. The effects can be temporary or permanent and direct or indirect;

they can also be cumulative. These terms are defined and used in the BRCP as follows (see Appendix P, *Glossary of Terms*).

- **Permanent Effects.** Permanent effects are impacts of covered activities that result in 1) the injury or mortality of a covered wildlife or fish species, 2) removal of a covered plant species, 3) irreversible permanent removal, degradation, or alteration of a land cover type supporting habitat for covered and other native species, or 3) that affect the functions of a land cover type as habitat for covered species for more than one year following implementation of the activity (e.g., creating a new road through grassland).
- **Temporary Effects.** Temporary effects are impacts of covered activities that 1) alter the behavior of a covered wildlife or fish species during the duration of the activity, 2) alter the habitat conditions supporting covered plants or shrimp species occurrences for a period of less than one year following initiation of the activity, or 3) alter a land cover type or that affect the functions of a land cover type as habitat for covered and other native species for less than one year following initiation of the activity (e.g., clearing of grassland for construction staging areas). Effects on the covered species habitat functions of land cover alterations are only temporary only if the functions can be recovered to or improved from preproject conditions. Temporary effects include disturbances, such as noise and dust generation, associated with the operation of construction equipment that can impact covered species (e.g., noise and visual disturbances may result in wildlife avoiding habitat areas adjacent to construction sites).
- **Direct Effects.** Direct effects are those effects on natural communities and covered species and their habitats that are expected to occur immediately as a result of the implementation of covered activities at the time and place of project implementation (e.g., construction-related ground, noise, and visual disturbances). Direct effects can be permanent or temporary.
- **Indirect Effects.** Indirect effects are those effects on natural communities and covered species and their habitats that are caused by or will result from the implementation of covered activities and are later in time but still reasonably certain to occur. Indirect effects are defined under United States Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) joint regulations as "those that are caused by the proposed action and are later in time, but are still reasonably certain to occur" (50 *Code of Federal Regulations* [CFR] 402.02). For example, indirect effects could be increased noise, disturbance by unattended pets, and night lighting as a result of homes built in immediate proximity to habitat. Indirect effects of the covered activities are permanent, and no temporary indirect effects have been identified with implementation of the BRCP covered activities.
- **Cumulative Effects.** Cumulative effects result from the incremental impact of the covered activities when viewed together with past, present, and reasonably foreseeable future actions. The Endangered Species Act (ESA) regulations define cumulative effects as "those effects of future State or private activities, not involving federal activities, that

are reasonably certain to occur within the action area of the federal action subject to consultation." [2] In the case of the BRCP, the "federal action" is the issuance of incidental take permits by USFWS and NMFS, and the federal "action area" is the BRCP Plan Area, as no impacts of covered activities are anticipated to extend beyond the Plan Area boundary. This definition only applies to ESA section 7 analyses and differs from the broader definition under National Environmental Policy Act of 1969 (NEPA) and California Environmental Quality Act of 1970 (CEQA). Habitat Conservation Plans (HCPs) are not required to discuss cumulative effects, however, as stated in the Habitat Conservation Planning Handbook, "the applicant should help ensure that those considerations required of the [USFWS and NFMS] by section 7 have been addressed in the HCP" (USFWS and NFMS 1996). Accordingly, the BRCP addresses the cumulative effects that could result from state, local, and private activities. Cumulative effects of all projects with a federal nexus are analyzed in the BRCP environmental impact report (EIR)/environmental impact statement (EIS) and are not addressed in the BRCP.

4.2.2 Impact Mechanisms

Impact mechanisms are defined as actions or results of actions to implement a covered activity that result in adverse effects on natural communities and covered species. The impacts of covered activities are determined based on the likely response of natural communities and covered species to the impact mechanisms using the best available scientific and commercial information and professional judgment. Impact mechanisms associated with the BRCP covered activities are summarized by category in Table 4–1, *Summary of Covered Activity Impact Mechanisms and Associated Potential Adverse Impacts for Covered Activity Categories* (see separate file) and are described below. Impact mechanisms associated with implementation of the covered activities result in permanent direct, temporary direct, and permanent indirect effects on biological resources (see Section 4.2.1, *Impact Category Definitions*). No impact mechanisms are identified that would result in temporary indirect effects. Consequently, temporary indirect effects are not described further in the assessment of impacts on natural communities (Section 4.3, *Impacts on Natural Communities and Agricultural Habitats*) and covered species (Section 4.4, *Impacts on Covered Species*).

Impact mechanisms are grouped for the purposes of analysis and in accordance with the description of covered activities presented in Chapter 2, *Covered Activities*. While Chapter 2, *Covered Activities*, provides details on the activities themselves, this section describes how groups of covered activities affect land cover and habitat for covered species. These descriptions provide an overview of the direct and indirect effects that could result from each category of covered activities. Required BRCP avoidance and minimization measures that are designed to avoid or reduce the impacts of covered activities are presented in Chapter 6, *Conditions on Covered Activities.*

[2] 50 *Code of Federal Regulations* (CFR) §402.02.

4.2.2.1 Residential, Commercial, Public, and Industrial Facilities within UPAs

BRCP covered residential, commercial, public, and industrial facility permanent development projects are described in Section 2.2.1.1, *Residential, Commercial, Public, and Industrial Facility Permanent Development Projects within UPAs*. There are no impact mechanisms associated with future maintenance of new residential, commercial, public, and industrial facilities, because any activities undertaken to maintain these facilities are expected to be implemented within existing development footprints[3] that do not support biological resources. With the exception of culverts placed in small intermittent drainages along roads within the footprint of new residential, commercial, public and industrial facilities, these activities do not include construction and recurring maintenance of in-water structures.

4.2.2.1.1 Permanent Direct Effects

The primary impact mechanism for residential, commercial, public, and industrial permanent development projects that result in permanent direct effects on natural communities and covered species is the conversion of natural communities and habitat for covered and other native species to developed land that does not support habitat. In addition to the permanent removal of natural communities and agricultural lands that support habitat for covered and other native species, such conversion may further fragment or isolate remaining natural habitat within the UPAs, rendering it less suitable or unsuitable for use by covered species. The operation of equipment to implement these permanent development projects also results in the removal of covered and other native plant species and injury or mortality of covered and other native wildlife species that cannot avoid operating equipment (e.g., crushing or striking of individuals, destruction of nests with eggs or nestlings). Accidental introduction of contaminants within project construction sites associated with construction-related activities (e.g., fuel spills) could also either result in mortality or inhibit normal behaviors of covered and other native wildlife species that are sensitive to and come into contact with these contaminants.

4.2.2.1.2 Temporary Direct Effects

The impact mechanism for residential, commercial, public and industrial permanent development projects on natural communities and covered species is the operation of construction-related equipment.[4] Noise, visual, and other disturbances (e.g., ground vibrations, night lighting of construction sites) associated with operation of construction-related equipment can result in

[3] Development footprints are the physical area within which the permanent development projects described in Chapter 2, *Covered Activities*, are assumed to be implemented. Permanent development footprints shown in Figures 4–1 to 4–10 are from the County and city general plans but do not necessarily indicate where all future projects will be located.

[4] Residential, commercial, public, and industrial facility permanent development projects are assumed to result in the complete conversion of natural communities and agricultural lands within project footprints. Consequently, there are no temporary direct impacts on natural communities and agricultural lands within project footprints. Operation of construction-related equipment to implement residential, commercial, public, and industrial facility permanent development projects will avoid perennial stream channels and banks, thus avoiding the potential for temporary direct effects of construction-related disturbances on aquatic species and habitat.

temporary abandonment or reduction in use of habitat areas by covered and other native wildlife species adjacent to work sites. Erosion, dust, and sedimentation associated with construction-related disturbance of soils during construction periods may also reduce the function of receiving waters and land surfaces as habitat for covered and other native species (e.g., increased turbidity, reduced dissolved oxygen, covering of plants with soil).

4.2.2.1.3 Permanent Indirect Effects

Impact mechanisms associated with residential, commercial, public, and industrial permanent development projects that result in permanent indirect effects on natural communities and covered species include increased human activity associated with human occupancy of new facilities adjacent to natural communities and agricultural lands supporting covered species habitats and the creation of impermeable ground surfaces (e.g., paved or compacted land). Noise, visual, and other disturbances associated with occupancy and use of new facilities can result from increases in ambient noise levels (e.g., traffic noise, lawn mowers) and visual disturbances that cause reduction in use or abandonment of habitat adjacent to new developments (e.g., increased traffic, increased intrusion of humans into adjacent habitat areas, night lighting of habitat areas emanating from adjacent structures). Occupancy of new facilities will result in increased risk for injury or mortality of covered and other native wildlife species. For example, increased traffic associated with new developments adjacent to habitat areas increases the risk for vehicle-wildlife collisions (e.g., crushing of small mammals, reptiles, and amphibians present on road surfaces; flying birds being hit by moving vehicles). Loose pets (e.g., dogs and cats) can result in increased predation (e.g., cats preying on small mammals and nesting birds) and harassment of native wildlife (e.g., dogs chasing deer). Increased levels of human access into adjacent habitat areas also increases the risk for wildfire that could result in temporary, periodic removal of vegetation that supports habitat for covered and other native species.

Occupancy of new residential developments can exacerbate the introduction or spread of nonnative species. For example, ornamental or aquarium species released in the wild may introduce new plants, animals, or diseases to resident populations. New species may spread to adjacent habitat areas and outcompete and displace native species; they can also hybridize (interbreed) with local native plants and animals, thereby disrupting the genetics of the native population. Such hybridization can affect native populations in several ways, including poor growth and reproduction.

Increasing the extent of impermeable surfaces may alter local surface runoff patterns (i.e., timing and amount of runoff) that support vernal pool habitat native vegetation (e.g., wetland and riparian vegetation). Increases in the amount of runoff, especially during storm events, can result in greater levels of scour and/or incision of local creeks, increased sediment loads, alterations of downstream hydrology, and decreased groundwater recharge. High runoff temperature may also result in an increase of in-stream water temperatures when runoff enters local streams affecting habitat conditions for covered species and other native aquatic organisms. Occupancy of new facilities may increase the amount of pollutants, such as grease, oil, and detergents that can be

transported from residences during wet weather. An increase in the quantity of pollutants reaching local streams through higher runoff may affect the biological and physical characteristics of aquatic habitats for covered fish and other native aquatic organisms.

4.2.2.2 Recreational Facilities within UPAs

Covered recreational facility permanent development projects and recurring maintenance activities are described in Sections 2.2.1.2, *Recreation Facility Permanent Development Projects within UPAs* and 2.2.2.1, *Recreation Facility Recurring Maintenance Activities within UPAs* respectively.

4.2.2.2.1 Permanent Direct Effects

Impact mechanisms associated with the development and recurring maintenance of recreational facilities that result in permanent direct effects on natural communities and covered species include those described for residential, commercial, public, and industrial facility permanent development projects in Section 4.2.2.1, *Residential, Commercial, Public, and Industrial Facilities within UPAs*. In addition, the construction of new pedestrian bridges across streams could locally alter the structure of in-stream channel habitat (e.g., in-stream woody debris, substrate) for covered fish and other native aquatic species if construction and bridge structures (e.g., abutments) disturb channel banks and stream beds.

Impact mechanisms for recurring recreational facility maintenance activities that result in permanent direct effects on natural communities and covered species include the operation of maintenance-related equipment and operation of the Sycamore Pool bladder dam. Operation of maintenance-related equipment can result in the removal of covered and other native plant species and injury or mortality of covered and other native wildlife species that cannot avoid operating equipment (e.g., crushing or striking of individuals, destruction of nests with eggs or nestlings). The accidental introduction of contaminants associated with construction-related activities (e.g., fuel spills) could also result in mortality or inhibit normal behaviors of covered and other native wildlife and fish species that are sensitive to and come into contact with these contaminants. The likelihood for these adverse effects, however, is considered to be low, because most maintenance activities will occur within the developed footprint of recreational facilities that do not support habitat and because, given the generally small size of maintenance equipment and short duration of equipment operation, any spills of contaminants will be small and highly localized.

Maintenance of Sycamore Pool in Big Chico Creek includes weekly dewatering from late May through early September. Dewatering of the pool could strand and result in injury or mortality of covered fish and other native aquatic organisms if they are not able to escape the pool during dewatering operations.

4.2.2.2.2 Temporary Direct Effects

Impact mechanisms associated with the development and recurring maintenance of recreational facilities that result in temporary direct effects on natural communities and covered species, include those described for residential, commercial, public, and industrial facility permanent development projects in Section 4.2.2.1. In addition, operation of equipment in stream channels to construct facilities (e.g., pedestrian bridges, maintenance of Sycamore Pool along Big Chico Creek) could mobilize sediment from stream beds and banks, causing increasing turbidity that could temporarily affect habitat conditions for covered fish species and other native aquatic organisms. Equipment-related noise, visual disturbances, and vibrations associated with operating construction- and maintenance-related equipment in and near channels could also cause covered and other native aquatic species (e.g., fish, reptiles, and amphibians) to temporarily reduce use of or avoid habitat areas upstream and downstream from project sites during periods when equipment is operating.

4.2.2.2.3 Permanent Indirect Effects

Impact mechanisms associated with the development of new recreational facilities that result in permanent indirect effects on natural communities and covered species include those described for residential, commercial, public, and industrial facility permanent development projects in Section 4.2.2.1. In addition, increased human activity (e.g., trails) in and adjacent to natural habitat areas result in noise and visual disturbances that can affect habitat use by covered and other native wildlife, increased risk for vehicle-wildlife collisions associated with increased traffic adjacent to habitat areas, increased collection of native plants and wildlife, trampling of plants, harassment of wildlife by pets, and other such disturbances. Incidental take associated with legal recreational uses, however, is only extended to Butte County Association of Governments (BCAG) as the Implementing Entity and Permittees for the indirect effects of allowable recreational uses (i.e., take caused by actions of individual recreationalists is not covered).

Maintenance of new golf courses and other high maintenance recreational facilities may increase the amount of pollutants (e.g., petroleum-based chemicals) that can be transported from maintained facilities during wet weather. An increase in the quantity of pollutants reaching local streams may affect the biological and physical characteristics of aquatic habitats for covered fish species and other native aquatic organisms.

4.2.2.3 Transportation Facilities within UPAs

BRCP covered transportation facility permanent development projects and recurring maintenance activities are described in Sections 2.2.1.3, *Transportation Facility Permanent Development Projects within UPAs* and 2.2.2.2, *Transportation Facility Recurring Maintenance Activities within UPAs*, respectively.

4.2.2.3.1 Permanent Direct Effects

Impact mechanisms associated with the development and recurring maintenance of transportation facilities that result in permanent direct effects on natural communities and covered species include those described for residential, commercial, public, and industrial facility permanent development projects in Section 4.2.2.1. In addition, construction of new roads may create barriers that disrupt movements of covered and other native wildlife species (e.g., small mammals, reptiles, amphibians) among habitat areas.

As described for permanent direct effects of residential, commercial, public, and industrial facility permanent development projects in Section 4.2.2.1, the operation of equipment to implement and maintain transportation facility projects could also result in the removal of covered and other native plant species and injury or mortality of covered and other native wildlife species. Direct effects on individual plants and wildlife is expected to be low for projects to widen existing roads and road maintenance activities because they will occur within existing rights of way (ROWs) that support low functioning habitat (i.e., low herbaceous vegetation typically dominated by nonnative vegetation adjacent to roads that are subject to ongoing traffic-related disturbances) and thus less likely to support occurrences of covered and other native species. However, impact assumptions for these activities are described fully in Section 2.2.2.2. Accidental introduction of contaminants within construction- and maintenance-related project sites (e.g., fuel spills) could also result in mortality or inhibit normal behaviors of covered and other native wildlife and fish species that are sensitive to and come into contact with these contaminants.

The construction of new and replacement bridges across streams could permanently alter in-stream channel habitats (e.g., in-stream woody debris, substrate) as a result of operating equipment and placing structures (e.g., bridge abutments) in stream channel banks and stream beds. Removal of woody and other debris from channels may cause alteration of in-channel aquatic habitat structure and hydrodynamics and may affect cover for covered and other native fish species, and basking and foraging habitat available for reptile species (e.g., western pond turtle).

4.2.2.3.2 Temporary Direct Effects

Impact mechanisms associated with the development and recurring maintenance of transportation facilities that result in temporary direct effects on natural communities and covered species include those described for residential, commercial, public, and industrial facility permanent development projects in Section 4.2.2.1. For new roadway projects, these

impact mechanisms only affect natural communities and covered species in areas outside of the ROWs of the new roadways. [5]

Impact mechanisms associated with construction of replacement and new bridges and maintaining bridges on near- and in-stream habitats that may result in temporary direct effects are the same as described for recreational facilities in Section 4.2.2.2, *Recreational Facilities within UPAs*.

4.2.2.3.3 Permanent Indirect Effects

Impact mechanisms associated with transportation facility projects that result in permanent indirect effects on natural communities and covered species include increased risk for injury and mortality of covered and other native wildlife species from collisions with vehicles resulting from traffic associated with new roads and increased traffic on widened existing roads. Noise and visual disturbances associated with traffic on new roads may also reduce the use of habitat adjacent to new roads by covered and other native species that are sensitive to such disturbances. New roads may also alter local surface runoff patterns (i.e., timing and amount of runoff) that support vernal pool habitats and native vegetation. Traffic along new roads and higher traffic volume on widened roads may increase the amount of petroleum-based pollutants (e.g., oil) that can be transported from road surfaces during wet weather. An increase in the quantity of pollutants reaching local streams may affect the biological and physical characteristics of aquatic habitats for covered fish species and other native aquatic organisms.

Placement of new bridge abutments in channels may create habitat for nonnative predatory fish that increases predation mortality on native fishes (e.g., juvenile salmonids).

4.2.2.4 Pipeline Facilities within UPAs

BRCP covered pipeline facility permanent development projects and recurring maintenance activities are described in Sections 2.2.1.4, *Pipeline Facility Permanent Development Projects within UPAs* and 2.2.2.3, *Pipeline Facility Recurring Maintenance Activities within UPAs*, respectively.

4.2.2.4.1 Permanent Direct Effects

Impact mechanisms associated with the development and recurring maintenance of pipeline facilities that result in permanent direct effects on natural communities and covered species include those described for residential, commercial, public, and industrial facility permanent development projects in Section 4.2.2.1. In addition to injury and mortality of covered and other native wildlife species that could result from equipment operation, covered and other native

[5] As described in Section 4.2.3, *Assumptions Used to Calculate Acreage Impacts on Natural Communities and Covered Species Habitats*, transportation facility permanent development projects are assumed to result in the complete conversion of natural communities and agricultural lands within project ROWs. Consequently, there are no construction- and maintenance related temporary direct impacts on habitat supporting covered and other native species within project footprints.

wildlife species that enter excavated trenches may not be able to escape and be subject to injury or mortality (e.g., predation, starvation, hypothermia).

4.2.2.4.2 Temporary Direct Effects

Impact mechanisms associated with the development and recurring maintenance of pipeline facilities that result in temporary direct effects on natural communities and covered species are the same as described for residential, commercial, public, and industrial facility permanent development projects in Section 4.2.2.1. For new pipeline projects, these impact mechanisms only affect natural communities and covered species in areas outside of the new pipeline ROWs.[6]

4.2.2.4.3 Permanent Indirect Effects

No impact mechanisms that could result in permanent indirect effects on natural communities and covered species are associated with the development and recurring maintenance of pipeline facilities because they are assumed to be located within existing developed areas that do not support habitat or within the total development footprint of new residential, commercial, public, and industrial facility permanent development projects.

4.2.2.5 Utility Services Facilities within UPAs

BRCP covered utility services facility permanent development projects and recurring maintenance activities are described in Sections 2.2.1.5, *Utility Services Facility Permanent Development Projects within UPAs* and 2.2.2.4, *Utility Service Facilities Recurring Maintenance Activities within UPAs*, respectively.

4.2.2.5.1 Permanent Direct Effects

Impact mechanisms associated with the development and recurring maintenance of utility services facilities that result in permanent direct effects on natural communities and covered species include those described for residential, commercial, public, and industrial facility permanent development projects in Section 4.2.2.1. In addition to injury and mortality of covered and other native wildlife species that could result from equipment operation, wildlife that enter excavated electric, telecommunications, and gas line trenches may not be able to escape and be subject to injury or mortality (e.g., predation, starvation, hypothermia). Construction of above ground electric transmission lines increases the risk for collisions of covered and other native bird species with transmission lines and the risk for electrocution of birds that perch on transmission poles/towers.

[6] Within UPAs, pipeline facility projects are assumed to result in the complete conversion of natural communities and agricultural lands within project footprints. Consequently, there are no temporary direct impacts on natural communities and agricultural lands within project footprints. Operation of construction-related equipment to implement pipeline facility projects will avoid perennial stream channels and banks, thus avoiding the potential for temporary direct effects of construction-related disturbances on aquatic species and habitat.

4.2.2.5.2 Temporary Direct Effects

Impact mechanisms associated with the development and recurring maintenance of utility services facilities that result in temporary direct effects on natural communities and covered species are the same as described for residential, commercial, public, and industrial facility permanent development projects in Section 4.2.2.1. For new utility projects, these impact mechanisms only affect natural communities and covered species in areas outside of the ROWs of the new utilities. [7]

4.2.2.5.3 Permanent Indirect Effects

No impact mechanisms that could result in permanent indirect effects on natural communities and covered species are associated with the development and recurring maintenance of utility services facilities because they are assumed to be located within existing developed areas that do not support habitat or within the total development footprint of new residential, commercial, public, and industrial facility permanent development projects.

4.2.2.6 Waste and Wastewater Management Facilities within UPAs

BRCP covered waste and wastewater facility permanent development projects and recurring maintenance activities are described in Sections 2.2.1.6, *Waste and Wastewater Management Facility Permanent Development Projects within UPAs* and 2.2.2.5, *Waste and Wastewater Management Facility Recurring Maintenance Activities within UPAs*, respectively.

4.2.2.6.1 Permanent Direct Effects

Impact mechanisms associated with the development and recurring maintenance of waste and wastewater management facilities that result in permanent direct effects on natural communities and covered species include those described for residential, commercial, public, and industrial facility permanent development projects in Section 4.2.2.1. In addition to injury and mortality of covered and other native wildlife species that could result from equipment operation, wildlife that enter excavated force main, effluent line, sewer line, discharge line, reclamation line, and mainline trenches may not be able to escape and be subject to injury or mortality (e.g., predation, starvation, hypothermia).

4.2.2.6.2 Temporary Direct Effects

Impact mechanisms associated with the development and recurring maintenance of waste and wastewater management facilities that result in temporary direct effects on natural communities

[7] Within UPAs, utility services facility projects are assumed to result in the complete conversion of natural communities and agricultural lands within project footprints. Consequently, there are no temporary direct impacts on natural communities and agricultural lands within project footprints.

and covered species are the same as described for residential, commercial, public, and industrial facility permanent development projects in Section 4.2.2.1.[8]

4.2.2.6.3 Permanent Indirect Effects

Impact mechanisms associated with the development of new waste and wastewater management facilities that result in permanent indirect effects on natural communities and covered species include increased risk for injury and mortality of covered and other native wildlife species resulting from collisions with vehicles using new facility access roads and increased noise and visual disturbances that may be associated with operation of new or expanded facilities. Construction of new sewer lines and mainlines and expansion of the Neal Road landfill could alter local surface and subsurface hydrology that could adversely affect vernal pools and native vegetation that is supported by existing hydrological conditions. New roads may also alter local surface runoff patterns (i.e., timing and amount of runoff) that support vernal pool habitats and native vegetation. Toxic compounds that may be present in stormwater runoff from the expanded Neal Road landfill could kill native vegetation and could alter the behavior or result in mortality of covered and other wildlife and fish species that are sensitive to the compounds. The likelihood for such effects is considered minimal because the landfill expansion will be designed and operated consistent with the requirements of applicable federal and state laws and regulations.

4.2.2.7 Flood Control and Stormwater Management Facility Permanent Development Projects within UPAs

BRCP covered flood control and stormwater management facility permanent development projects and recurring maintenance activities are described in Sections 2.2.1.7, *Flood Control and Stormwater Management Facility Permanent Development Projects within UPAs* and 2.2.2.6, *Flood Control and Stormwater Management Recurring Maintenance Activities within UPAs*, respectively.

4.2.2.7.1 Permanent Direct Effects

Impact mechanisms associated with the development and recurring maintenance of flood control and stormwater management facilities that result in permanent direct effects on natural communities and covered species include those described for residential, commercial, public, and industrial facility permanent development projects in Section 4.2.2.1. In addition, construction of new linear infrastructure (e.g., flood channels, levees/dikes, and flood walls) may create barriers to movement of wildlife species with limited mobility (e.g., small mammals). Ongoing and periodic removal of vegetation and other debris from streambeds, channels, and other flood conveyance structures that support native wildlife and fish species could result in

[8] Within UPAs, waste and wastewater facility permanent development projects are assumed to result in the complete conversion of natural communities and agricultural lands within project footprints. Consequently, there are no temporary direct impacts on natural communities and agricultural lands within project footprints.

permanent localized alteration of water temperatures and in-channel habitat structure for native aquatic species.

4.2.2.7.2 Temporary Direct Effects

Impact mechanisms associated with the development and recurring maintenance of flood control and stormwater management that result in temporary direct effects on natural communities and covered species are the same as described for residential, commercial, public, and industrial facility permanent development projects in Section 4.2.2.1.[9]

4.2.2.7.3 Permanent Indirect Effects

Impact mechanisms associated with the development of new flood control and stormwater management that result in permanent indirect effects on natural communities and covered species include increased risk for injury and mortality of covered and other native wildlife species resulting from collisions with vehicles using new facility access roads. Construction of new flood control structures (e.g., grading or other modifications to runoff patterns) could alter the hydrology of adjacent habitats, including localized dewatering of floodplain habitats supporting covered and other native species. This may also contribute to permanent alterations to habitat structure in areas supporting covered and other native species (e.g., changes in vegetation type). Steep-sided, concrete-lined stormwater channels may pose additional risks to wildlife species by trapping individuals or causing drowning mortality. Lack of vegetation along new linear flood control structures (e.g., levees) bisecting habitat areas may result in increased predation risk for covered and other native amphibians, reptiles, and small mammals.

4.2.2.8 Vegetation Management Recurring Maintenance Activities within UPAs

BRCP covered vegetation management recurring maintenance activities are described in Sections 2.2.2.7, *Vegetation Management Recurring Maintenance Activities within UPAs* and 2.3.2.4, *Vegetation Management Recurring Maintenance Activities outside UPAs*.

4.2.2.8.1 Permanent Direct Effects

Impact mechanisms associated with vegetation management recurring maintenance activities that result in permanent direct effects on natural communities and covered species include operation of maintenance-related equipment that may result in direct injury or mortality of covered and other native wildlife species. For example, juvenile mammals and ground-nesting birds could be disturbed or injured by mowing equipment, or rodent burrows used by covered species could be obliterated by disking of fire breaks. Construction and maintenance of new fire breaks in tree

[9] As described in Section 4.3.3, *Assumptions Used to Calculate Acreage Impacts on Natural Communities and Covered Species Habitats*, flood control and stormwater management permanent development projects are assumed to result in the complete conversion of natural communities and agricultural lands within project ROWs. Consequently, there are no construction- and maintenance-related temporary direct impacts on habitat supporting covered and other native species within project footprints.

and shrub dominated habitats converts them to herbaceous dominated habitats, resulting in a change in the type and diversity of native species using the affected habitat area.[10]

4.2.2.8.2 Temporary Direct Effects

Impact mechanisms associated with vegetation management recurring maintenance activities that result in temporary direct effects on natural communities and covered species include operation of maintenance-related equipment. Noise and visual disturbances associated with vegetation management activities may result in temporary reduced availability of habitat for covered and other native species. The introduction of contaminants associated with vegetation management-related activities (e.g., fuel spills) may cause morbidity or mortality of covered and other native species coming in contact with contaminants. Erosion and sedimentation associated with ground disturbance of soils (e.g., disking to maintain firebreaks) may result in reduced function of receiving waters and land surfaces as habitat for covered and other native species (e.g., increased turbidity, reduced dissolved oxygen, silting over vegetation).

4.2.2.8.3 Permanent Indirect Effects

The impact mechanism associated with recurring vegetation management activities that could result in permanent indirect effects on natural communities and covered species is the creation of fire breaks in tree and shrub dominated habitats that create wide linear bands of open habitat. The creation of these open habitat areas within otherwise closed-canopied habitats could increase the risk of predation on small mammals, reptiles and amphibians that move through the created patches of open habitat.

4.2.2.9 Wastewater Management Facilities outside UPAs

BRCP covered wastewater facility permanent development projects and recurring maintenance activities are described in Sections 2.3.1.1, *Wastewater Management Facility Permanent Development Activities outside UPAs* and 2.3.2.1, *Wastewater Management Facility Recurring Maintenance Activities outside UPAs*, respectively. Impact mechanisms associated with the development and recurring maintenance of waste and wastewater management facilities outside of UPAs that result in impacts on natural communities and covered species are the same as those described for waste management facilities within UPAs in Section 4.2.2.6, *Waste and Wastewater Management Facilities within UPAs*.

4.2.2.10 Transportation Facilities outside UPAs

BRCP covered transportation facility permanent development projects and recurring maintenance activities are described in Sections 2.3.1.2, *Transportation Facility Permanent Development Activities outside UPAs* and 2.3.2.2, *Transportation Facility Recurring*

[10] Recurring maintenance of existing fire breaks does not result in additional impacts on habitat because the activities maintain the existing habitat condition.

Maintenance Activities outside UPAs, respectively. Impact mechanisms associated with the development and recurring maintenance of transportation facilities outside of UPAs that result in impacts on natural communities and covered species are the same as those described for transportation facilities within UPAs in Section 4.2.2.3, *Transportation Facilities within UPAs*.

4.2.2.11 Agricultural Services Facilities outside UPAs

BRCP covered agricultural services facilities permanent development projects are described in Section 2.3.1.3, *Agricultural Services Permanent Development Activities outside UPAs*. Impact mechanisms associated with the development agricultural services facilities outside of UPAs that result in impacts on natural communities and covered species are the same as those described for residential, commercial, public, and industrial facility permanent development projects in Section 4.2.2.1. The magnitude and likelihood of permanent indirect effects, however, is expected to be much lower than described for residential, commercial, public, and industrial facility permanent development projects because new agricultural services facilities are expected to be located in agricultural lands that are subject to existing high levels of disturbance and that support habitat for relatively few native species relative to developments that are located adjacent to natural habitats.

4.2.2.12 Flood Control and Stormwater Management Recurring Maintenance outside UPAs

BRCP covered flood control and stormwater management recurring maintenance activities are described in Section 2.3.2.3, *Flood Control and Stormwater Management Recurring Maintenance Activities outside UPAs*.

4.2.2.12.1 Permanent Direct Effects

The impact mechanism associated with the recurring maintenance of flood control and stormwater management facilities that result in permanent direct effects on natural communities and covered species is the operation of maintenance-related equipment. Operation of equipment may result in direct injury or mortality of covered and other native wildlife species that are unable to avoid operating equipment (e.g., crushing of wildlife in burrows by operation of tracked equipment).[11]

4.2.2.12.2 Temporary Direct Effects

The impact mechanism associated with the recurring maintenance of future and existing flood control and stormwater management facilities that result in permanent direct effects on natural

[11] As described in Section 4.3.3, *Assumptions Used to Calculate Acreage Impacts on Natural Communities and Covered Species Habitats*, flood control and stormwater management recurring maintenance activities are assumed to maintain the existing modified vegetation conditions present on flood control levees. Consequently, there are no maintenance-related permanent direct impacts on habitat supporting covered and other native species within maintained areas.

communities and covered species is the operation of maintenance-related equipment. Noise, visual, and other disturbances (e.g., ground vibrations) associated with operation of maintenance-related equipment can result in temporary abandonment or reduction in use of habitat areas by covered and other native wildlife species adjacent to work sites.

4.2.2.12.3 Permanent Indirect Effects

No impact mechanisms that could result in permanent indirect effects on natural communities and covered species are associated with the recurring maintenance of flood control and stormwater management facilities.

4.2.2.13 Water and Irrigation District Facilities

BRCP covered water and irrigation district permanent development projects and recurring maintenance activities are described in Section 2.4, *Covered Activities within Water and Irrigation Districts*.

4.2.2.13.1 Permanent Direct Effects

Impact mechanisms associated with rerouting of canals and recurring maintenance of water and irrigation district facilities that result in permanent direct effects on natural communities and covered species include those described for residential, commercial, public, and industrial facility permanent development projects in Section 4.2.2.1.1, *Permanent Direct Effects*. In addition, the placement of rerouted canals may create barriers to or restrict the movement of native wildlife between habitat patches that are bisected by the canals (e.g., small mammals). This impact, however, is expected to be minimal because rerouted canals are expected to be located primarily on existing agricultural lands that typically support wildlife species for which canals would not pose a barrier to their movement.

Operation of equipment to maintain water and irrigation district canals and ditches could result in periodic ongoing removal of vegetation that supports habitat for covered and other native species and result in injury or mortality of individuals that cannot avoid operating equipment (e.g., wildlife in burrows, amphibians).

4.2.2.13.2 Temporary Direct Effects

Impact mechanisms associated with the development and recurring maintenance of water and irrigation district facilities that result in temporary direct effects on natural communities and covered species include those described for residential, commercial, public, and industrial facility permanent development projects in Section 4.2.2.1. In addition, irrigation canals may be temporarily dewatered during maintenance periods resulting in a temporary loss of habitat for covered and other native aquatic species.

4.2.2.13.3 Permanent Indirect Effects

No impact mechanisms that could result in permanent indirect effects on natural communities and covered species are associated with the development and recurring maintenance of water and irrigation district facilities because they are assumed to be located within the working landscape of existing agricultural lands that are subject to ongoing disturbances.

4.2.2.14 Habitat Restoration

BRCP habitat restoration conservation measures are described in Section 5.4.2.1, *CM4: Develop and Implement Site Specific Wetland and Riparian Restoration Plans*.

4.2.2.14.1 Permanent Direct Effects

Impact mechanisms associated with habitat restoration activities that result in permanent direct effects on natural communities and covered species include the conversion of cultivated lands, dredger tailings, and lands dominated by herbaceous vegetation to riparian, vernal pool, and emergent wetland land cover types; conversion of cultivated land to create greater sandhill crane roosting habitat; and operation of restoration-related equipment. Land cover type conversion will result in the loss of habitat for covered and other native wildlife species for which the restored land cover types do not also support habitat for those species.[12] Operation of restoration-related equipment could result in injury or mortality of covered and other native wildlife species that cannot avoid operating equipment. Accidental introduction of contaminants within project construction sites associated with construction-related activities (e.g., fuel spills) could also result in mortality or inhibit normal behaviors of covered and other native wildlife species that are sensitive to and come into contact with these contaminants.

4.2.2.14.2 Temporary Direct Effects

The impact mechanisms associated with habitat restoration activities that result in temporary direct effects on natural communities and covered species is the operation of restoration-related equipment. Restoration equipment and material staging areas and access roads may result in temporary impacts on habitat located outside of habitat restoration footprints. The area of affected habitat associated with each restoration project, however, is expected to be relatively small (e.g., less than 1 acre) and will be restored following completion of restoration activities.

Noise and visual disturbances associated with operation of restoration-related equipment can result in temporary abandonment or reduction in use of habitat areas by covered and other native wildlife species adjacent to restoration sites. Erosion, dust and sedimentation associated with

[12] It is expected that the primary land cover type on which vernal pools will be restored is grassland with vernal swales that historically supported vernal pools with high ecological functions and that emergent wetlands will be restored primarily on rice land or seasonal managed wetland. As such, the restoration actions are assumed to increase the ecological functions of the converted land cover types for covered species from existing conditions.

construction-related disturbance of soils during construction periods may also reduce the function of receiving waters and land surfaces as habitat for covered and other native species (e.g., increased turbidity, reduced dissolved oxygen, covering of plants with soil).

4.2.2.14.3 Permanent Indirect Effects

No impact mechanisms that could result in permanent indirect effects on natural communities and covered species are associated with habitat restoration activities because the overall change in ecological functions of restored habitats for covered species will be increased from existing conditions.

4.2.2.15 Enhancement and Management of Protected Lands

BRCP conservation measures to enhance and manage BRCP conservation lands are described in Sections 5.4.2.2, *Enhance Protected Natural Communities for Covered Species* and 5.4.2.3, *CM6: Maintain and Enhance Public and Easement Habitat Lands for Covered Species*.

4.2.2.15.1 Permanent Direct Effects

Impact mechanisms associated with the enhancement and management of BRCP conservation lands that result in permanent direct effects on natural communities and covered species include the development of conservation land management-related infrastructure (e.g., access roads, fences, small outbuildings, signage) and operation of habitat enhancement and management-related equipment. Development of infrastructure will result in the removal of relatively small areas of land cover supporting habitat for covered and other native wildlife species. New access roads are expected to be unimproved (e.g., unpaved two-track roads, gravel surfaced secondary roads) and have narrow ROWs (e.g., no road shoulder). Consequently, new access roads are not expected to create barriers to the movement of covered and other native wildlife species. Management of some conservation lands may require establishment and maintenance of new fire breaks. Maintenance of fire breaks are primarily expected to retain the existing land cover (e.g., grassland), but alter vegetation structure following disking of firebreaks during the dry season.[13]

Operation of vehicles and other equipment necessary to manage BRCP conservation lands could result in injury or mortality of covered and other native wildlife species that cannot avoid operating equipment. Accidental introduction of contaminants within project construction sites associated with construction-related activities (e.g., fuel spills) could also result in mortality or inhibit normal behaviors of covered and other native wildlife species that are sensitive to and come into contact with these contaminants.

[13] Firebreaks are not expected to be established in oak woodland and savanna and riparian land cover types. If firebreaks must be established in these land cover types, it would result in conversion of these land cover types to herbaceous-dominated habitats.

4.2.2.15.2 Temporary Direct Effects

Impact mechanisms associated with the enhancement and management of BRCP conservation lands that result in temporary direct effects on natural communities and covered species include those described for habitat restoration activities in Section 4.2.2.14, *Habitat Restoration*. Mechanical and chemical removal/control of nonnative vegetation may result in the temporary removal of small patches of vegetation associated with ground disturbance and vegetation removal in the immediate vicinity of where such actions are implemented. The effects of these activities on natural communities and covered species is expected to be low because each maintenance event typically will be of short duration and will only affect small patches of habitat (e.g., less than 1 acre).

Temporary direct effects of noise and visual disturbances associated with periodic controlled public access for education (e.g., scheduled school classes) and recreation (e.g., bird watching) on designated BRCP conservation lands can result in temporary abandonment or reduction in use of habitat areas by covered and other native wildlife species adjacent to public access sites (e.g., trails).

4.2.2.15.3 Permanent Indirect Effects

No impact mechanisms that could result in permanent indirect effects on natural communities and covered species are associated with BRCP conservation land enhancement and management.

4.2.2.16 Aquatic Habitat Improvements

BRCP conservation measures to enhance and manage BRCP conservation lands and aquatic resources are described in Sections 5.4.3.3, *CM9: Replenish Spawning Gravels for Salmonids*, 5.4.3.4, *CM10: Remove Impediments to Upstream and Downstream Fish Passage*, and 5.4.3.5, *CM11: Remove, Modify, or Screen Unscreened Diversions*.

4.2.2.16.1 Permanent Direct Effects

Impact mechanisms associated with aquatic habitat improvement activities that result in permanent direct effects on natural communities and covered species include removal of riprap from banks, operation of habitat enhancement-related equipment in stream channels, and placement of material in channels. Riprap removal, operation of equipment in channels, and placement of spawning gravels in stream channels may remove riparian vegetation from channel banks (e.g., vegetation growing through riprap, vegetation removed for equipment access) and will alter the existing in-channel habitat structure for covered fish and other native aquatic organisms. Operation of habitat enhancement-related equipment could result in injury or mortality of covered and other native aquatic and wildlife species that cannot avoid operating equipment. Accidental introduction of contaminants within habitat enhancement sites associated with equipment operation activities (e.g., fuel spills) could also result in mortality or inhibit

normal behaviors of covered and other native aquatic and wildlife species that are sensitive to and come into contact with these contaminants.

4.2.2.16.2 Temporary Direct Effects

Impact mechanisms associated with aquatic habitat improvement activities that result in temporary direct effects on natural communities and covered species include those described for habitat restoration activities in Section 4.2.2.14. Noise and vibration disturbances associated with operation of equipment in and adjacent to stream channels can result in temporary abandonment or reduction in use of habitat areas by covered fish and other native aquatic organisms upstream and downstream from habitat enhancement sites. Operation of equipment in and adjacent to channels and placement of spawning gravels could result in temporary degradation of water quality conditions (e.g., turbidity) for native aquatic species that may result in temporary abandonment of habitat and increased risk of predation downstream of habitat enhancement sites.

4.2.2.16.3 Permanent Indirect Effects

Impact mechanisms associated with aquatic habitat improvement activities that result in permanent direct effects on natural communities and covered species include removal of riprap from banks, placement of spawning gravels, and removal of in-channel debris to improve fish passage. Removal of riprap and in-channel debris and placement of spawning gravels may result in localized alterations in channel form and patterns of erosion and sedimentation that over time change aquatic habitat structure and function from existing conditions.

4.2.2.17 Establishment of Covered Plant Species Occurrences

4.2.2.17.1 Permanent Direct Effects

Impact mechanisms associated with the establishment of covered plant species occurrences that result in permanent direct effects on natural communities and covered species include the collection of seed from existing covered plant species occurrences and equipment operation. Site preparation and planting activities may cause the removal of native vegetation, including covered plant species. Associated ground disturbance may injure or kill covered shrimp species (e.g., burying shrimp cysts) and bury seeds of covered plant species too deeply to support their subsequent germination. Seed collection activities could also result in damage of individual plants from which seed is collected. Collection of seeds or plants from one site and translocation to another could also result in the inadvertent transfer of non-native and/or invasive seeds/plants and could introduce or spread at both collection sites and establishment sites. The likelihood for these effects is considered low because seed will be collected using methods approved by USFWS and California Department of Fish and Wildlife (CDFW).

4.2.2.17.2 Temporary Direct Effects

Impact mechanisms associated with the establishment of covered plant species occurrences that result in temporary direct effects on natural communities and covered species include those described for habitat restoration activities in Section 4.2.2.14.

4.2.2.17.3 Permanent Indirect Effects

Impact mechanisms associated with the establishment of covered plant species occurrences that result in permanent direct effects on natural communities and covered species include the collection of seed from existing covered species plant occurrences. Seed collection may result in short-term reductions in the abundance of the species of plant at the collection site from which seeds are collected. The likelihood for this effect is considered low because seed will be collected using methods approved by USFWS and California Department of Fish and Game (CDFW).

4.2.3 Assumptions Used to Calculate Acreage Impacts on Natural Communities and Covered Species Habitat

The acreage of natural communities and modeled and mapped covered species habitats that could be directly and indirectly affected by permanent development covered activities within and outside the UPAs was assessed based on the planned future permanent development footprints shown in Figures 4-1 through 4-10 (see separate files). Assumptions regarding the design (e.g., area of impact footprints) and implementation of permanent development projects and assumptions for implementation of recurring maintenance activities that were used to conduct the assessment of acreage impacts are presented in Table 4–2, *Covered Activity Implementation Assumptions Used to Conduct the Assessment of Impacts on Natural Communities and Modeled Covered Species Habitat* (see separate file).

4.2.4 Assessment of Impacts on Natural Communities and Agricultural Habitats

Effects of the impact mechanisms described for each category of covered activity described in Section 4.2.2, *Impact Mechanisms* on natural communities and agricultural habitats are assessed quantitatively and qualitatively. The following describes how impacts on BRCP natural communities and agricultural habitats were determined by impact category.

4.2.4.1 Permanent Direct Effects

Permanent direct effects (described in Section 4.2.2) for which permanent development footprints[14] were estimated using GIS by intersecting the BRCP land cover type Geographic Information System (GIS) data layer with the planned future permanent development footprints identified in the County and city general plans and other planning documents that have been prepared for the covered activities (e.g., regional recreation plans) (Figures 4-1 to 4-10). For permanent development projects for which project footprints are not defined in existing plans but for which sufficient information is available, hypothetical GIS footprints were developed based on a reasonable interpretation of the project descriptions. For permanent development projects for which sufficient information is not available to develop a reasonable hypothetical GIS footprint, a limit on the extent and location of allowable impacts was established. Assumptions used to evaluate permanent direct effects of covered activities without a defined footprint are described in Table 4–2.

The footprint location of implemented permanent development projects within and outside of the UPAs may differ from the permanent development project footprints shown in Figures 4–1 to 4-10. Any such differences between planned and actual project footprints will be minor and must be consistent with all applicable elements of the BRCP. In addition, the total acreage of each natural community and agricultural habitat type that may be removed within each UPA and outside the UPAs by Conservation Acquisition Zone (CAZ) cannot exceed the amounts provided for in Section 4.5, *Requested Level of Take and Permit Coverage*.

The GIS intersection of the land cover type GIS data layer with the permanent development project GIS footprint data layer represents the acreage of each natural community and land cover type that could be permanently and directly affected by the permanent development projects. The GIS-generated acreage of riparian, emergent wetland, and grassland with vernal swale complex land cover types that could be affected was then adjusted downward to reduce the extent of allowable impacts on these land cover types within specified UPAs and in specified CAZs outside of UPAs. These limits on the acreage of these land cover types that may be permanently and directly affected by permanent development projects were applied because these land cover types support covered species habitats that have declined substantially both within California and the Plan Area. These impact reductions were determined through examining the distribution of these land cover types within the permanent development project footprints (Figures 4–1 to 4–10) to estimate the acreage of each of the land cover types that could be reasonably avoided through project design and application of the avoidance and minimization measures described in Chapter 6, *Conditions on Covered Activities*. In addition, because implementation of the covered activities will not remove perennial stream courses, GIS-generated impacts on perennial stream courses resulting from slight spatial inconsistencies

[14] Development footprints are the physical area within which planned future permanent development described in Chapter 2, *Covered Activities*, are assumed to be implemented. Permanent development footprints shown in Figures 4-1 to 4-10 are from the County and city general plans.

between the permanent development footprint and land cover type GIS data layers, are not considered as impacts. The reductions made to the allowable acreage of impact on riparian, emergent wetland, and grassland with vernal swale complex land cover types and perennial stream courses (subsumed in the open water land cover type) are described in footnotes to the natural community impact tables (see Table 4–3, *Maximum Extent of Permanent Direct Impacts on Natural Communities and Land Cover Types within the Plan Area* and Table 4–4, *Maximum Extent of Natural Communities and Land Cover Types Removed (Permanent Direct Effects) with Implementation of the Covered Activities in CAZs and UPAs* [separate files]).

4.2.4.2 Temporary Direct Effects

Temporary direct effects (described in Section 4.2.2) of noise and visual disturbances associated with construction of permanent development projects are assessed quantitatively using the GIS planned future permanent development data layer (Figures 4–1 to 4–10). Temporary direct effects, on average, are assumed to extend 500 feet from the edge of each permanent development footprint into the surrounding land cover types outside of the footprints. The area of temporary direct effect on a particular native species may be lesser or greater than 500 feet (see Section 4.2.5.4, *Temporary Direct Effects* and Table 4–5, *Distances Used to Model the Extent of Construction-Related Temporary Direct Effects and Permanent Indirect Effects of Permanent Development Facility Projects on Modeled Covered Species Habitats and Occurrences from Project Footprint Boundaries*) depending on the sensitivity of the species to construction-related disturbances and site-specific conditions (e.g., topography or presence of trees that serve as visual barriers). The acreage of temporary direct effects for each natural community and land cover and agricultural habitat type was determined by intersecting the BRCP GIS land cover type data layer with the 500-foot buffer extending from the edge of each of the GIS permanent development footprints. The acreage of affected area that is also located within 500 feet of existing permanent developments was also calculated because this acreage is also currently impacted by the existing developments (Figure 4–11, *Example Calculation of the Acreage of Temporary Direct Effects of Construction of Permanent Development Projects on Natural Communities and Modeled Covered Species Habitat* [see separate file]).

Except as noted in Table 4–2, all construction-related activities associated with implementation of permanent development projects that result in temporary removal or ground disturbance to land cover types (e.g., operation of construction-related equipment, use of equipment and material staging areas) are assumed to result in permanent direct impacts on affected land cover types. Consequently, no temporary direct impacts on land cover types comprising the natural communities are described in the impact assessment for permanent development projects.

Temporary direct effects associated with implementation of covered recurring maintenance activities and covered activities that do not have a defined footprint were assessed qualitatively and are described for each of the natural communities and agricultural habitats in Section 4.3.

4.2.4.3 Permanent Indirect Effects

With the exception of impacts on the hydrology supporting vernal pools in grassland with vernal swale, permanent indirect effects (described in Section 4.2.2) are quantitatively defined for permanent development projects using the methods and 500-foot assumed distance of effect from project footprints as described for temporary direct effects in Section 4.2.1 (see Figure 4–12, *Example Calculation of the Acreage of Permanent Indirect Effects of Occupancy of New Developments on Natural Communities and Modeled Covered Species Habitat* [separate file] and footnotes in Table 4–5). Depending on the sensitivity of native species to disturbances associated with human occupancy of new permanent development and site-specific conditions (e.g., topography or presence of trees that serve as visual barriers), the area of permanent indirect effect may be lesser or greater than 500 feet (see Table 4–5).

Permanent indirect effects of permanent development projects on hydrological conditions supporting vernal pools in grassland with vernal swale are assumed, based on USFWS guidance, to extend, on average, 250 feet from the edge of each project footprint into the surrounding grassland with vernal swale complex land cover type where present. The acreage of permanent indirect effects on vernal pools was determined by intersecting the BRCP land cover type GIS data layer with the 250-foot buffer extending from the edge of each of the GIS permanent development footprints. The acreage of affected area was then reduced by the acreage of each affected area that is also located within 250 feet of existing permanent developments because this acreage is currently impacted by the existing developments (Figure 4–13, *Example Calculation of the Acreage of Permanent Indirect Effects of Construction of New Development Projects on Hydrologic Conditions Supporting Grassland with Vernal Swale* [see separate file]). In instances where a hydrologic barrier (i.e., paved roads, water supply canals, drainage ditches, flood control channels, creek beds) was located between vernal pools and the covered activity work site, the area of impact was assumed to only extend to the barrier (see Figure 4–14, *Example Calculation of the Acreage of Permanent Indirect Effects of New Development Projects on Hydrologic Conditions Supporting Grassland with Vernal Swale where Hydrologic Barriers are Present* [separate file]).

Permanent indirect effects associated with implementation of covered recurring maintenance activities and covered activities that do not have a defined footprint were assessed qualitatively and are described for each natural communities and agricultural habitats in Section 4.3.

4.2.5 Assessment of Impacts on Covered Species

The acreage of impacts on habitat for 34 of the 40 covered species is determined quantitatively using the species habitat models described in Appendix A using the methods described below. Impacts on California black rail habitat are estimated based on general associations of its habitat with wetland land cover types (see Section 4.4.7, *California Black Rail*, for a description of assumptions), and impacts on Blainville's horned lizard, Conservancy fairy shrimp, lesser

saltscale, veiny monardella, and California beaked-rush habitat are qualitatively described based on their habitat requirements and distribution of known occurrences in the Plan Area.

4.2.5.1 Species Take Avoidance Requirements

Implementation of the covered activities must avoid direct mortality or injury of CDFW-designated fully protected wildlife species and removal (i.e., damage or destruction) of covered plant species for which a biological objective to avoid their removal is established (see Section 5.3.2.3, *Species-Level Goals and Objectives*). Removal will be avoided with implementation of Avoidance and Minimization Measures (AMMs) (described in Chapter 6, *Conditions on Covered Activities*). Implementation of the covered activities must avoid direct mortality or injury of species covered by the Migratory Bird Treaty Act (MBTA). If a covered species covered by the MBTA is listed under the federal ESA, the section 10(a)(1)(B) permit can at that point serve as a Special Purpose Permit under the MBTA. The assessment of impacts on these species in Section 4.4 assumes that direct impacts on individuals of the following species will be avoided, with the exception described below.

- Greater sandhill crane
- California black rail
- Western yellow-billed cuckoo
- American peregrine falcon
- Bald eagle
- White-tailed kite
- Western spadefoot toad
- Conservancy fairy shrimp
- Hoover's spurge
- Hairy Orcutt grass
- Slender Orcutt grass
- Veiny monardella
- Greene's tuctoria

Take of the covered plant species listed above will only be permitted if the species conservation requirements for these species described in Table 4–6, *Take Limits for Covered Species* (see separate file) are met. If the conservation provisions are met, take will only be permitted for occurrences of these covered plant species if in consultation with USFWS and CDFW, it is determined that the taking would not remove a significant occurrence that is necessary to maintain the genetic diversity or maintain the regional distribution of the species.

In addition to impact limits on covered species habitat (see Sections 4.4 and 4.5), the impact analysis further assumes the application of the take limits described Table 4–6 for the following species.

- Tricolored blackbird
- Bank swallow
- Blainville's horned lizard
- Ferris' milkvetch
- Lesser saltscale
- Ahart's dwarf rush
- Ahart's paronychia
- California beaked-rush
- Red Bluff dwarf rush
- Butte County meadowfoam
- Butte County checkerbloom
- Butte County golden clover

4.2.5.2 Species Habitat Models

Habitat models were developed for 34 of the covered species for which there was sufficient information to develop a GIS-based habitat model that reasonably reflects the understanding of each species behaviors and the physical and biological elements that constitute their habitat types. The species habitat models were developed for use in conducting the assessment of impacts on these species' habitats because information regarding the complete distribution of habitat areas occupied by these species is not available or feasible to collect. The models are based on various combinations of parameters of vegetation, soils, water features, geology, and topography used to circumscribe habitat for each of the species and species-specific requirements and behaviors (e.g., maximum typical distance between patches of nesting and foraging habitats that a species will travel) that can be spatially modeled using available and specifically developed GIS databases. The structure, underlying assumptions, and GIS-data layers comprising the habitat models are described for each species in Appendix A.

Effects of the impact mechanisms described for each category of covered activity described in Section 4.2.2 on covered species are assessed quantitatively and qualitatively. The following describes how impacts on BRCP covered species were determined by impact category.

4.2.5.3 Permanent Direct Effects

The acreage of modeled habitat that could be permanently and directly impacted (i.e., removed) was determined by intersecting the GIS habitat model layers for each species (see Appendix A) with the future permanent development footprint data layer (Figures 4–1 to 4–10). The GIS intersection of modeled habitat with the permanent development project footprints represents the acreage of each species modeled habitat type that could be permanently removed. The GIS-generated extent of modeled habitat that would be permanently and directly affected for species with habitat models that include riparian, emergent wetland, and grassland with vernal swale complex land cover types was adjusted downward as described in Section 4.2.4.1, *Permanent Direct Effects* for impacts on natural communities to reduce the extent of allowable impact on these covered species. For the six covered species for which habitat models are not developed, the impact mechanisms and the probability for permanent direct effects on occupied habitat is qualitatively described.

Implementation of the covered activities could result in injury or mortality of covered wildlife and fish species and damage or destruction of covered plant species. Sufficient information regarding the occurrence of some covered species is available to quantify direct impacts on individuals. Direct impacts on known occurrences of covered plant and fairy shrimp species for which there is not a prohibition on their removal (Section 4.2.5.1, *Species Take Avoidance Requirements*) was determined by intersecting the GIS species occurrence data layers (see Appendix A) with the permanent development footprint data layer (Figures 4–1 to 4–10). Impacts on known California black rail and Blainville's horned lizard and tricolored blackbird, bank swallow, Swainson's hawk, bald eagle, and American peregrine falcon nest sites[15] were similarly determined. Known covered plant and fairy shrimp occurrences and nest sites that are located within permanent development project footprints are considered to be directly impacted (i.e., removed) unless there is an avoidance and minimization measure identified in Chapter 6, *Conditions on Covered Activities* that will require that the impact be avoided. For most of the covered species, sufficient information regarding the location of occupied habitat and their abundance is not available to quantitatively determine the number of individual covered species that could be directly impacted by the covered activities. For these species, the impact mechanisms and the probability for direct impacts on individual covered wildlife, fish, and plant species is qualitatively described.

4.2.5.4 Temporary Direct Effects

The acreage of modeled habitat for each of the covered species that could be temporarily removed by implementation of permanent development covered activities is included in the acreage determined for permanent direct effects (i.e., modeled habitat that is permanently removed). Except as noted in Table 4–2, the assumptions used to conduct the impact assessment

[15] Removal of nest sites will not result in injury or mortality of individuals of these species because these impacts must be avoided as described in Section 4.2.5.1 and provided for in the avoidance and minimization measures in Section 5.4.4.

for permanent development projects assumes that all temporary impacts on habitat are permanent (e.g., staging areas for transportation facility permanent development projects are assumed to be located within the ROW, within which all habitat is assumed to be permanently removed). Temporary direct effects of recurring maintenance covered activities on modeled habitat and plant occurrences are qualitative described.

Temporary direct effects of noise, visual, and other disturbances (e.g., ground vibrations), dust generation, sedimentation and other effects associated with the construction of permanent development projects are quantitatively defined using the GIS permanent development project data layer (Figures 4–1 to 4–10) and species habitat model GIS data layers. Temporary direct effects on each covered species, on average, are assumed to extend the distances indicated in Table 4–5 from the edge of each project footprint into the surrounding modeled habitat area for each of the covered species. Depending on site-specific conditions (e.g., topography or presence of trees that serve as visual barriers), the area of temporary direct effect may be lesser or greater than the distances indicated in Table 4–5. For example, a large stand of trees between a permanent development project construction site and a western burrowing owl nesting burrow located within 500 feet (from Table 4–5) of the construction site will screen construction-related visual disturbances such that owls using the burrow may not be adversely affected by these disturbances (i.e., harassment). Conversely, if there is a direct line of sight between a construction site that is operating multiple pieces of heavy construction equipment simultaneously and a western burrowing owl nesting burrow located farther than 500 feet (from Table 4–5) from the construction site, owls using the burrow could be adversely affected (i.e., harassment) by the construction-related noise and visual disturbances.

The acreage of temporary direct effects on each covered species was determined using GIS by intersecting the BRCP land cover type GIS data layer with the distance buffers indicated in Table 4–5 extending from the edge of each of the GIS permanent development footprints into modeled habitat for each of the covered species. The acreage of affected area for each covered species that is also located within the same distance of existing permanent developments was also calculated because this acreage is also currently impacted by the existing developments (see Figure 4–11). For the six covered species for which habitat models are not developed, the impact mechanisms and the probability for temporary direct effects on occupied habitat is qualitatively described.

Temporary direct effects associated with implementation of covered recurring maintenance activities and covered activities that do not have a defined footprint were assessed qualitatively and are described for each of the covered species in Section 4.4.

4.2.5.5 Permanent Indirect Effects

The acreage of permanent indirect effects (described in Section 4.2.2) on modeled covered species habitat are determined for permanent development projects using the methods and assumed distances of effect from project footprints (see Table 4–5) as described above for

temporary direct effects in Section 4.2.4.2, *Temporary Direct Effects* (see Figure 4–12). The acreage of permanent indirect impacts on modeled habitat for vernal pool species as determined using this method was then reduced as described for the grassland with vernal swale complex land cover type in Section 4.2.4.3, *Permanent Indirect Effects*. Depending on the sensitivity of each covered species to disturbances associated with human occupancy of new permanent development and site-specific conditions (e.g., topography or presence of trees that serve as visual barriers), the area of permanent indirect effect may be lesser or greater than the distances indicated in Table 4–5. For the six covered species for which habitat models are not developed, the impact mechanisms and the probability for permanent indirect effects on occupied habitat is qualitatively described.

Permanent indirect effects associated with implementation of covered recurring maintenance activities and covered activities that do not have a defined footprint were assessed qualitatively and are described for each covered species in Section 4.4.

4.2.6 Assessment of Impacts on Designated Critical Habitat

Potential impacts on the primary constituent elements (PCEs) of designated critical habitat in the Plan Area are assessed. Critical habitat has been designated within the Plan Area for the following species.

- Central Valley spring-run Chinook salmon
- Central Valley steelhead
- Vernal pool tadpole shrimp
- Conservancy fairy shrimp
- Vernal pool fairy shrimp
- Hoover's spurge
- Hairy Orcutt grass
- Butte County meadowfoam
- Greene's tuctoria

The location of critical habitat units are presented in Appendix A for each of the species for which critical habitat is designated. Descriptions of the PCEs for each species' designated critical habitat are presented in Section 4.4.

Methods used to determine the acreage of modeled habitat within each designated critical habitat unit for the invertebrate and plant species that could be removed by covered activities was determined using the same methods as described for covered species in Section 4.2.5.3, *Permanent Direct Effects*. The potential effects of each covered activity on the PCEs of each critical habitat unit were qualitatively assessed using aerial imagery. The covered activities will

not remove designated critical habitat for the covered fish species and potential effects on the PCEs for these designated critical habitat areas were qualitatively assessed.

4.3 IMPACTS ON NATURAL COMMUNITIES AND AGRICULTURAL HABITATS

This section describes the adverse effects on natural communities and agricultural habitats resulting from the impact mechanisms of planned future permanent development projects, recurring maintenance activities, and the BRCP conservation measures (CMs) within the Plan Area (see Chapter 2, *Covered Activities*, and Section 5.4, *Conservation Measures*) described in Section 4.2, *Impact Assessment Approach*. The impacts of the covered activities on each natural community and agricultural habitat are described for each of these covered activity categories, segregated by location within and outside of UPAs. The expected outcomes of implementing the covered activities, including the BRCP conservation measures, for the natural communities and agricultural habitats are described in Section 5.5, *Conservation Provided for Natural Communities.* The impact mechanisms associated with each of the covered activity categories that could result in permanent and temporary direct effects and permanent indirect effects on natural communities and agricultural habitats are presented in Table 4–1. No impact mechanisms are identified that could result in temporary indirect effects.

The maximum extent (acreage or linear) of each natural community and agricultural habitat that will be removed (i.e., permanent direct impacts) with implementation of the covered activities is summarized for the Plan Area in Table 4–3 and presented by CAZ and UPA in Table 4–4. The maximum acreage of permanent indirect and temporary direct impacts on natural communities and agricultural habitat types are presented in Appendix K, *Temporary Direct and Permanent Indirect Effects of Covered Activities.* Figure 4–15 through Figure 4–20 (see separate files) depict the extent and location of each natural community that will be removed within and outside of UPAs based on the location of planned future development described in Chapter 2, *Covered Activities,* and depicted in Figures 4–1 to 4–10. As described in Section 4.2, the actual footprint location where each of the permanent development activities will be implemented may differ from that shown in Figures 4-15 to 4-20. The acreage of each natural community that could be removed by the permanent development activities, however, will not exceed the acreages indicated in Table 4–4 for locations within and outside of UPAs.

Clean Water Act (CWA) jurisdictional wetlands and other waters may occur as inclusions within each of the natural communities and agricultural habitat types that could be affected by implementation of the covered activities. Impacts of implementing the covered activities on jurisdictional wetlands are described in Section 4.7, *Jurisdictional Wetlands and Other Waters Impacts*.

The avoidance and minimization measures that will be applied during implementation of the covered activities to avoid and minimize impacts on the land cover types comprising each of the natural communities are presented in Table 4–7, *Avoidance and Minimization Measures that Reduce the Level of Impact of the Covered Activities on Natural Community Land Cover Types*

and Covered Species (see separate file). Table 4–7 only includes avoidance and minimization measure titles, a full description of each avoidance and minimization measure is presented in Chapter 6, *Conditions on Covered Activities*.

4.3.1 Oak Woodland and Savanna

The maximum acreage of the oak woodland and savanna natural community that will be permanently affected, directly and indirectly, with implementation of the covered activities is 24,766 acres (see Table 4–3, Appendix K and Figure 4–15, *Oak Woodland and Savanna: Direct Impacts of Covered Activities*).

4.3.1.1 Effects Common among Covered Activities

Actions undertaken to implement the covered activities (e.g., operation of construction- and maintenance-related equipment) could result in injury or mortality of covered and other native wildlife species that are unable to avoid operating equipment (e.g., small mammals, reptiles, amphibians) and removal of covered plant species. For example, reptiles and amphibians aestivating underground could be crushed by operation of ground-disturbing equipment or disturbed ground vibrations. The potential for injury and mortality of native wildlife species is considered to be low for highly mobile species (e.g., birds, large mammals). Implementation of the applicable AMMs indicated in Table 4–7, however, will avoid or minimize the potential for these effects on covered and other native species associated with oak woodland and savanna.

The accidental introduction of contaminants associated with operation of construction- and maintenance-related equipment (e.g., fuel spills) could adversely affect individual native wildlife and other organisms that come into contact with and are sensitive to the contaminant(s). The potential for this effect is considered low, because most wildlife are likely to avoid work sites in response to ongoing noise and visual disturbances associated with equipment operation. In addition, implementation of the applicable AMMs indicated in Table 4–7 provides for containment and rapid cleanup of releases that may occur, thus reducing exposure risk and the period that individuals could be exposed to contaminants.

4.3.1.2 Permanent Development Projects

Direct effects of permanent development projects will result in the permanent removal of up to 1,478 acres of blue oak savanna, 3,817 acres of blue oak woodland, 513 acres of interior live oak woodland, and 5,517 acres of mixed oak woodland (Table 4–3 and Figure 4–15). Indirect effects of permanent development projects will result in reduced functions of up to 1,200 acres of blue oak savanna, 4,160 acres of blue oak woodland, 509 acres of interior live oak woodland, and 7,574 acres of mixed oak woodland, 10,876 acres of which overlap with areas subject to ongoing effects of existing permanent developments (Appendix K). Figure O–1, *Oak Woodland and Savanna Habitat in the Plan Area with full BRCP Implementation* in Appendix O, *Conservation Outcome Figures* and Table 4–3 provide the acreage and percentage of oak woodland and

savanna remaining within the Plan Area (including BRCP protected lands and lands that are not impacted by the covered activities) with full implementation of the covered activities.

4.3.1.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects within the Chico, Oroville, Bangor, Foothill Area, and Neal Road Drop-Off and Recycling Facility UPAs will result in permanent direct effects on up to 1,469 acres of blue oak savanna, 3,794 acres of blue oak woodland, 507 acres of interior live oak woodland, and 5,469 acres of mixed oak woodland (see Tables 4-5 and 4-6, Figure 4–15).

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise, visual, and other disturbances (e.g., ground vibrations) associated with operating equipment and other activities necessary to construct new developments (Table 4–1). These impact mechanisms could cause covered and other native wildlife associated with the oak woodland and savanna community to reduce their use of affected habitat areas during the period these activities are implemented. Based on an average 500-foot distance from permanent new developments within which temporary direct effects will occur (Section 4.2.4, *Assessment of Impacts on Natural Communities and Agricultural Habitats*), up to 1,200 acres of blue oak savanna, 4,160 acres of blue oak woodland, 509 acres of interior live oak woodland, and 7,574 acres of mixed oak woodland will be temporarily and directly affected by permanent development covered activities Plan Area-wide[16], 10,876 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). The potential for temporary direct effects on oak woodland and savanna will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other equipment), pet-related, building maintenance, and other disturbances associated with human occupancy following construction of permanent developments (see Table 4–1). These disturbances could affect use of oak woodland and savanna habitats adjacent to new permanent developments by covered and other native wildlife and result in damage of covered plant species and other native vegetation. For example, lighting may affect native wildlife species that are active nocturnally and cause them to avoid habitat around permanent development. In addition, uncontrolled pets may depredate individuals and nests of covered and other bird species, as well as slower moving species, such as reptiles and amphibians, and increased human activity in

[16] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

adjacent natural habitat areas could increase the risk for wildfire, resulting in periodic loss of habitat for associated covered and other native species.

Based on an average 500-foot distance from permanent new developments within which permanent indirect effects will occur (Section 4.2.4), up to 1,200 acres of blue oak savanna, 4,160 acres of blue oak woodland, 509 acres of interior live oak woodland, and 7,574 acres of mixed oak woodland will be permanently and indirectly affected by permanent development covered activities Plan Area-wide[17], 10,876 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). These permanent indirect effects will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.3.1.2.2 Outside of Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects will result in permanent direct effects on up to 9 acres of blue oak savanna, 23 acres of blue oak woodland, 6 acres of interior live oak woodland, and 48 acres of mixed oak woodland outside of UPAs in the Cascade Foothills and Sierra Foothills CAZs (see Table 4–4 and Figure 4–15).

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise, visual, and other disturbances (e.g., ground vibrations) associated with operating equipment and other activities necessary to construct new developments (Table 4–1). The effects of these impact mechanisms on oak woodland and savanna communities are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs. The potential for temporary direct effects on oak woodland and savanna will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 500-foot distance from permanent new developments within which temporary indirect effects will occur (Section 4.2.4), up to 1,200 acres of blue oak savanna, 4,160 acres of blue oak woodland, 509 acres of interior live oak woodland, and 7,574 acres of mixed oak woodland will be temporarily and directly affected by permanent development covered activities Plan Area-wide[18], 10,876 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

[17] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.
[18] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other equipment), pet-related, building maintenance, and other disturbances associated with human occupancy following construction of permanent developments (see Table 4–1). The effects of these impact mechanisms on oak woodland and savanna communities are the same as described for the permanent indirect effects of implementing permanent development projects in the UPAs. The level of these effects, however, is expected to be less than that associated with permanent development projects within UPAs, because they do not include residential developments that are expected to support higher levels of human activity than nonresidential developments. Based on an average 500-foot distance from permanent new developments within which temporary indirect effects will occur (see Table 4–5), up to 1,200 acres of blue oak savanna, 4,160 acres of blue oak woodland, 509 acres of interior live oak woodland, and 7,574 acres of mixed oak woodland will be permanently and indirectly affected by permanent development covered activities Plan Area-wide[19], 10,876 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). These permanent indirect effects will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.3.1.3 Recurring Maintenance Activities

4.3.1.3.1 Within Urban Permit Areas

Permanent Direct Effects

With the exception of the potential impact mechanisms and associated effects on oak woodland and savanna described in Section 4.3.1.1, *Effects Common among Covered Activities*, there are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on oak woodland and savanna.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (e.g., ground vibrations) (Table 4–1). The effects of these impact mechanisms on oak woodland and savanna are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs, except that the duration of maintenance-related activities is generally expected to be less and more localized than that of construction-related activities. The potential for temporary direct effects

[19] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

on oak woodland and savanna will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

As described in Table 4–1, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on oak woodland and savanna.

4.3.1.3.2 Outside Urban Permit Areas

Permanent Direct Effects

With the exception of the potential impact mechanisms and associated effects on valley oak woodland and savanna described in Section 4.3.1.1, there are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on oak woodland and savanna.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (e.g., ground vibrations) (Table 4–1). The effects of these impact mechanisms on oak woodland and savanna are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs, except that the duration of maintenance-related activities is generally expected to be less than that of construction-related activities.

Permanent Indirect Effects

As described in Table 4–1, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on oak woodland and savanna.

4.3.1.4 Effects of Covered Activities within Conservation Lands

Permanent Direct Effects

Implementation of conservation measures CM3, Identify High Priority Locations for Wildlife Passage Structures and Secure Funding, and CM5, Enhance Protected Natural Communities for Covered Species, provide for enhancing and managing all BRCP protected lands, including protected oak woodland and savanna. Restoration of vernal pools and other seasonal wetlands under CM4, Develop and Implement Site Specific Wetland and Riparian Restoration Plans, if implemented in oak savanna will alter the structure of the understory but will not result in removal of oak savanna habitats. With the exception of the potential impact mechanisms and associated effects on oak woodland and savanna described in Section 4.3.1.1, there are no additional impact mechanisms associated with implementation of conservation measures that are expected to result in permanent direct effects on valley oak woodland and savanna.

Temporary Direct Effects

The primary temporary direct effects on oak woodland and savanna will result from the operation of equipment and other activities related to implementing habitat enhancement and management actions in or adjacent to BRCP conservation lands that cause temporary noise, visual, and other disturbances (Table 4–1). The effects of these impact mechanisms on oak woodland and savanna are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs. The potential for temporary direct effects on oak woodland and savanna will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

Implementation of conservation measures will not result in permanent indirect effects on oak woodland and savanna, because actions implemented in BRCP protected habitats will not be associated with increasing human or pet presence, noise, traffic risks, or other impact mechanisms that could result in permanent indirect effects (Table 4–1).

4.3.2 Grassland

The maximum acreage of the grassland natural community that will be permanently affected, directly and indirectly, with implementation of the covered activities is 16,224 acres (see Table 4–3, Appendix K, and Figure 4–16, *Grassland: Direct Impacts of Covered Activities* [separate files]).

4.3.2.1 Effects Common among Covered Activities

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction of new developments, restoration of habitat, and maintenance of existing facilities) could result in injury or mortality of covered and other native wildlife species that may be unable to avoid equipment operations (e.g., small mammals, reptiles, amphibians) and removal of covered plant species, including vernal pools or their hydrological functions. For example, reptiles and amphibians aestivating underground may be disturbed and/or experience mortality if present at locations where ground-moving/breaking construction activities occur. In addition, activities that occur near or within vernal pools may alter hydrological conditions through drainage and runoff, which may affect the functions of vernal pools for covered species, by altering habitat structure and water chemistry. The potential for injury and mortality of native wildlife species is considered to be low for highly mobile species (e.g., birds, large mammals). Implementation of the applicable AMMs indicated in Table 4–7, however, will avoid or minimize the potential for these effects on covered and other native species associated with grasslands.

The probability that the accidental introduction of contaminants associated with construction and maintenance activities (e.g., fuel spills) will adversely affect individual native wildlife and other organisms that come into contact with and are sensitive to the contaminant(s) is considered low,

because individuals are expected to avoid work sites with ongoing noise and visual construction-related disturbances. In addition, implementation of the applicable AMMs indicated in Table 4–7 provides for containment and rapid cleanup of releases that may occur, thus reducing exposure risk and the period that individuals could be exposed to contaminants.

4.3.2.2 Permanent Development Projects

Direct effects of permanent development projects will result in the permanent removal of up to 7,694 acres of grassland and 1,391 acres of grassland with vernal swale complex (Table 4–3 and Figure 4–16). Indirect effects of permanent development projects will result in reduced functions of up to 6,408 acres of grassland and 731 acres of grassland with vernal swale complex, 4,479 acres of which overlap with areas subject to ongoing effects of existing permanent developments (Appendix K). Figure O–2, *Grassland and Grassland with Vernal Swale Complex Habitat in the Plan Area with full BRCP Implementation* in Appendix O and Table 4–3 provide the acreage and percentage of grassland remaining within the Plan Area (including BRCP protected lands and lands that are not impacted by the covered activities) with full implementation of the covered activities.

4.3.2.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects within the Chico, State Route 99, Honcut, Oroville, Bangor, Foothill Area, and Neal Road Drop-Off and Recycling Facility UPAs will result in permanent direct effects on up to 7,338 acres of grassland and 1,289 acres of grassland with vernal swale complex (see Tables 4-5 and 4-6, Figure 4–16).

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise, visual, and other disturbances (e.g., ground vibrations) associated with operating equipment and other activities necessary to construct new developments (Table 4–1). These impact mechanisms could cause covered and other native wildlife associated with the grassland community to reduce their use of affected habitat areas during the period these activities are implemented. Other temporary direct effects (altered runoff, dust) may affect water quality of vernal habitats. Based on an average 500-foot distance from permanent new developments within which temporary direct effects will occur (Section 4.2.4), up to 6,408 acres of grassland and 731 acres of grassland with vernal swale complex will be temporarily and directly affected by permanent development covered activities Plan Area-wide[20], 4,479 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). The potential for temporary direct effects on grassland will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

[20] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other equipment), pet-related, building maintenance, and other disturbances associated with human occupancy following construction of permanent developments (see Table 4–1). These disturbances could affect use of grassland habitats that are adjacent to new permanent developments by covered and other native wildlife and result in damage of covered plant species and other native vegetation. For example, lighting may affect native wildlife species that are active nocturnally and cause them to avoid habitat around permanent development. In addition, uncontrolled pets may depredate individuals and nests of covered and other bird species, as well as reptile and amphibian species, and increased human activity in adjacent natural habitat areas could increase the risk for wildfire, resulting in periodic loss of habitat for associated covered and other native species. The hydrology supporting vernal pools and other seasonal wetlands may be altered as a result of construction of new road surfaces and grading and soil compaction.

Based on an average 500-foot distance from permanent new developments within which permanent indirect effects will occur (Section 4.2.4), up to 421 acres of 6,408 acres of grassland and 731 acres of grassland with vernal swale complex will be permanently and indirectly affected by permanent development covered activities Plan Area-wide[21], 4,479 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). In addition, based on an average 250-foot distance from permanent new developments within which permanent indirect effects on hydrologic conditions will occur (Section 4.2.4), hydrologic conditions supporting vernal pools and seasonal wetlands present in up to 257 acres of grassland with vernal swale complex will be permanently and indirectly affected by permanent development covered activities Plan Area-wide[22] (see Appendix K). These permanent indirect effects will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.3.2.2.2 Outside of Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects will result in permanent direct effects on up to 356 acres of grassland and 101 acres of grassland with vernal swale complex outside of UPAs among all the CAZs (see Table 4–4 and Figure 4–16).

[21] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.
[22] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise, visual, and other disturbances (e.g., ground vibrations) associated with operating equipment and other activities necessary to construct new developments (Table 4–1). The effects of these impact mechanisms on grassland communities are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs. The potential for temporary direct effects on grassland communities will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 500-foot distance from permanent new developments within which temporary indirect effects will occur (Section 4.2.4), up to 6,408 acres of grassland and 731 acres of grassland with vernal swale complex will be temporarily and directly affected by permanent development covered activities Plan Area-wide[23], 4,479 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other equipment), pet-related, building maintenance, and other disturbances associated with human occupancy following construction of permanent developments (see Table 4–1). The effects of these impact mechanisms on grassland communities are the same as described for the permanent indirect effects of implementing permanent development projects in the UPAs. The level of these effects, however, is expected to be less than that associated with permanent development projects within UPAs, because they do not include residential developments that are expected to support higher levels of human activity than nonresidential developments.

Based on an average 500-foot distance from permanent new developments within which temporary indirect effects will occur (see Table 4–5), up to 6,408 acres of grassland and 731 acres of grassland with vernal swale complex will be permanently and indirectly affected by permanent development covered activities Plan Area-wide[24], 4,479 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). In addition, based on an average 250-foot distance from permanent new developments within which permanent indirect effects on hydrologic conditions will occur (Section 4.2.4), hydrologic conditions supporting vernal pools and seasonal wetlands present in up to 257 acres of grassland with vernal swale complex will be permanently and indirectly affected by permanent

[23] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.
[24] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

development covered activities Plan Area-wide[25] (see Appendix K). These permanent indirect effects will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.3.2.3 Recurring Maintenance Activities

4.3.2.3.1 Within Urban Permit Areas

Permanent Direct Effects

With the exception of the potential impact mechanisms and associated effects on the grassland natural community described in Section 4.3.2.1, *Effects Common among Covered Activities*, there are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on grassland communities.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (e.g., ground vibrations) (Table 4–1). The effects of these impact mechanisms on grassland communities are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs, except that the duration of maintenance-related activities is generally expected to be less than and more localized than that of construction-related activities.

Permanent Indirect Effects

As described in Table 4–1, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on the grassland natural community.

4.3.2.3.2 Outside Urban Permit Areas

Permanent Direct Effects

With the exception of the potential impact mechanisms and associated effects on the grassland natural community described in Section 4.3.2.1, there are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on grassland communities.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (e.g., ground vibrations) (Table 4–1). The effects of these impact mechanisms on grassland communities are the same as described for the temporary

[25] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

direct effects of implementing permanent development projects in the UPAs, except that the duration of maintenance-related activities is generally expected to be less than and more localized than that of construction-related activities.

Permanent Indirect Effects

As described in Table 4–1, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on the grassland natural community.

4.3.2.4 Effects of Covered Activities within Conservation Lands

Permanent Direct Effects

Implementation of conservation actions to restore riparian habitat could remove up to 189 acres grassland land cover types if all riparian restoration is located in grassland.[26] Restoration of vernal pool and other seasonal wetlands will permanently alter the ecological functions of up to 306 acres of grassland. In addition, the operation of equipment and other activities related to implementing habitat restoration, enhancement, and management actions in or adjacent to protected grassland could result in injury or mortality of covered and other native wildlife species that are unable to avoid operating equipment, and the removal of covered and other native plant species (Table 4–1). The potential for permanent direct effects on native species will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Temporary Direct Effects

Habitat restoration, enhancement and management actions undertaken in protected grassland natural communities could result in temporary noise, visual, and other disturbances to covered and other native wildlife species that use grasslands habitats (Table 4–1). The effects of these impact mechanisms on covered and other native wildlife species are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs. The potential for temporary direct effects on grassland communities will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

Implementation of conservation measures will not result in permanent indirect effects on grassland communities, because actions implemented in BRCP protected habitats will not be associated with increasing human or pet presence, noise, traffic risks, or other impact mechanisms that could result in permanent indirect effects (Table 4–1).

[26] Additional acreage will be removed if actions to restore other habitat types listed in Table 5-5, though unlikely, are implemented in grassland land cover types.

4.3.3 Riparian

The maximum acreage of the riparian natural community that will be permanently affected, directly and indirectly, with implementation of the covered activities is 1,412 acres (see Table 4–3, Appendix K and Figure 4–17, *Riparian: Direct Impacts of Covered Activities* [separate files]).

4.3.3.1 Effects Common among Covered Activities

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction of new developments, for restoration of habitat, and for maintenance of existing facilities) could result in injury or mortality of covered and other native wildlife species that may be unable to avoid equipment operations (e.g., small mammals, reptiles, amphibians) and removal of covered plant species. For example, reptiles and amphibians aestivating underground may be disturbed and/or experience mortality if present at locations where ground-moving/breaking construction activities occur. The potential for injury and mortality of native wildlife species is considered to be low for highly mobile species (e.g., birds, large mammals). Implementation of the applicable AMMs indicated in Table 4–7, however, will avoid or minimize the potential for these effects on covered and other native species associated with riparian.

The probability that the accidental introduction of contaminants associated with construction and maintenance activities (e.g., fuel spills) will adversely affect individual native wildlife and other organisms that come into contact with and are sensitive to the contaminant(s) is considered low, because individuals are expected to avoid work sites with ongoing noise and visual construction-related disturbances. In addition, implementation of the applicable AMMs indicated in Table 4–7 provides for containment and rapid cleanup of releases that may occur, thus reducing exposure risk and the period that individuals could be exposed to contaminants.

4.3.3.2 Permanent Development Projects

Direct effects of permanent development projects will result in the permanent removal of up to 27 acres of cottonwood-willow riparian forest, 46 acres of valley oak riparian forest, 11 acres of willow scrub, 20 acres of herbaceous riparian river bar, 105 acres of dredger tailings with riparian-stream associated, and 136 acres of dredger tailings with riparian-non-stream associated (Table 4–3 and Figure 4–17). Indirect effects of permanent development projects will result in reduced functions of up to 477 acres of cottonwood-willow riparian forest, 274 acres of valley oak riparian forest, 218 acres of willow scrub, 851 acres of which overlap with areas subject to ongoing effects of existing permanent developments (Appendix K). Figure O–3, *Riparian Habitat in the Plan Area with full BRCP Implementation* in Appendix O and Table 4–3 provide the acreage and percentage of riparian remaining within the Plan Area (including BRCP protected lands and lands that are not impacted by the covered activities) with full implementation of the covered activities.

4.3.3.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects within the Chico, Oroville, Bangor, Foothill Area, Durham, and Neal Road Drop-Off and Recycling Facility UPAs will result in permanent direct effects on up to 8 acres of cottonwood-willow riparian forest, 26 acres of valley oak riparian forest, 6 acres of willow scrub, 20 acres of herbaceous riparian river bar, 103 acres of dredger tailings with riparian-stream associated, and 136 acres of dredger tailings with riparian-non-stream associated (see Tables 4-5 and 4-6, Figure 4–17).

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise, visual, and other disturbances (e.g., ground vibrations) associated with operating equipment and other activities necessary to construct new developments (Table 4–1). These impact mechanisms could cause covered and other native wildlife associated with the riparian community to reduce their use of affected habitat areas during the period these activities are implemented. Based on an average 500-foot distance from permanent new developments within which temporary direct effects will occur (Section 4.2.4), up to 477 acres of cottonwood-willow riparian forest, 274 acres of valley oak riparian forest, 218 acres of willow scrub will be temporarily and directly affected by permanent development covered activities Plan Area-wide[27], 851 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). The potential for temporary direct effects on riparian communities will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other equipment), pet-related, building maintenance, and other disturbances associated with human occupancy following construction of permanent developments (see Table 4–1). These disturbances could affect use of riparian habitats that are adjacent to new permanent developments by covered and other native wildlife and result in damage of covered plant species and other native vegetation. For example, lighting may affect native wildlife species that are active nocturnally and cause them to avoid habitat around permanent development. In addition, uncontrolled pets may depredate individuals and nests of covered and other bird species, as well as slower moving species, such as reptiles and amphibians. Colonization of invasive ornamental species from developed areas may adversely affect native vegetation and alter habitat functions for riparian associated wildlife species.

[27] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

Based on an average 500-foot distance from permanent new developments within which permanent indirect effects will occur (Section 4.2.4), up to 477 acres of cottonwood-willow riparian forest, 274 acres of valley oak riparian forest, 218 acres of willow scrub will be permanently and indirectly affected by permanent development covered activities Plan Area-wide[28], 851 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). These permanent indirect effects will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.3.3.2.2 Outside of Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects will result in permanent direct effects on up to 19 acres of cottonwood-willow riparian forest, 20 acres of valley oak riparian forest, 5 acres of willow scrub, and 2 acres of dredger tailings with riparian – stream-associated outside of UPAs distributed in the Cascade Foothills, Sierra Foothills, Southern Orchards, Basin, and Sacramento River CAZs (see Table 4–4 and Figure 4–17).

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise, visual, and other disturbances (e.g., ground vibrations) associated with operating equipment and other activities necessary to construct new developments (Table 4–1). The effects of these impact mechanisms on riparian communities are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs. The potential for temporary direct effects on riparian communities will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 500-foot distance from permanent new developments within which temporary indirect effects will occur (Section 4.2.4), up to 477 acres of cottonwood-willow riparian forest, 274 acres of valley oak riparian forest, 218 acres of willow scrub will be temporarily and directly affected by permanent development covered activities Plan Area-wide[29], 851 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other

[28] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.
[29] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

equipment), pet-related, building maintenance, and other disturbances associated with human occupancy following construction of permanent developments (see Table 4–1). The effects of these impact mechanisms on riparian communities are the same as described for the permanent indirect effects of implementing permanent development projects in the UPAs. The level of these effects, however, is expected to be less than that associated with permanent development projects within UPAs, because they do not include residential developments that are expected to support higher levels of human activity than nonresidential developments.

Based on an average 500-foot distance from permanent new developments within which temporary indirect effects will occur (see Table 4–5), up to 477 acres of cottonwood-willow riparian forest, 274 acres of valley oak riparian forest, 218 acres of willow scrub will be permanently and indirectly affected by permanent development covered activities Plan Area-wide[30], 851 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). These permanent indirect effects will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.3.3.3 Recurring Maintenance Activities

4.3.3.3.1 Within Urban Permit Areas

Permanent Direct Effects

With the exception of the potential impact mechanisms and associated effects on the riparian natural community described in Section 4.3.3.1, *Effects Common among Covered Activities*, there are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on riparian communities.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (e.g., ground vibrations) (Table 4–1). The effects of these impact mechanisms on riparian communities are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs, except that the duration of maintenance-related activities is generally expected to be less than and more localized than that of construction-related activities.

[30] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

Permanent Indirect Effects

As described in Table 4–1, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on the riparian natural community.

4.3.3.3.2 Outside Urban Permit Areas

Permanent Direct Effects

With the exception of the potential impact mechanisms and associated effects on the grassland natural community described in Section 4.3.3.1, there are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on riparian communities.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (e.g., ground vibrations) (Table 4–1). The effects of these impact mechanisms on riparian communities are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs, except that the duration of maintenance-related activities is generally expected to be less than and more localized than that of construction-related activities.

Permanent Indirect Effects

As described in Table 4–1, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on the riparian natural community.

4.3.3.4 Effects of Covered Activities within Conservation Lands

Permanent Direct Effects

The operation of equipment and other activities related to implementing habitat enhancement and management actions in or adjacent to protected riparian habitats could result in injury to or mortality of covered and other native wildlife species that are unable to avoid operating equipment and the removal of native plant species (Table 4–1). The potential for permanent direct effects on native species will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Temporary Direct Effects

Habitat enhancement and management actions undertaken in protected riparian natural communities could result in temporary noise, visual, and other disturbances to covered and other native wildlife species that use grasslands habitats (Table 4–1). The effects of these impact mechanisms on covered and other native wildlife species are the same as described for the

temporary direct effects of implementing permanent development projects in the UPAs. The potential for temporary direct effects on riparian communities will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

Implementation of conservation measures will not result in permanent indirect effects on riparian communities, because actions implemented in BRCP protected habitats will not be associated with increasing human or pet presence, noise, traffic risks, or other impact mechanisms that could result in permanent indirect effects (Table 4–1).

4.3.4 Wetland

The maximum acreage of the wetland natural community that will be permanently affected, directly and indirectly, with implementation of the covered activities is 191 acres (see Table 4–3, Appendix K, and Figure 4–18, *Wetland: Direct Impacts of Covered Activities* [separate files]).

4.3.4.1 Effects Common among Covered Activities

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction of new developments, restoration of habitat, and maintenance of existing facilities) could result in injury or mortality of covered and other native wildlife species that may be unable to avoid equipment operations (e.g., small mammals, reptiles, amphibians) and removal of covered plant species. For example, reptiles and amphibians in the water column or aestivating underground may be disturbed and/or experience mortality if present at locations where drainage of wetlands or ground-moving construction activities occur. The potential for injury and mortality of native wildlife species is considered to be low for highly mobile species (e.g., birds, large mammals). Implementation of the applicable AMMs indicated in Table 4–7, however, will avoid or minimize the potential for these effects on covered and other native species associated with wetland.

The probability that the accidental introduction of contaminants associated with construction and maintenance activities (e.g., fuel spills) will adversely affect individual native wildlife and other organisms that come into contact with and are sensitive to the contaminant(s) is considered low, because individuals are expected to avoid work sites with ongoing noise and visual construction-related disturbances. In addition, implementation of the applicable AMMs indicated in Table 4–7 provides for containment and rapid cleanup of releases that may occur, thus reducing exposure risk and the period that individuals could be exposed to contaminants.

4.3.4.2 Permanent Development Projects

Direct effects of permanent development projects will result in the permanent removal of up to 35 acres of emergent wetland, 7 acres of managed seasonal wetland, and 5 acres of managed wetland (Table 4–3 and Figure 4–18). Indirect effects of permanent development projects result

in reduced functions of up to 143 acres of emergent wetland, 108 acres of which overlap with areas subject to ongoing effects of existing permanent developments (Appendix K). Figure O–4, *Wetland Habitat in the Plan Area with full BRCP Implementation* in Appendix O and Table 4–3 provide the acreage and percentage of wetland remaining within the Plan Area (including BRCP protected lands and lands that are not impacted by the covered activities) with full implementation of the covered activities.

4.3.4.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects within the Oroville and Bangor UPAs will result in permanent direct effects on up to 27 acres of emergent wetland (see Tables 4-5 and 4-6, Figure 4–18, *Wetland: Direct Impacts of Covered Activities*).

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise, visual, and other disturbances (e.g., ground vibrations) associated with operating equipment and other activities necessary to construct new developments (Table 4–1). These impact mechanisms could cause covered and other native wildlife associated with the wetland community to reduce their use of affected habitat areas during the period these activities are implemented. Based on an average 500-foot distance from permanent new developments within which temporary direct effects will occur (Section 4.2.4), up to 143 acres of emergent wetland will be temporarily and directly affected by permanent development covered activities Plan Area-wide[31], 108 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). The potential for temporary direct effects on emergent wetland will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other equipment), pet-related, building maintenance, and other disturbances associated with human occupancy following construction of permanent developments (see Table 4–1). These disturbances could affect use of wetland habitats that are adjacent to new permanent developments by covered and other native wildlife and result in damage of covered plant species and other native vegetation. For example, lighting may affect native wildlife species that are active nocturnally and cause them to avoid habitat around permanent development. In addition, uncontrolled pets may depredate individuals and nests of covered and other bird species, as well as slower moving species, such as reptiles and amphibians. In addition, any increased level of

[31] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

application of pesticides to control mosquitoes adjacent to new developments could affect the foodweb productivity (e.g., the diversity and abundance of invertebrate species produced in wetlands). Stormwater runoff from new permanent developments into adjacent wetland habitats could increase the risk for exposure of native wildlife species to contaminants and reduce survival and productivity of species that are sensitive to any such increases in contaminants.

Based on an average 500-foot distance from permanent new developments within which permanent indirect effects will occur (Section 4.2.4), up to 143 acres of emergent wetland will be permanently and indirectly affected by permanent development covered activities Plan Area-wide[32], 108 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). These permanent indirect effects will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.3.4.2.2 Outside of Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects will result in permanent direct effects on up to 8 acres of emergent wetland, 7 acres of managed seasonal wetland, and 5 acres of managed wetland outside of UPAs distributed in the Sierra Foothills, Southern Orchards, and Basin CAZs (see Table 4–4 and Figure 4–18).

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise, visual, and other disturbances (e.g., ground vibrations) associated with operating equipment and other activities necessary to construct new developments (Table 4–1). The effects of these impact mechanisms on wetland communities are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs.

Based on an average 500-foot distance from permanent new developments within which temporary direct effects will occur (Section 4.2.4), up to 143 acres of emergent wetland will be temporarily and directly affected by permanent development covered activities Plan Area-wide[33], 108 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). The potential for temporary direct effects on wetland communities will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

[32] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.
[33] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other equipment), pet-related, building maintenance, and other disturbances associated with human occupancy following construction of permanent developments (see Table 4–1). The effects of these impact mechanisms on wetland communities are the same as described for the permanent indirect effects of implementing permanent development projects in the UPAs. The level of these effects, however, is expected to be less than that associated with permanent development projects within UPAs, because they do not include residential developments that are expected to support higher levels of human activity than nonresidential developments.

Based on an average 500-foot distance from permanent new developments within which temporary indirect effects will occur (see Table 4–5), up to 143 acres of emergent wetland will be permanently and indirectly affected by permanent development covered activities Plan Area-wide[34], 108 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). These permanent indirect effects will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.3.4.3 Recurring Maintenance Activities

4.3.4.3.1 Within Urban Permit Areas

Permanent Direct Effects

Maintenance of canals will periodically remove emergent vegetation, if present, that is expected to reestablish following completion of the activity. The effect of this periodic removal on covered and other native wildlife species is considered low, because the removed vegetation occurs as narrow bands along ditch and canal banks that generally support low functioning habitat for associated covered and other native wildlife species. The potential for injury or mortality of covered and other native wildlife species that cannot avoid operating maintenance equipment will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (e.g., ground vibrations) (Table 4–1). The effects of these impact mechanisms on wetland communities are the same as described for the temporary

[34] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

direct effects of implementing permanent development projects within the UPAs, except that the duration of maintenance-related activities is generally expected to be less than and more localized than that of construction-related activities.

Permanent Indirect Effects

As described in Table 4–1, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on the wetland natural community.

4.3.4.3.2 Outside Urban Permit Areas

Permanent Direct Effects

Permanent direct effects of recurring maintenance activities on the wetland natural community are the same as described for recurring maintenance activities within the UPAs.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (e.g., ground vibrations) (Table 4–1). The effects of these impact mechanisms on wetland communities are the same as described for the temporary direct effects of implementing permanent development projects within the UPAs, except that the duration of maintenance-related activities is generally expected to be less than and more localized than that of construction-related activities.

Permanent Indirect Effects

As described in Table 4–1, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on the wetland natural community.

4.3.4.4 Effects of Covered Activities within Conservation Lands

Permanent Direct Effects

Implementation of CM5, Enhance Protected Natural Communities for Covered Species, provides for enhancing and managing all BRCP protected lands, including protected wetland communities. With the exception of the potential impact mechanisms and associated effects on wetland communities described in Section 4.3.4.1, *Effects Common among Covered Activities*, there are no additional impact mechanisms associated with implementation of conservation measures that are expected to result in permanent direct effects on wetland communities.

Temporary Direct Effects

The primary temporary direct effects on wetland communities will result from the operation of equipment and other activities related to implementing habitat enhancement and management actions in or adjacent to BRCP conservation lands that cause temporary noise, visual, and other

disturbances (Table 4–1). The effects of these impact mechanisms on wetland communities are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs. The potential for temporary direct effects on wetland communities will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

Implementation of conservation measures will not result in permanent indirect effects on wetland communities, because actions implemented in BRCP protected habitats will not be associated with increasing human or pet presence, noise, traffic risks, or other impact mechanisms that could result in permanent indirect effects (Table 4–1).

4.3.5 Aquatic

The maximum acreage of the aquatic natural community that will be permanently affected, directly and indirectly, with implementation of the covered activities is 652 acres (see Table 4–3, Appendix K and Figure 4–19, *Aquatic: Direct Impacts of Covered Activities* [separate files]). Up to 52 ponds will also be removed by the covered activities (Table 4–3).

4.3.5.1 Effects Common among Covered Activities

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction within or adjacent to the aquatic environment, for restoration of habitat) could result in injury or mortality of covered and other native species that may be unable to avoid equipment operations (e.g., amphibians, reptiles, fish). For example, native fishes may avoid habitat areas affected by sound and vibrations in the water column resulting from operation of equipment in channels. Similarly, reptiles (i.e., western pond turtle) and larval stages of many amphibians during their obligate aquatic life history stage in the water column may be disturbed and/or experience mortality if present at locations where equipment is operated in channels. Intrusion of sediment or otherwise contaminated runoff could alter water chemistry and affect aquatic foodwebs and covered species. The potential for injury and mortality of native wildlife species is considered to be low for highly mobile species (e.g., birds, large mammals, most adult fish). Implementation of the applicable AMMs indicated in Table 4–7, however, will avoid or minimize the potential for these effects on covered and other native species associated with the aquatic natural community.

The probability that the accidental introduction of contaminants associated with construction and maintenance activities (e.g., fuel spills) will adversely affect individual covered and other native organisms that come into contact with and are sensitive to the contaminant(s) is considered moderate, because implementation of avoidance and minimization measures identified in Table 4–7 will reduce the probability for the accidental release of contaminants and provide for the rapid cleanup of releases that may occur, thus reducing exposure risk and the period that individuals could be exposed to contaminants.

4.3.5.2 Permanent Development Projects

Direct effects of permanent development projects will result in the permanent removal of up to 52 ponds but not open water or major canal land cover types (Table 4–3 and Figure 4–19). Indirect effects of permanent development projects will result in reduced functions of up to 596 acres of open water and 56 acres of major canal, 108 acres of which overlap with areas subject to ongoing effects of existing permanent developments (Appendix K).

4.3.5.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects within the Chico, Oroville, Bangor, Foothill Area, Neal Road Drop-Off and Recycling Facility, Gridley-Biggs, and Nelson UPAs will result in permanent direct effects on up to 52 ponds (see Tables 4-5 and 4-6, Figure 4–19). Construction of new and replacement bridges will not remove aquatic habitats but will alter aquatic habitat structure (e.g., substrate composition) in up 2.6 acres of permanent stream channels (see bridge impact assumptions in Table 4–2).

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise, visual, and other disturbances (e.g., ground vibrations) and localized increases in turbidity associated with operating equipment and other activities necessary to construct new developments (Table 4–1). These impact mechanisms could cause covered and other native organisms associated with the aquatic community to reduce their use of affected habitat areas and increase their susceptibility to predation during the period these activities are implemented. Based on an average 500-foot distance from permanent new developments within which temporary direct effects will occur (Section 4.2.4), up to 596 acres of open water and 56 acres of major canal will be temporarily and directly affected by permanent development covered activities Plan Area-wide[35], 108 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). In addition, based on the assumptions presented in Table 4–2, operation of construction-related equipment in stream channel associated primarily with construction of new and replacement bridges could temporarily affect aquatic habitat conditions and habitat use by covered fish and other native aquatic organisms, as well as increase predation risk along up to 1,400 feet of stream channel. The potential for temporary direct effects on the aquatic community will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other

[35] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

equipment), pet-related, building maintenance, and other disturbances associated with human occupancy following construction of permanent developments (see Table 4–1). Increased levels of such disturbances adjacent to ponds could reduce use of these habitats by waterfowl and other water birds, and any increased level of application of pesticides to control mosquitoes in ponds adjacent to new developments could affect the foodweb productivity (e.g., the diversity and abundance of invertebrate species produced in ponds). Stormwater runoff from new permanent developments into adjacent aquatic habitats could increase the risk for exposure of native fish and wildlife species to contaminants and reduce survival and productivity of species that are sensitive to any such increases in contaminants.

Based on an average 500-foot distance from permanent new developments within which permanent indirect effects will occur (Section 4.2.4), up to 596 acres of open water and 56 acres of major canal will be permanently and indirectly affected by permanent development covered activities Plan Area-wide[36], 108 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). In addition, construction of new and replacement bridges will alter aquatic habitat structure (e.g., substrate composition) in up to 2.6 acres of permanent stream channels (see bridge impact assumptions in Table 4–2). Permanent indirect effects of such alteration in aquatic habitat structure could include decreased survival of juvenile salmonids and other native aquatic fishes if changes in habitat structure increase habitat availability for predatory nonnative fish. These permanent indirect effects will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.3.5.2.2 Outside of Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects outside of the UPAs will not result in the permanent removal of aquatic habitat (Table 4–4 and Figure 4–19). Construction of up to 89 new and replacement bridges that could span intermittent and perennial stream channels will not remove aquatic habitats but could permanently alter aquatic habitat structure (e.g., substrate composition) in up 23.5 acres of stream channels outside the UPAs in the Northern Orchards and Basin CAZs. Up to 6.2 acres of stream channels supporting modeled covered fish species habitat will be altered (see bridge impact assumptions in Table 4–2). This alteration of habitat could result in a permanent reduction in the function of affected channels for covered and other native aquatic organisms.

[36] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise, visual, and other disturbances (e.g., ground vibrations) and localized increases in turbidity associated with operating equipment and other activities necessary to construct new developments (Table 4–1). The effects of these impact mechanisms on aquatic communities are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs.

Based on an average 500-foot distance from permanent new developments within which temporary direct effects will occur (Section 4.2.4), up to 596 acres of open water and 56 acres of major canal will be temporarily and directly affected by permanent development covered activities Plan Area-wide[37], 108 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). In addition, based on the assumptions presented in Table 4–2, operation of construction-related equipment in stream channel to construct new and replacement bridges could temporarily affect aquatic habitat conditions and habitat use by covered fish and other native aquatic organisms, as well as increase predation risk along up to 10,800 feet (approximately 2 miles) of stream channel. Up to a total of 2,880 feet of the potentially affected stream channel supports modeled covered fish species habitat. The potential for temporary direct effects on the aquatic community will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other equipment), pet-related, building maintenance, and other disturbances associated with human occupancy following construction of permanent developments (see Table 4–1). The effects of these impact mechanisms on aquatic communities are the same as described for the permanent indirect effects of implementing permanent development projects in the UPAs. The level of these effects, however, is expected to be less than that associated with permanent development projects within UPAs, because they do not include residential developments that are expected to support higher levels of human activity than nonresidential developments.

Based on an average 500-foot distance from permanent new developments within which temporary indirect effects will occur (see Table 4–5), up to up to 596 acres of open water and 56 acres of major canal will be permanently and indirectly affected by permanent development covered activities Plan Area-wide[38], 108 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the

[37] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.
[38] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

acreage of temporary direct effects (see Appendix K). In addition, construction of new and replacement bridges will alter aquatic habitat structure (e.g., substrate composition) in up 23.4 acres of permanent stream channels. Up to 6.2 acres of stream channels supporting modeled covered fish species habitat will be altered (see bridge impact assumptions in Table 4–2). These permanent indirect effects will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.3.5.3 Recurring Maintenance Activities

4.3.5.3.1 Within Urban Permit Areas

Permanent Direct Effects

In addition to the potential impact mechanisms and associated effects on aquatic communities described in Section 4.3.5.1, *Effects Common among Covered Activities*, the operation of equipment in channels to remove debris to maintain flood conveyance will result in localized alteration in channel structure and associated habitat functions for covered and other associated aquatic organisms. The potential for temporary direct effects on aquatic habitats will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (e.g., ground vibrations) (Table 4–1). The effects of these impact mechanisms on aquatic communities are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs, except that the duration of maintenance-related activities is generally expected to be less and more localized than that of construction-related activities. In addition, the operation of equipment in channels to remove debris to maintain flood conveyance may result in temporary localized increases in turbidity that could result in temporary reduction in use of affected channel reaches by covered and other aquatic organisms and increase predation risk. The potential for temporary direct effects on aquatic communities will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

As described in Table 4–1, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on aquatic communities.

4.3.5.3.2 Outside Urban Permit Areas

Permanent Direct Effects

Permanent direct effects of recurring maintenance activities on aquatic natural communities are the same as described above for recurring maintenance activities within UPAs, except that the

duration of maintenance-related activities is generally expected to be less than that of construction-related activities.

Temporary Direct Effects

Temporary direct effects of recurring maintenance activities on aquatic natural communities are the same as described above for recurring maintenance activities within UPAs, except that the duration of maintenance-related activities is generally expected to be less than that of construction-related activities.

As described in Table 4–1, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on the aquatic natural community.

4.3.5.4 Effects of Covered Activities within Conservation Lands

Permanent Direct Effects

In addition to the potential impact mechanisms and associated effects on aquatic communities described in Section 4.3.5.1, implementation of conservation actions to screen diversions, remove barriers from channels that impede upstream and downstream movement of covered fish species, and place gravel in channels to replenish the supply of salmonid spawning gravels will permanently alter the structure of aquatic habitats supporting covered fish and other native aquatic organisms. The adverse effects of these activities are expected to be low, because they are designed to improve habitat conditions for covered fish species.

Temporary Direct Effects

In-channel operation of equipment to implement habitat restoration, enhancement, and management actions in BRCP protected aquatic natural communities could result in temporary noise and visual disturbances to covered and other native aquatic species that use aquatic habitats. In addition, the operation of equipment in channels may result in temporary localized increases in turbidity that could result in temporary reduction in use of affected channel reaches by covered and other aquatic organisms and increase predation risk. The potential for temporary direct effects on aquatic communities will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

Implementation of conservation measures will not result in permanent indirect effects on aquatic communities, because actions implemented in BRCP protected habitats will not be associated with increasing human or pet presence, noise, traffic risks, or other impact mechanisms that could result in permanent indirect effects (Table 4–1).

4.3.6 Agricultural Habitat

The maximum acreage of agricultural habitat types that will be permanently affected, directly and indirectly, with implementation of the covered activities is 7,517 acres (see Table 4–3, Appendix K and Figure 4–20, *Agricultural Lands: Direct Impacts of Covered Activities*).

4.3.6.1 Effects Common among Covered Activities

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction within or adjacent to the agricultural environment, restoration of habitat, and maintenance of existing facilities) could result in injury or mortality of covered and other native wildlife species that may be unable to avoid equipment operations (e.g., amphibians, reptiles, small mammals). For example, aestivating reptiles or amphibians may be disturbed and/or experience mortality if present at locations where ground-moving construction activities occur. The potential for injury and mortality of native wildlife species is considered to be low for highly mobile species (e.g., birds, large mammals) and those species only use agricultural habitats for foraging. Implementation of the applicable AMMs indicated in Table 4–7, however, will avoid or minimize the potential for these effects on covered and other native species associated with agricultural habitats.

The probability that the accidental introduction of contaminants associated with construction- and maintenance-related activities (e.g., fuel spills) will adversely affect individual native wildlife that come into contact with and are sensitive to the contaminant(s) is considered low, because most wildlife are likely avoid work sites in response to ongoing noise and visual disturbances associated with equipment operation. In addition, implementation of the applicable AMMs indicated in Table 4–7 provides for containment and rapid cleanup of releases that may occur, thus reducing exposure risk and the period that individuals could be exposed to contaminants.

4.3.6.2 Permanent Development Projects

Direct effects of permanent development projects will result in the permanent removal of up to 3,822 acres of agricultural cropland, comprised of 1,615 acres of rice, 2,102 acres of irrigated cropland, and 105 acres of irrigated pasture that support modeled habitat for covered species (Table 4–3 and Figure 4–20). Indirect effects of permanent development projects result in reduced functions of up to 1,792 acres of rice, 1,748 acres of irrigated cropland, and 155 acres of irrigated pasture, 1,563 acres of which overlap with areas subject to ongoing effects of existing permanent developments (Appendix K). Figure O–5, *Agriculture Habitat in the Plan Area with full BRCP Implementation* in Appendix A and Table 4–3 provide the acreage and percentage of oak woodland and savanna remaining within the Plan Area (including BRCP protected lands and lands that are not impacted by the covered activities) with full implementation of the covered activities.

4.3.6.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects within the Chico, Oroville, Bangor, Foothill Area, Gridley-Biggs, Nelson, and Richvale UPAs will result in permanent direct effects on up to 1,131 acres of rice, 1,846 acres of irrigated cropland, and 105 acres of, irrigated pasture (see Tables 4-5 and 4-6, Figure 4–20).

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise, visual, and other disturbances (e.g., ground vibrations) associated with operating equipment and other activities necessary to construct new developments (Table 4–1). These impact mechanisms could cause covered and other native wildlife associated with agricultural habitats to temporarily reduce their use of affected habitat areas during the period these activities are implemented. Based on an average 500-foot distance from permanent new developments within which temporary direct effects will occur (Section 4.2.4), up to 1,792 acres of rice, 1,748 acres of irrigated cropland, and 155 acres of irrigated pasture will be temporarily and directly affected by permanent development covered activities Plan Area-wide[39], 1,563 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). The impact of construction-related disturbances on covered and other native wildlife species that use agricultural habitats, however, is expected to be relatively low, because agricultural habitats undergo recurring levels of disturbance associated with farming operations. The potential for temporary direct effects on agricultural habitats will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other equipment), pet-related, building maintenance, and other disturbances associated with human occupancy following construction of permanent developments (see Table 4–1). These impact mechanisms could cause covered and other native wildlife associated with agricultural habitats to permanently reduce their use of affected habitat areas following occupancy of new developments, Based on an average 500-foot distance from permanent new developments within which permanent indirect effects will occur (Section 4.2.4), up to 1,792 acres of rice, 1,748 acres of irrigated cropland, and 155 acres of irrigated pasture will be permanently and indirectly affected by permanent development covered activities Plan Area-wide[40], 1,563 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the

[39] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.
[40] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). The impact of ongoing disturbances from new developments on covered and other native wildlife species that use adjacent agricultural habitats, however, is expected to be relatively low, because agricultural habitats undergo recurring levels of disturbance associated with farming operations. These permanent indirect effects will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

These affected areas are the same as and not in addition to the area agricultural habitats affected by temporary direct effects of construction-related noise and visual disturbances (see Appendix K). These permanent indirect effects will be minimized with implementation of AMM18 (Design Developments to Minimize Indirect Impacts at Urban Habitat Interfaces; see Chapter 6, *Conditions on Covered Activities*).

Temporary Indirect Effects

Implementation of the permanent development projects will not result in temporary indirect effects on agricultural habitats.

4.3.6.2.2 Outside of Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects will result in permanent direct effects on up to 484 acres of rice and 255 acres of irrigated cropland outside of UPAs distributed among all the CAZs (see Table 4–4 and Figure 4–20).

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise, visual, and other disturbances (e.g., ground vibrations) associated with operating equipment and other activities necessary to construct new developments (Table 4–1). The effects of these impact mechanisms on agricultural habitats are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs.

Based on an average 500-foot distance from permanent new developments within which temporary indirect effects will occur (Section 4.2.4), up to 1,792 acres of rice, 1,748 acres of irrigated cropland, and 155 acres of irrigated pasture will be temporarily and directly affected by permanent development covered activities Plan Area-wide[41], 1,563 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). The impact of construction-related disturbances on covered and other native wildlife species that use agricultural habitats, however, is expected to be relatively low, because agricultural habitats undergo recurring levels of disturbance associated with farming operations. The potential for

[41] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

temporary direct effects on agricultural habitats will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other equipment), pet-related, building maintenance, and other disturbances associated with human occupancy following construction of permanent developments (see Table 4–1). The effects of these impact mechanisms on agricultural habitats are the same as described for the permanent indirect effects of implementing permanent development projects in the UPAs. The level of these effects, however, is expected to be less than that associated with permanent development projects within UPAs, because they do not include residential developments that are expected to support higher levels of human activity than nonresidential developments.

Based on an average 500-foot distance from permanent new developments within which temporary indirect effects will occur (see Table 4–5), up to 1,792 acres of rice, 1,748 acres of irrigated cropland, and 155 acres of irrigated pasture will be permanently and indirectly affected by permanent development covered activities Plan Area-wide[42], 1,563 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). Adverse effects of these disturbances, however, will be low for the reasons described above for temporary direct effects of construction-related noise and visual disturbances.

4.3.6.3 Recurring Maintenance Activities

4.3.6.3.1 Within Urban Permit Areas

Permanent Direct Effects

With the exception of the potential impact mechanisms and associated effects on agricultural habitats described in Section 4.3.6.1, *Effects Common among Covered Activities*, there are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on agricultural habitats.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (e.g., ground vibrations) (Table 4–1). The effects of these impact mechanisms on agricultural habitats are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs, except that the

[42] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

duration of maintenance-related activities, other than any extensive maintenance of underground pipelines and utilities, is generally expected to be less and more localized than that of construction-related activities. The potential for temporary direct effects on agricultural habitats will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

As described in Table 4–1, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on agricultural habitats.

4.3.6.3.2 Outside Urban Permit Areas

Permanent Direct Effects

With the exception of the potential impact mechanisms and associated effects on agricultural habitats described in Section 4.3.6.1, there are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on agricultural habitats.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (e.g., ground vibrations) (Table 4–1). The effects of these impact mechanisms on agricultural habitats are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs, except that the duration of maintenance-related activities, other than any extensive maintenance of underground pipelines and utilities, is generally expected to be less and more localized than that of construction-related activities. The potential for temporary direct effects on agricultural habitats will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

As described in Table 4–1, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on agricultural habitats.

4.3.6.4 Effects of Covered Activities within Conservation Lands

Permanent Direct Effects

In addition to the potential impact mechanisms and associated effects on agricultural habitats described in Section 4.3.6.1, implementation of conservation actions to restore giant garter snake, emergent wetland, riparian habitat, and vernal pools and other seasonal wetlands could remove up to 1,123 acres agricultural habitat types if all the restoration is located on cultivated

lands (Table 5-7, *BRCP Restoration Targets*).[43] The potential for permanent direct effects on native species will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Temporary Direct Effects

Habitat restoration, enhancement, and management actions undertaken in protected agricultural habitats could result in temporary noise, visual, and other disturbances to covered and other native wildlife species that use grasslands habitats (Table 4–1). The effects of these impact mechanisms on covered and other native wildlife species are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs. The potential for temporary direct effects on agricultural habitats will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

Implementation of conservation measures will not result in permanent indirect effects on agricultural habitats, because actions implemented in BRCP protected habitats will not be associated with increasing human or pet presence, noise, traffic risks, or other impact mechanisms that could result in permanent indirect effects (Table 4–1).

4.4 IMPACTS ON COVERED SPECIES

This section describes the adverse effects on covered species resulting from the impact mechanisms of planned future permanent development projects, recurring maintenance activities, and the BRCP conservation measures within the Plan Area (see Chapter 2, *Covered Activities* and Section 5.4) described in Section 4.2. The impacts of the covered activities on each covered species are described for each of these covered activity categories, segregated by location within and outside of UPAs. Impacts of the covered activities on ESA critical designated habitat are also described. The expected outcomes of implementing the covered activities, including the BRCP conservation measures, on each of the covered species are described in Section 5.6, *Conservation Provided for Covered Species*. The impact mechanisms associated with each of the covered activity categories that could result in permanent and temporary direct effects and permanent indirect effects on covered species are presented in Table 4–1. No impact mechanisms are identified that could result in temporary indirect effects.

The maximum extent (acreage or linear) of each covered species modeled habitat type and number of covered plant species occurrences that will be removed (i.e., permanent direct impacts) with implementation of the covered activities is summarized for the Plan Area in Table 4–8, *Maximum Extent of Permanent Direct Impacts on Modeled Covered Species Habitat Types and Known Occurrences within the Plan Area*, and presented by CAZ and UPA in

[43] The preponderance of impacts are expected to be on rice lands, which support site conditions favorable for restoration of giant garter snake, emergent wetland, and vernal pool habitats.

Table 4–9, *Maximum Extent of Permanent Direct Impacts on Modeled Covered Species Habitat Types and Known Occurrences by CAZ and UPA* (see separate files). The maximum acreage of permanent indirect and temporary direct impacts on modeled covered species habitat types are presented in Appendix K. Figures 4-21 to 4–54 (see separate files) depict the acreage of each covered species' modeled habitat type that will be removed within and outside of the UPAs based on the location of planned future development of the permanent development activities described in Chapter 2, *Covered Activities*, and depicted in Figures 4–1 to 4–14. As described in Section 4.2, the actual footprint location where each of the permanent development activities will be implemented may differ from that shown in Figures 4–21 to 4–54; the acreage of each covered species modeled habitat type that could be removed by the permanent development activities, however, will not exceed the acreages indicated in Table 4–9 for locations within and outside of UPAs.

The land cover types and other criteria that comprise modeled habitat for each of the applicable covered species is described for each of those species in Appendix A.

The avoidance and minimization measures that will be applied during implementation of the covered activities to avoid and minimize impacts on each of the covered species are presented in Table 4–7.

4.4.1 Tricolored Blackbird

The maximum acreage of modeled tricolored blackbird breeding and foraging habitat that will be permanently affected, directly and indirectly, with implementation of the covered activities is 23,372 acres, representing approximately 9 percent of the current extent of modeled breeding and foraging habitat (see Table 4–8, Appendix K and Figure 4–21, *Tricolored Blackbird: Direct Impacts of Covered Activities*).

Nesting habitat is not segregated in the habitat model; however, a partial surrogate for nesting habitat is the acreage of emergent wetland present in the Plan Area.[44] BRCP covered activities will remove up to 35 acres of mapped emergent wetland (Table 4–3) or less than 1 percent of the emergent wetland present in the Plan Area. Consequently, given the historically and relatively small size of the Plan Area breeding population, it is unlikely the Plan Area population is limited by the availability of nesting habitat or will be adversely affected by the acreage of emergent wetland removed by covered activities. Furthermore, implementation of the applicable AMMs indicated in Table 4–7 will avoid the removal of active nesting colonies by covered activities and minimize the potential for harassment of nesting colonies.

[44] Foraging and nesting habitat are combined in the tricolored blackbird habitat model because patches of suitable nesting habitat (e.g., Himalayan blackberry, emergent wetlands smaller than 1 acre) can occur as inclusions within modeled foraging habitat.

4.4.1.1 Effects Common among Covered Activities

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction of new developments, restoration of habitat, and maintenance of existing facilities) could result in injury or mortality of tricolored blackbird. For example, individual tricolored blackbirds could collide with moving construction-related equipment, eggs and nestlings could be crushed by equipment operating in nesting habitat, and adults could abandon care of eggs and nestlings as a result of excessive construction-related noise and visual disturbances near nest sites. The risk for collision of adult birds with construction-related equipment, however, is considered low, because equipment is expected to be operated at speeds that will be avoided by adult birds, which are highly mobile. Implementation of the applicable AMMs indicated in Table 4–7 will also avoid direct disturbance to active breeding colonies and mortality or injury of individuals at occupied breeding sites. Because adult tricolored blackbirds are highly mobile, actions associated with implementation of the covered activities (e.g., operation of construction equipment) will not result in mortality or injury of adult individuals.

The probability that the accidental introduction of contaminants associated with construction and maintenance activities (e.g., fuel spills) will adversely affect individual tricolored blackbirds is considered low, because birds are expected to avoid work sites with ongoing noise and visual construction-related disturbances. In addition, implementation of the applicable AMMs indicated in Table 4–7 provides for containment and rapid cleanup of releases that may occur, thus reducing exposure risk and the period that individuals could be exposed to contaminants.

4.4.1.2 Permanent Development Projects

Direct effects of permanent development projects will result in the permanent removal of up to 12,617 acres of modeled breeding and foraging habitat, representing approximately 5 percent of the existing acreage of modeled breeding and foraging habitat in the Plan Area (Table 4–8, Figure 4–21). Indirect effects of permanent development projects will result in reduced functions of up to 10,755 acres of modeled habitat as habitat for the tricolored blackbird, 5,573 acres of which overlap with areas subject to ongoing effects of existing permanent developments (Appendix K. Figure O–6, *Tricolored Blackbird Habitat in the Plan Area with full BRCP Implementation* in Appendix O and Table 4–8 provide the acreage of modeled tricolored blackbird habitat remaining within the Plan Area (including BRCP protected lands and lands that are not impacted by the covered activities) with full implementation of the covered activities.

4.4.1.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects within the Chico, State Route 99, Foothill Area, Neal Road Drop-Off and Recycling Facility, Honcut, Oroville, Bangor, Nelson, and Richvale UPAs will result in permanent direct effects on up to 11,341 acres of modeled tricolored blackbird breeding and foraging habitat (see Table 4–9). Loss of this habitat area will

reduce the area of any actual tricolored blackbird habitat that is located within affected modeled habitat and, thus, will reduce the area of habitat available to tricolored blackbird. Covered activities will not remove existing known active[45] nesting colonies, because none are located in the UPAs. The potential for permanent direct effects on active nesting colony sites that may establish in the future, but before all permanent development projects are implemented in the UPAs, will be avoided with implementation of the applicable AMMs indicated in Table 4–7.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise, visual, and other disturbances associated with operating equipment and other activities necessary to construct new developments (see Table 4–1). These impact mechanisms could cause tricolored blackbirds to reduce their foraging use of affected habitat areas during the period these activities are implemented. Temporary displacement from foraging habitat and increased numbers of flight responses to disturbance may elevate energetic costs to tricolored blackbird. Nesting colonies of tricolored blackbirds are highly sensitive to disturbance, which may cause nest abandonment or interfere with the incubation and feeding of young in a way that reduces reproductive success (NBHCP 2003). The potential for temporary direct effects on tricolored blackbird nesting colonies will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 500-foot distance from permanent new developments within which temporary direct effects will occur (see Table 4–5), up to 10,755 acres of modeled tricolored blackbird breeding and foraging habitat Plan Area-wide[46] will be temporarily and directly affected by permanent development covered activities, 5,573 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). The potential for adverse effects of temporary construction-related disturbances on tricolored foraging behavior, however, is considered low because foraging habitat is not a factor limiting the species in the Plan Area (see Appendix A) and, given the distribution of modeled foraging habitat (Figure 4–21), there is a high probability that alternate foraging habitat areas will be available near affected areas.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other equipment), pet-related, building maintenance, and other disturbances associated with human occupancy following construction of permanent developments (see Table 4–1). These disturbances could cause tricolored blackbirds to reduce their foraging use of habitat adjacent to permanent development areas. Noise and visual disturbances are likely to preclude tricolored blackbird from nesting in patches of vegetation adjacent to permanent developments that

[45] An active colony is defined as having had nests with eggs or young within the previous five years.
[46] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

otherwise would be suitable for nesting. Although unlikely, if tricolored blackbird were to nest adjacent to new permanent developments, indirect effects could include nest abandonment and changes in incubation, brooding, and foraging behavior of adult birds that could reduce nesting success. Increasing human and pet presence could also increase the frequency of flight responses that could increase energy demand and expose incubating eggs to nest predation or cooling. Indirect permanent effects of permanent development projects will not cause abandonment of known active nesting colonies, because none are located in the UPAs. If tricolored blackbirds were to establish nesting colonies in UPAs near proposed project footprints before all of the permanent development projects have been implemented, noise, visual, and other disturbances associated with occupancy of permanent development projects near new colonies could result in colony abandonment or reduced nesting success. The potential for this effect, however, is considered low because the incidence of nesting in the Plan Area is low, and nesting habitat near many proposed project footprints are in areas that already support development unlikely to be used by nesting tricolored blackbirds.

Based on an average 500-foot distance from permanent new developments within which permanent indirect effects will occur (see Table 4–5), up to 10,755 acres of modeled tricolored blackbird breeding and foraging habitat Plan Area-wide[47] will be permanently and indirectly affected by permanent development covered activities, 5,573 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). These permanent indirect effects will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent indirect effects associated with alteration in local hydrology may alter the vegetation composition and structure of foraging habitat but will not affect the acreage of available foraging habitat. Based on an average 500-foot distance from permanent new developments within which these permanent indirect effects are expected to occur (see Section 4.2.4.3), up to 36 acres of emergent wetland that may support nesting habitat Plan Area-wide[48] will be indirectly affected if permanent development projects alter the supporting hydrology (see Appendix K). The potential for adverse effects of any such nesting habitat losses on tricolored blackbird is expected to be low, because implementation of the applicable AMMs indicated in Table 4–7 will avoid locating permanent development projects near tricolored blackbird nesting colonies. Conversely, alterations that increase local water availability may result in the establishment of patches of emergent wetland that could support nesting habitat.

[47] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.
[48] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

4.4.1.2.2 Outside Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects will result in permanent direct effects on up to 1,276 acres of modeled tricolored blackbird breeding and foraging habitat outside the UPAs distributed among all CAZs; see Table 4–9). The effects of such loss of modeled habitat on tricolored blackbird are the same as described for the permanent direct effects of implementing permanent development projects in the UPAs (see Section 4.4.1.2.1, *Within Urban Permit Areas*). Covered activities will not remove existing known nesting colonies, because none are located in the footprint of permanent development projects located outside of the UPAs. The potential for permanent direct effects on active nesting colony sites that may be established in the future will be avoided with implementation of the applicable AMMs indicated in Table 4–7.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise, visual, and other disturbances associated with operating equipment and other activities necessary to construct new developments (see Table 4–1). The effect of these impact mechanisms on tricolored blackbird is the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.1.2.1). The potential for temporary direct effects on tricolored blackbird nesting colonies will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 500-foot distance from permanent new developments within which temporary indirect effects will occur (see Table 4–5), up to 10,755 acres of modeled tricolored blackbird breeding and foraging habitat Plan Area-wide[49] will be temporarily and directly affected by permanent development covered activities, 5,573 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

The potential for adverse effects on individual tricolored blackbirds from construction-related noise and visual disturbances is considered to be low because of the following factors.

1. Less than 1 percent of the modeled foraging habitat would be affected if all permanent development activities outside UPAs were implemented simultaneously, but permanent development projects would not be implemented simultaneously and, thus, a much smaller area of habitat would be affected by construction-related disturbances at any point in time.
2. The majority of covered activities implemented outside of the UPAs are linear infrastructure projects. As such, the period over which a given area of habitat adjacent to project footprints will be subjected to temporary direct construction-related disturbances will be limited as the area under construction moves along the project ROW.

[49] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

3. Affected modeled habitat areas are within or near larger patches of modeled habitat that would not be disturbed and would be available for use by displaced individuals.
4. Implementation of AMM9 will avoid construction-related activities within 1,300 feet of active nesting colonies during the tricolored blackbird nesting season (see Tables 4-7, 4-6, and 5-25).

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other equipment), pet-related, building maintenance, and other disturbances associated with human occupancy following construction of permanent developments (see Table 4–1). The level of these effects are expected to be less than that associated with permanent development projects within UPAs, because they do not include residential developments which are expected to support higher levels of human activity than nonresidential developments. Permanent indirect effects of new roads include ongoing noise and visual disturbances associated with vehicle traffic that could affect use of adjacent habitat areas and increased risk for mortality or injury of individual tricolored blackbirds associated with collisions with vehicles.

Noise and visual disturbances are likely to preclude tricolored blackbird from nesting in patches of vegetation adjacent to new agricultural services facilities and new roads that otherwise would be suitable for nesting. If tricolored blackbird were to nest adjacent to these new facilities and roads, the effects on tricolored blackbird is the same as described for the permanent indirect effects of implementing permanent development projects in the UPAs (see Section 4.4.1.2.1). Indirect permanent effects of permanent development projects outside of UPAs will not cause abandonment of known active nesting colonies, because at this time none are located near the proposed footprints of new agricultural services facilities and new roads. If tricolored blackbirds were to establish nesting colonies in outside UPAs near proposed project footprints before full build out of agricultural services facility and new roads, noise, visual, and other disturbances associated with use of these development projects could result in colony abandonment or reduced nesting success. The potential for this effect, however, is considered low because the incidence of nesting in the Plan Area is low and the affected area is small (less than 1 percent of the modeled tricolored blackbird habitat located outside the UPAs.

Based on an average 500-foot distance from permanent new agricultural services facilities and new roads within which permanent indirect effects will occur (see Table 4–5), up to 10,755 acres of modeled tricolored blackbird breeding and foraging habitat Plan Area-wide[50] will be permanently and indirectly affected, 5,573 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the

[50] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

acreage of temporary direct and permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects. Adverse effects of these disturbances, however, will be low for the reasons described above for temporary direct effects of construction-related noise and visual disturbances. Permanent indirect effects of new agricultural services facilities will be minimized with implementation of the applicable AMMs indicated in Table 4–7. Permanent indirect effects associated with alteration in local hydrology may alter the vegetation composition and structure of foraging habitat but will not affect the acreage of available foraging habitat. Based on an average 500-foot distance from permanent new developments within which these permanent indirect effects are expected to occur (see Section 4.2.4.3), up to 36 acres of emergent wetland that may support nesting habitat Plan Area-wide[51] will be indirectly affected if permanent development projects alter the supporting hydrology (see Appendix K). The potential for adverse effects of any such nesting habitat losses on tricolored blackbird is expected to be low, because implementation of AMM5 will avoid locating permanent development projects near tricolored blackbird nesting colonies. Conversely, alterations that increase local water availability may result in the establishment of patches of emergent wetland that could support nesting habitat.

4.4.1.3 Recurring Maintenance Activities

4.4.1.3.1 Within Urban Permit Areas

Permanent Direct Effects

With the exception for the potential impact mechanisms and associated effects on tricolored blackbird described in Section 4.4.1.1, *Effects Common among Covered Activities*, there are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on tricolored blackbird (see Table 4–1). Maintenance removal of emergent and other vegetation that potentially support tricolored blackbird habitat will not adversely affect tricolored blackbird because 1) vegetation in these locations occur in narrow bands along ditch and canal banks that are too small to support nesting and 2) are typically adjacent to field access roads subject to regular disturbance by farming operations during the nesting season that will likely preclude nesting attempts.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (see Table 4–1). The effects of these impact mechanisms on tricolored blackbird are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.1.2.1), except that the duration of maintenance-related activities is generally expected to be less than that of construction-related activities. The potential for temporary direct effects on tricolored blackbird

[51] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

nesting colonies will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

The potential for adverse effects of temporary recurring maintenance-related disturbances on tricolored foraging behavior is considered low within the UPAs because many of these activities will be implemented in developed areas that are already subject to high levels of disturbance (e.g., traffic), foraging habitat is not a factor limiting the species in the Plan Area (see Appendix A) and, given the distribution of modeled foraging habitat (Figure 4–21), there is a high probability that alternate foraging habitat areas will be available near affected areas during a generally short period of disturbance for most activities (e.g., a few hours to a few days).

Permanent Indirect Effects

As described in Table 4–2, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on tricolored blackbird.

4.4.1.3.2 Outside Urban Permit Areas

Permanent Direct Effects

As described in Section 4.2.2, there are no impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on modeled tricolored blackbird habitat. Maintenance removal of emergent and other vegetation that potentially support tricolored blackbird habitat will not adversely affect tricolored blackbird for the reasons described for permanent direct effects of recurring maintenance activities within UPAs (see Section 4.4.1.2.1).

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (Table 4–1). The effects of these impact mechanisms on tricolored blackbird are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.1.2.1) except that the duration of maintenance-related activities is generally expected to be less than that of construction-related activities. The potential for temporary direct effects on tricolored blackbird nesting colonies will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

The potential for adverse effects of temporary maintenance-related disturbances on tricolored foraging behavior is considered low because foraging habitat is not a factor limiting the species in the Plan Area (see Appendix A) and, given the distribution of modeled foraging habitat (Figure 4–21), there is a high probability that alternate foraging habitat areas will be available near affected areas.

Permanent Indirect Effects

As described in Table 4–5, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on tricolored blackbird.

4.4.1.4 Effects of Covered Activities within Conservation Lands

4.4.1.4.1 Permanent Direct Effects

Implementation of conservation measures to restore riparian habitat will convert up to 190 acres of agricultural land and grassland that support modeled tricolored blackbird habitat to riparian vegetation types that do not support modeled tricolored blackbird habitat (see Table 5-7). The effects of such loss of modeled habitat on tricolored blackbird are the same as described for the permanent direct effects of implementing permanent development projects in the UPAs (see Section 4.4.1.2.1). Implementation of applicable AMMs indicated in Table 4–7 will avoid permanent direct effects on active nesting colonies.

4.4.1.4.2 Temporary Direct Effects

Temporary direct effects are associated with the operation of equipment and other activities related to implementing habitat restoration, enhancement, and management actions in or adjacent to BRCP conservation lands that cause temporary noise, visual, and other disturbances to tricolored blackbird (see Table 4–2). The effects of these impact mechanisms on tricolored blackbird are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.1.2.1). The potential for temporary direct effects on tricolored blackbird nesting colonies will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.1.4.3 Permanent Indirect Effects

Implementation of conservation measures will not result in permanent indirect effects on tricolored blackbird, because restored and protected habitats will not be associated with increasing human or pet presence, noise, traffic risks, or other impact mechanisms that could result in indirect effects (Table 4–2). Restored habitat types, although they may not support tricolored blackbird, are highly unlikely to impose additional risk factors or stressors on tricolor blackbird.

4.4.1.5 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of tricolored blackbird within the Plan Area.

4.4.1.5.1 Permanent Direct Effects

Implementation of the Covered Activities will result in loss of up to 12,617 acres of modeled tricolored blackbird foraging and nesting habitat (Table 4–8). Permanent direct effects on habitat supporting active tricolored blackbird nesting colony sites will be avoided with implementation of the applicable AMMs indicated in Table 4–7.

Permanent direct effects on tricolored blackbird eggs, nestlings, juveniles, and adults in nesting colonies will be avoided with implementation of the applicable AMMs indicated in Table 4–7. Because tricolored black bird is protected by the MBTA, take in the form of death or injury will not be allowed under the federal permit for any covered activity. The Natural Community Conservation Plan (NCCP) permit serves as authorization by CDFW for incidental take of tricolored black birds consistent with this Plan under the Fish and Game Code. If tricolored black bird is listed under the federal ESA, the section 10(a)(1)(B) permit can at that point serve as a Special Purpose Permit under the MBTA.

4.4.1.5.2 Temporary Direct Effects

A temporary reduction in the functions of up to 10,755 acres of modeled tricolored blackbird foraging and nesting habitat would result from harassment associated with covered activities, 5,573 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Management-related activities on 48,411 acres of conservation lands supporting modeled tricolored blackbird habitat (Table 5-10, *Covered Species Habitat Conservation and Mitigation Targets*) will result in temporary direct effects on a relatively small acreage of additional habitat that cannot be estimated. The acreage of take (i.e., harassment) will be the amount of actual habitat that is located within the area of affected modeled habitat. Temporary direct effects on tricolored blackbird nesting colonies will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.1.5.3 Permanent Indirect Effects

A permanent reduction in the functions of up to 10,755 acres of modeled tricolored blackbird foraging and nesting habitat would result from harassment associated with covered activities, 5,573 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). The acreage of take (i.e., harassment) will be the amount of actual habitat that is located within the area of affected modeled habitat. Permanent indirect effects on tricolored blackbird nesting colonies will be minimized with implementation of the applicable AMMs indicated in Table 4–7. A small, but indeterminable, amount of direct take of individual juvenile and adult tricolored blackbird could be associated with collisions with vehicles adjacent to permanent development projects and with vehicles operation on new roadways.

4.4.1.6 Overall Impact Likely to Result from Take

The primary threat to tricolored blackbird has been the historical loss of its wetland nesting habitat and associated stressors (e.g., increased vulnerability of nesting colonies to disturbances that cause nest or colony abandonment, increased predation in nesting colonies; see Appendix A). Surveys of tricolored blackbird were conducted in 2008 in 35 California counties, from San Diego County in the south to Shasta County in the north. At that time, a total of 395,321 birds were estimated statewide. A total of 2,541 tricolored blackbirds were observed in Butte County within the Plan Area during the 2008 survey, representing approximately 0.6 percent of the statewide total (University of California Davis 2008). The number of tricolored blackbird nesting colonies have declined substantially from over 30 colonies reported from 1931-1937 supporting an estimated 159,000 adults (Neff 1937) to one colony in 2001 supporting an estimated 500 adults (Humple and Churchwell 2002).[52]

The covered activities will result in the loss of up to 12,617 acres of modeled tricolored blackbird foraging and nesting habitat (Table 4–8), representing approximately 5 percent of the extent of modeled habitat present in the Plan Area. Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. The most recent available survey information indicates that the Plan Area population has declined by 98.4 percent of the adults present in the 1930s (see above). Consequently, it is likely that the current population estimate of 500 breeding adults is not limited by the availability of foraging habitat and, thus, will not be adversely affected by foraging habitat removed by the covered activities. Modeled tricolored blackbird is well distributed throughout the Plan Area and, because tricolored blackbird is a highly mobile and wide-ranging species, changes in the spatial distribution of habitat with implementation of the covered activities is not expected to adversely affect its distribution in the Plan Area.

Nesting habitat is not segregated in the habitat model; however, a partial surrogate for nesting habitat is the acreage of emergent wetland present in the Plan Area.[53] BRCP covered activities will remove up to 35 acres of mapped emergent wetland (Table 4–3) or less than 1 percent of the emergent wetland present in the Plan Area. Consequently, given the historically and relatively small size of the Plan Area breeding population, it is unlikely the Plan Area population is limited by the availability of nesting habitat or will be adversely affected by the acreage of emergent wetland removed by covered activities. Furthermore, implementation of the applicable AMMs indicated in Table 4–7 will avoid the removal of active nesting colonies by covered activities and minimize the potential for harassment of nesting colonies.

[52] The 2008 tricolored blackbird survey observed tricolored blackbirds at 4 historical nesting colony sites; however, survey results do not report if nesting was observed (http://tricolor.ice.ucdavis.edu/).

[53] Foraging and nesting habitat are combined in the tricolored blackbird habitat model because patches of suitable nesting habitat (e.g., Himalayan blackberry, emergent wetlands smaller than 1 acre) can occur as inclusions within modeled foraging habitat.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on tricolored blackbird or adversely affect its Plan Area distribution or abundance.

4.4.2 Yellow-Breasted Chat

Yellow-breasted chat habitat was modeled using two methods, suitable habitat with occupancy unknown (nesting and foraging habitat) and habitat with known occurrences (known use areas) (see Appendix A.2, *Yellow-Breasted Chat* for a full explanation regarding modeled habitat with and without known occurrences). The maximum acreage of modeled yellow-breasted chat nesting and foraging habitat and nesting and foraging habitat (known use area) that will be permanently affected, directly and indirectly, with implementation of the covered activities is 1,530 or approximately 21 percent of modeled habitat in the Plan Area (see Table 4–8, Appendix K, and Figure 4–22, *Yellow-Breasted Chat: Direct Impacts of Covered Activities* [separate file]).

4.4.2.1 Effects Common among Covered Activities

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction of new developments, restoration of habitat, and maintenance of existing facilities) could result in injury or mortality of yellow-breasted chat. For example, individual yellow-breasted chats could collide with moving construction-related equipment, eggs and nestlings could be crushed by equipment operating in nesting habitat, and adults could abandon care of eggs and nestlings as a result of excessive construction-related noise and visual disturbances near nest sites. The risk for collision of adult birds with construction-related equipment, however, is considered low because equipment is expected to be operated at speeds that will be avoided by adult birds, which are highly mobile. In addition, yellow-breasted chat typically inhabit dense brushy vegetation (Small 1994), which makes high-speed impacts with equipment very unlikely. Implementation of the applicable AMMs indicated in Table 4–7 will also avoid or minimize direct disturbance to active nests and mortality or injury of individuals at nest sites. Because adult yellow-breasted chat are highly mobile, actions associated with implementation of the covered activities (e.g., operation of construction equipment) will not result in mortality or injury of adult individuals.

Effects from domestic animals, non-native vegetation, and vectors for disease may also impact this species. Additionally, the accidental introduction of contaminants associated with construction and maintenance activities (e.g., fuel spills) will adversely affect individual yellow-breasted chat is considered low because birds are expected to avoid work sites with ongoing noise and visual construction-related disturbances. In addition, implementation of the applicable AMMs indicated in Table 4–7 will provide for containment and rapid cleanup of releases that may occur, thus reducing exposure risk and the period that individuals could be exposed to contaminants.

4.4.2.2 Permanent Development Projects

Direct effects of permanent development projects will result in the permanent removal of up to 278 acres of modeled nesting and foraging habitat (occupancy unknown), representing 4 percent of the existing acreage of this modeled habitat in the Plan Area (Table 4–8, Figure 4–22). Permanent development projects will not result in the removal of modeled nesting and foraging habitat known use area (Table 4–8). Indirect effects of permanent development projects will result in reduced functions of up to 1,252 acres of modeled nesting and foraging habitat and up to 6 acres of modeled nesting and foraging habitat known use area as habitat for the yellow-breasted chat, 1,059 acres of which overlap with areas subject to ongoing effects of existing permanent developments (Appendix K). Figure O–7, *Yellow-Breasted Chat Habitat in the Plan Area with full BRCP Implementation* in Appendix O and Table 4–8 provide the acreage of modeled yellow-breasted chat remaining within the Plan Area (including BRCP protected lands and lands that are not impacted by the covered activities) with full implementation of the covered activities.

4.4.2.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects within the Chico, Oroville, and Bangor UPAs will result in permanent direct effects on up to 275 acres of modeled yellow-breasted chat nesting and foraging habitat and 0 acres of modeled nesting and foraging known use area riparian habitat would be permanently and directly affected (Table 4–9). Loss of this habitat area will not reduce the area of any actual yellow-breasted chat habitat that is located within affected modeled habitat and, thus, will not reduce the area of habitat available to yellow-breasted chat.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise, visual, and other disturbances (e.g., ground vibrations) associated with operating equipment and other activities necessary to construct new developments (see Table 4–1). These impact mechanisms could cause yellow-breasted chat to reduce their foraging use of affected habitat areas during the period these activities are implemented. Temporary displacement from foraging habitat and increased numbers of flight responses to disturbance may elevate energetic costs to yellow-breasted chat. The potential for temporary direct effects on yellow-breasted chat will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 500-foot distance from permanent new developments within which temporary direct effects will occur (see Table 4–5), up to 1,252 acres of modeled yellow-breasted chat habitat Plan Area-wide[54] will be temporarily and directly affected by permanent development covered activities, 1,059 acres of which overlap with areas subject to ongoing

[54] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

effects of existing permanent developments (see Appendix K). The potential for adverse effects of temporary construction-related disturbances on yellow-breasted chat behavior, however, is considered low because the relatively few observations of the species in the Plan Area likely means it is not abundant and the majority of modeled habitat in the Plan Area is unoccupied (see Appendix A) and, as the BRCP progresses a large amount of restored riparian habitat relative to what is permanently affected will be available for use.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other equipment), pet-related, building maintenance, and other disturbances associated with human occupancy following construction of permanent developments (see Table 4–1). These disturbances could cause yellow-breasted chat to reduce their foraging use of habitat adjacent to permanent development areas. Noise and visual disturbances are likely to preclude yellow-breasted chat from nesting in patches of vegetation adjacent to permanent developments that otherwise would be suitable for nesting. If yellow-breasted chat were to nest adjacent to new permanent developments, indirect effects could include nest abandonment and changes in incubation, brooding, and foraging behavior of adult birds that could reduce nesting success. Increasing human and pet presence could also increase the frequency of flight responses that could increase energy demand and expose incubating eggs to nest predation or cooling. If yellow-breasted chat were to establish nests in UPAs near proposed project footprints before all of the permanent development projects have been implemented, noise, visual, and other disturbances associated with occupancy of permanent development projects near new nests could result in nest abandonment or reduced nesting success. The potential for this effect, however, is considered low because the incidence of nesting in the Plan Area is low and nesting habitat near many proposed project footprints are in areas that already support development unlikely to be used by nesting yellow-breasted chat.

Based on an average 500-foot distance from permanent new developments within which permanent indirect effects will occur (see Table 4–5), up to 1,252 acres of modeled yellow-breasted chat nesting and foraging habitat and 6 acres of modeled yellow-breasted chat nesting and foraging habitat known use area Plan Area wide[55] will be permanently and indirectly affected by permanent development covered activities, 1,059 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). These permanent indirect effects will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

[55] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

Permanent indirect effects associated with alteration in local hydrology may alter the vegetation composition and structure of foraging habitat but will not affect the acreage of available nesting and foraging habitat. Based on an average 250-foot distance from permanent new developments within which these permanent indirect effects on hydrologic features are expected to occur (see Section 4.2.4.3), up to 751 acres of riparian habitat Plan Area-wide[56] that may support nesting habitat will be indirectly affected if permanent development projects alter the supporting hydrology, 628 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). The potential for adverse effects of any such nesting habitat losses on yellow-breasted chat is expected to be low, because yellow-breasted chat only use a very small portion of available modeled habitat to nest in and most riparian habitat that may be affected is already located near development and is, therefore, already less desirable as nesting habitat than other less disturbed areas.

4.4.2.2.2 Outside Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects will result in permanent direct effects on up to 3 acres of modeled yellow-breasted chat nesting and foraging habitat and 0 acres of modeled yellow-breasted chat nesting and foraging known use area habitat outside the UPAs in the Sierra Foothills CAZ (see Table 4–9). The effects of such loss of modeled habitat on yellow-breasted chat are the same as described for the permanent direct effects of implementing permanent development projects in the UPAs (see Section 4.4.2.2.1).

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise, visual, and other disturbances (e.g., ground vibrations) associated with operating equipment and other activities necessary to construct new developments (see Table 4–-1). The effects of these impact mechanisms on yellow-breasted chat are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.2.2.1). The potential for temporary direct effects on yellow-breasted chat will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 500-foot distance from permanent new developments within which temporary direct effects will occur (see Table 4–5), up to 1,252 acres of modeled yellow-breasted chat nesting and foraging habitat and 6 acres of modeled nesting and foraging habitat known use area Plan Area-wide[57] will be temporarily and directly affected by permanent development covered activities, 1,059 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

[56] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.
[57] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

The potential for adverse effects on individual yellow-breasted chats of construction-related noise and visual disturbances is considered to be low because of the following factors.

1. Approximately 3 percent of the available modeled foraging habitat would be affected if all permanent development activities outside were implemented simultaneously, but permanent development projects would not be implemented simultaneously and, thus, a much smaller area of habitat would be affected by construction-related disturbances at any point in time.
2. The majority of covered activities implemented outside of the UPAs are linear transportation infrastructure projects (i.e., bridge replacements). As such, the period over which a given area of habitat adjacent to project footprints will be subjected to temporary direct construction-related disturbances will be limited as the area under construction moves along the project ROW.
3. Affected modeled habitat areas are within or near larger patches of modeled habitat that would not be disturbed and would be available for use by displaced individuals.
4. The area of affected habitat is extremely small and unlikely to be occupied by yellow-breasted chat.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include:

- Ongoing visual (e.g., operation of vehicles, lighting, human activity) and noise (e.g., operation of vehicles and other equipment), disturbances associated with human activity following construction of permanent developments (see Table 4–1). The level of these effects are expected to be less than that associated with permanent development projects within UPAs because they do not include residential developments that are expected to support higher levels of human activity than nonresidential developments;
- Permanent indirect effects of new roads include ongoing noise and visual disturbances associated with vehicle traffic that could affect use of adjacent habitat areas; and
- Increased risk for mortality or injury of individual yellow-breasted chats associated with collisions with vehicles.

Noise and visual disturbances are likely to preclude yellow-breasted chats from nesting in patches of vegetation adjacent to new roads and bridges that otherwise would be suitable for nesting. Although unlikely, if yellow-breasted chat were to nest adjacent to these new facilities, the effects on yellow-breasted chat are the same as described for the permanent indirect effects of implementing permanent development projects in the UPAs (see Section 4.4.2.2.1). If yellow-breasted chats were to establish nests outside of UPAs near proposed project footprints before full completion of new roads and bridges, noise, visual, and other disturbances associated with use of these development projects could result in nest abandonment or reduced nesting success. The potential for this effect, however, is considered low because the incidence of nesting in the

Plan Area is low and the affected area is small (100 acres of the modeled yellow-breasted chat habitat is located outside the UPAs).

Based on an average 500-foot distance from new roads and bridges within which permanent indirect effects will occur (see Table 4–5), up to 1,252 acres of modeled yellow-breasted chat nesting and foraging habitat and 6 acres of modeled yellow-breasted chat nesting and foraging known use area habitat Plan Area wide[58] will be permanently and indirectly affected, 1,059 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). Adverse effects of these disturbances, however, will be low for the reasons described above for temporary direct effects of construction-related noise and visual disturbances.

Permanent indirect effects associated with alteration in local hydrology may alter the vegetation composition and structure of habitat but will not affect the acreage of available foraging habitat. Based on an average 250-foot distance from permanent new developments within which these permanent indirect effects are expected to occur (see Section 4.2.4.3), up to 751 acres of riparian habitat that may support nesting habitat will be indirectly affected if permanent development projects alter the supporting hydrology, 628 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

4.4.2.3 Recurring Maintenance Activities

4.4.2.3.1 Within Urban Permit Areas

Permanent Direct Effects

With the exception of the potential impact mechanisms and associated effects on yellow-breasted chat described in Section 4.4.2.1, *Effects Common among Covered Activities*, there are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on yellow-breasted chat (see Table 4–1).

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (e.g., ground vibrations; see Table 4–1). The effects of these impact mechanisms on yellow-breasted chat are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.2.2.1, *Within Urban Permit Areas*), except that the duration of maintenance-related activities

[58] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

is generally expected to be less than that of construction-related activities. The potential for temporary direct effects on occupied yellow-breasted chat habitat will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

The potential for adverse effects of temporary recurring maintenance-related disturbances on yellow-breasted chat foraging behavior is considered low within the UPAs because many of these activities will be implemented in developed areas that are already subject to high levels of disturbance (e.g., traffic), the relatively few observations of the species in the Plan Area likely means it is not abundant, and the majority of modeled habitat in the Plan Area is unoccupied (see Appendix A) meaning there is a high probability that alternate foraging habitat areas will be available near affected areas during a generally short period of disturbance for most activities (e.g., a few hours to a few days).

Permanent Indirect Effects

As described in Table 4–2, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on yellow-breasted chat.

4.4.2.3.2 Outside Urban Permit Areas

Permanent Direct Effects

As described in Section 4.2.2, maintenance removal of riparian vegetation that potentially support yellow-breasted chat habitat may have some adverse effects on yellow-breasted chat for the reasons described for permanent direct effects of recurring maintenance activities inside UPAs (see Section 4.4.2.3.1, *Within Urban Permit Areas*). In addition, the area of modeled nesting and foraging yellow-breasted chat habitat permanent directly affected by covered activities outside of UPAs is very small (orders of magnitude less than what is affected within UPAs) and therefore it is even less likely that maintenance will adversely affect yellow-breasted chat.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (e.g., ground vibrations). The effects of these impact mechanisms on yellow-breasted chat are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.2.2.1) except that the duration of maintenance-related activities is generally expected to be less than that of construction-related activities.

The potential for adverse effects of temporary maintenance-related disturbances on yellow-breasted chat behavior is considered low for the same reasons as the reasons described for temporary direct effects of recurring maintenance activities inside UPAs and the area of modeled habitat that will be temporarily directly affected by maintenance outside of UPAs is small.

Permanent Indirect Effects

As described in Table 4–2, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on yellow-breasted chat.

4.4.2.4 Effects of Covered Activities within Conservation Lands

4.4.2.4.1 Permanent Direct Effects

Implementation of the conservation measures are not expected to result in permanent indirect effects on yellow-breasted chat. Operation of equipment to enhance and manage protected woody riparian vegetation supporting yellow-breasted chat habitat could result in injury or mortality of individuals (e.g., destruction of nests with eggs or nestlings). The potential for this impact, however, will be avoided with implementation of the applicable AMMs indicated in Table 4–7.

4.4.2.4.2 Temporary Direct Effects

Temporary direct effects are associated with the operation of equipment and other activities related to implementing habitat restoration, enhancement, and management actions in or adjacent to BRCP conservation lands that cause temporary noise, visual, and other disturbances to yellow-breasted chat (see Table 4–2). The effects of these impact mechanisms on yellow-breasted chat are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.2.2.1). The potential for temporary direct effects on occupied yellow-breasted chat habitat will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.2.4.3 Permanent Indirect Effects

Implementation of conservation measures will not result in permanent indirect effects on yellow-breasted chat, because restored and protected habitats will not be associated with increasing human or pet presence, noise, traffic risks, or other impact mechanisms that could result in indirect effects (Table 4–2). Restored habitat types, although they may not support yellow-breasted chat, are highly unlikely to impose additional risk factors or stressors on yellow-breasted chat.

4.4.2.5 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of yellow-breasted chat within the Plan Area.

4.4.2.5.1 Permanent Direct Effects

Loss of up to 278 acres of modeled yellow-breasted chat nesting and foraging habitat and 0 acres of modeled yellow-breasted chat nesting and foraging known use area habitat (Table 4–8). The acreage of take (i.e., harm) will be the amount of actual habitat that is located within the area of affected modeled habitat.

A small, but indeterminable, amount of direct take of individual juvenile and adult yellow-breasted chat could be associated with operation of equipment to construct permanent development projects and conduct recurring maintenance activities. Permanent direct effects on yellow-breasted chat eggs, nestlings, juveniles, and adults in nesting colonies will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.2.5.2 Temporary Direct Effects

A temporary reduction in the functions of up to 1,252 acres of modeled yellow-breasted chat habitat Plan Area wide would result from harassment associated with covered activities, 1,059 acres of which overlap with areas subject to ongoing effects of existing permanent developments. Management-related activities on 3,164 acres of conservation lands supporting modeled yellow-breasted chat habitat (Table 5-10) will result in temporary direct effects on a relatively small acreage of additional habitat that cannot be estimated. Temporary direct effects on occupied yellow-breasted chat habitat will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.2.5.3 Permanent Indirect Effects

A permanent reduction in the functions of up to 1,252 acres of modeled yellow-breasted chat nesting and foraging habitat (occupancy unknown) and 6 acres of modeled yellow-breasted chat nesting and foraging known use area habitat would result from harassment associated with covered activities, 1,059 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). Permanent indirect effects on occupied yellow-breasted chat habitat will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.2.6 Overall Impact Likely to Result from Take

The primary threat to yellow-breasted chat has been the historical loss and degradation of its riparian habitat and associated stressors (e.g., lack of habitat patches large enough to support breeding activity, increased nest parasitism and depredation; see Appendix A) (Remsen 1978, Rosenberg et al. 1991). Population status and trends are largely unknown in California, with attempts to make population estimates suffering from low abundance, low sample size, and

imprecision (Ricketts and Kus 2000). In general, western populations are considered to be stable (though greatly reduced relative to historical abundance), but some local declines have occurred recently in California (Dunn and Garrett 1997). There is little historical or current information regarding the distribution of yellow-breasted chats in Butte County. While no occurrences are reported in the California Natural Diversity Database (CNDDB), several detections have been made in the foothill canyons of the Plan Area, including Big Chico Creek, Little Chico Creek, and Butte Creek.

The covered activities will result in the loss of up to 278 acres of modeled yellow-breasted chat nesting and foraging habitat (occupancy unknown) and 0 acres of modeled yellow-breasted chat nesting and foraging habitat known use area (Table 4–8), representing approximately 4 percent and 0 percent of the extent of modeled habitat present in the Plan Area, respectively. Given that there are relatively few observations of yellow-breasted chat in the Plan Area, a relatively small amount of modeled habitat will be removed by covered activities, yellow-breasted chat will not be adversely affected by the amount of existing modeled habitat being permanently affected by the covered activities.

Consequently, given the avoidance of occupied habitat and restoration of a much greater area of suitable riparian habitat than will be removed by covered activities, it is unlikely the Plan Area population will be adversely affected by the acreage of riparian removed by covered activities. Furthermore, implementation of applicable AMMs indicated in Table 4–7 will minimize the removal of occupied habitat by covered activities and minimize the potential for harassment of nests and individuals.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on yellow-breasted chat or adversely affect its Plan Area distribution or abundance.

4.4.3 Bank Swallow

There are no permanent direct effects on modeled bank swallow nesting habitat (Table 4–8). Modeled nesting habitat is defined as vertical banks or bluffs of friable soils (e.g., sandy loam soils) suitable for burrowing typically along unleveed and unchannelized portions of the Sacramento River, Feather River, Big Chico Creek; and Butte Creek. In addition, banks of the waterways listed above were included in the model where levees are set back at least 50 feet from the channel banks (see Appendix A.3, *Bank Swallow* for additional information). The maximum mileage of modeled bank swallow nesting habitat that will be temporarily and indirectly affected with implementation of the covered activities is 40 linear miles of stream bank nesting habitat, representing approximately 24 percent of modeled habitat in the Plan Area (see Table 4–8, Appendix K and Figure 4–23, *Bank Swallow: Direct Impacts of Covered Activities* [separate file]).

4.4.3.1 Effects Common among Covered Activities

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction of new developments, restoration of habitat, and maintenance of existing facilities) could result in injury or mortality, or harm and harassment (such as displacement) of bank swallow. For example, individual bank swallows could collide with moving construction-related equipment and adults could abandon care of eggs and nestlings as a result of excessive construction-related noise and visual disturbances near nest sites. The risk for collision of adult birds with construction-related equipment, however, is considered low because equipment is expected to be operated at speeds that will be avoided by adult birds, which are highly mobile. Implementation of the applicable AMMs indicated in Table 4–7 will also avoid or minimize direct disturbance to active breeding colonies and mortality or injury of individuals at nest sites.

The probability that the accidental introduction of contaminants associated with construction and maintenance activities (e.g., fuel spills) will adversely affect individual bank swallows is considered low because birds are expected to avoid work sites with ongoing noise and visual construction-related disturbances. In addition, implementation of the applicable AMMs indicated in Table 4–7 provides for containment and rapid cleanup of releases that may occur, thus reducing exposure risk and the period that individuals could be exposed to contaminants.

4.4.3.2 Permanent Development Projects

Direct effects of permanent development projects will not result in the permanent removal of modeled bank swallow nesting habitat. Indirect effects of permanent development projects will result in reduced functions of up to 40 linear miles of modeled bank swallow nesting habitat, 36 miles of which overlap with areas subject to ongoing effects of existing permanent developments as habitat for the bank swallow (Appendix K).

Following implementation of the covered activities, all modeled nesting habitat will remain in the Plan Area (see Figure O–8, *Bank Swallow Habitat in the Plan Area with full BRCP Implementation* in Appendix O and Table 4–8).

4.4.3.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects within the UPAs will not result in permanent direct effects on modeled bank swallow nesting habitat (Table 4–9).

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise, visual, and other disturbances (e.g., ground vibrations) associated with operating equipment and other activities necessary to construct new developments (see Table 4–1). These impact mechanisms could cause bank swallow to reduce their foraging use of affected

habitat areas during the period these activities are implemented, but this is considered unlikely because bank swallow forage high in the air or over water at distances where noise is less likely to affect them and swallow species readily forage in areas of high visual and noise disturbance (e.g., around bridges, above traffic, etc.). Bank swallows have been found to return to colonies affected by disturbance at similar rates as other swallows returning to colonies unaffected by disturbance (Mayhew 1963). If disturbance occurs near nesting colonies, increased numbers of flight responses from nests due to disturbance may elevate energetic costs to bank swallow. The potential for temporary direct effects on bank swallow will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 500-foot distance from permanent new developments within which temporary indirect effects will occur (see Table 4–5), up to 40 linear miles of modeled bank swallow nesting habitat will be temporarily and directly affected by permanent development covered activities, 36 linear miles of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). The potential for adverse effects of temporary construction-related disturbances on bank swallow behavior, however, is considered low for the reasons mentioned above and because current known bank swallow nesting colonies are not located near permanent development within UPAs (see Appendix A).

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other equipment), pet-related, building maintenance, and other disturbances associated with human occupancy following construction of permanent developments (see Table 4–1). These disturbances could cause bank swallow to reduce their foraging use of habitat adjacent to permanent development areas. Although unlikely, if bank swallow were to nest adjacent to new permanent developments, indirect effects could include nest abandonment and changes in incubation, brooding, and foraging behavior of adult birds that could reduce nesting success. Increasing human and pet presence could also increase the frequency of flight responses that could increase energy demand and expose incubating eggs to adverse environmental conditions. If bank swallow were to establish colonies in UPAs near proposed project footprints before all of the permanent development projects have been implemented, noise, visual, and other disturbances associated with occupancy of permanent development projects near new nesting colonies could result in nest abandonment or reduced nesting success. The potential for this effect, however, is considered low because a large amount of unoccupied potential nesting habitat is available outside of UPAs that would not be subject to nearly as much disturbance as areas near permanent development within UPAs and nesting habitat near many proposed project footprints within UPAs are in areas already adjacent development that would be unlikely to be used by nesting bank swallow.

Based on an average 500-foot distance from permanent new developments within which permanent indirect effects will occur (see Table 4–5), up to 40 miles of modeled bank swallow nesting habitat will be permanently and indirectly affected by permanent development covered

activities, 36 linear miles of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). These permanent indirect effects will be minimized with implementation of applicable AMMs indicated in Table 4–7.

4.4.3.2.2 Outside Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects will not result in permanent direct effects on modeled bank swallow nesting habitat outside the UPAs.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise, visual, and other disturbances (e.g., ground vibrations) associated with operating equipment and other activities necessary to construct new developments (see -1). The effects of these impact mechanisms on bank swallow are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.3.2.1, *Within Urban Permit Areas*). The potential for temporary direct effects on bank swallow will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 500-foot distance from permanent new developments within which temporary indirect effects will occur (see Table 4–5), up to 40 miles of modeled bank swallow nesting habitat Plan Area-wide[59] will be temporarily and directly affected by permanent development covered activities, 36 linear miles of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

The potential for adverse effects on individual bank swallow from construction-related noise and visual disturbances is considered to be low because of the following factors.

1. Less than 1 percent of the available modeled nesting habitat would be affected if all permanent development activities outside UPAs were implemented simultaneously, but permanent development projects would not be implemented simultaneously and thus a much smaller area of habitat would be affected by construction-related disturbances at any point in time.
2. The majority of covered activities implemented outside of the UPAs are linear transportation infrastructure projects (e.g., bridge replacements, intersection improvements). As such, the period over which a given area of habitat adjacent to

[59] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

project footprints will be subjected to temporary direct construction-related disturbances will be limited as the area under construction moves along the project ROW.

3. The area of affected habitat is extremely small.
4. As mentioned earlier, swallows readily forage in areas of high visual and noise disturbance and swallows typically forage high in the air and over water and can easily reach far enough distances to avoid noise caused by construction.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include:

- Ongoing visual (e.g., operation of vehicles, lighting, human activity) and noise (e.g., operation of vehicles and other equipment), disturbances associated with human activity following construction of permanent developments (see Table 4–1). The level of these effects are expected to be less than that associated with permanent development projects within UPAs because they do not include residential developments, which are expected to support higher levels of human activity than nonresidential developments.
- Ongoing noise and visual disturbances associated with vehicle traffic that could affect use of habitat areas adjacent to newly constructed roads and bridges; and
- Increased risk for mortality or injury of individual bank swallows associated with vehicle strikes associated with traffic using newly constructed roads.

Noise and visual disturbances are likely to preclude bank swallows from forming nesting colonies in banks immediately adjacent to new roads and bridges that otherwise would be suitable for nesting. Although unlikely, if bank swallow were to nest adjacent to these new facilities, the effects on bank swallow are the same as described for the permanent indirect effects of implementing permanent development projects in the UPAs (see Section 4.4.3.2.1). If bank swallows were to establish colonies outside of UPAs near proposed project footprints before full completion of new roads and bridges, noise, visual, and other disturbances associated with use of these development projects could result in nest abandonment or reduced nesting success. The potential for this effect, however, is considered low because a large amount of unoccupied potential nesting habitat is available outside of UPAs that would not be subject to disturbance and the affected area is small (less than 1 percent of the modeled bank swallow habitat located outside the UPAs).

Based on an average 500-foot distance from new roads and bridges within which permanent indirect effects will occur (see Table 4–5), up to 40 miles of modeled bank swallow nesting habitat will be permanently and indirectly affected, 36 linear miles of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). Adverse effects

of these disturbances, however, will be low for the reasons described above for temporary direct effects of construction-related noise and visual disturbances.

4.4.3.3 Recurring Maintenance Activities

4.4.3.3.1 Within Urban Permit Areas

Permanent Direct Effects

With the exception of the potential impact mechanisms and associated effects on bank swallow described in Section 4.4.3.1, *Effects Common among Covered Activities*, there are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on bank swallow (see Table 4–1). Maintenance activities will not affect any bank habitat that may support modeled bank swallow nesting habitat.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (e.g., ground vibrations; see Table 4–1). The effects of these impact mechanisms on bank swallow are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.3.2.1) except that the duration of maintenance-related activities is generally expected to be less than that of construction-related activities. The potential for temporary direct effects on occupied bank swallow nesting habitat, in the unlikely even they occur (due to the likely absence of bank swallow), will be minimized with implementation of the applicable AMMs indicated in Table 4–7).

The potential for adverse effects of temporary recurring maintenance-related disturbances on bank swallow foraging behavior is considered low within UPAs because many of these activities will be implemented in developed areas that are already subject to high levels of disturbance (e.g., traffic), only a small area will be indirectly affected by maintenance, a large area of suitable habitat that will not be affected by maintenance is available and there is a high probability that alternate foraging habitat areas will be available near affected areas during a generally short period of disturbance for most activities (e.g., a few hours to a few days), swallows readily forage in areas of high noise and visual disturbance, and adult swallows are extremely mobile and can easily move to a distance that is unaffected by maintenance.

Permanent Indirect Effects

As described in Table 4–2, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on bank swallow.

4.4.3.3.2 Outside Urban Permit Areas

Permanent Direct Effects

As described in Section 4.2.2, there are no impact mechanisms associated with implementation of recurring maintenance activities that are expected to affect any bank habitat that may support modeled bank swallow nesting habitat.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (e.g., ground vibrations). The effects of these impact mechanisms on bank swallow are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.3.2.1) except that the duration of maintenance-related activities is generally expected to be less than that of construction-related activities.

The potential for adverse effects of temporary maintenance-related disturbances on bank swallow behavior is considered low for the same reasons as the reasons described for temporary direct effects of recurring maintenance activities inside UPAs.

Permanent Indirect Effects

As described in Table 4–2, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on bank swallow.

4.4.3.4 Effects of Covered Activities within Conservation Lands

4.4.3.4.1 Permanent Direct Effects

Implementation of conservation measures to restore riparian habitat will not permanently directly affect modeled bank swallow nesting habitat.

4.4.3.4.2 Temporary Direct Effects

Temporary direct effects are associated with the operation of equipment and other activities related to implementing habitat restoration, enhancement, and management actions in or adjacent to BRCP conservation lands that cause temporary noise, visual, and other disturbances to bank swallow. The effects of these impact mechanisms on bank swallow are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.3.2.1). The potential for temporary direct effects on occupied bank swallow habitat will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.3.4.3 Permanent Indirect Effects

Implementation of conservation measures will not result in permanent indirect effects on bank swallow because restored and protected habitats will not be associated with increasing human or pet presence, noise, traffic risks, or other impact mechanisms that could result in indirect effects (see Table 4–2). Restored habitat types, although they may not support bank swallow, are highly unlikely to impose additional risk factors or stressors on bank swallow.

4.4.3.5 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of bank swallow within the Plan Area.

4.4.3.5.1 Permanent Direct Effects

No loss of modeled bank swallow nesting habitat will occur under the BRCP.

A small, but indeterminable, amount of direct take of individual juvenile and adult bank swallow could be associated with collisions with operation of equipment used to construct permanent development projects and conduct recurring maintenance activities. Permanent direct effects on bank swallow eggs, nestlings, juveniles, and adults in nesting colonies will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.3.5.2 Temporary Direct Effects

A temporary reduction in the functions of up to 40 miles of modeled bank swallow nesting habitat would result from harassment associated with covered activities, 36 linear miles of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Management-related activities on 20 miles of banks adjoining conservation lands supporting modeled bank swallow habitat (Table 5-10) will result in temporary direct effects on a relatively small acreage of additional habitat that cannot be estimated. The area of take (i.e., harassment) will be the amount of actual habitat that is located within the area of affected modeled habitat. Temporary direct effects on occupied bank swallow habitat will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.3.5.3 Permanent Indirect Effects

A permanent reduction in the functions of up to 40 miles of modeled bank swallow nesting habitat would result from harassment associated with covered activities, 36 linear miles of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). The acreage of take (i.e., harassment) will be the amount of actual habitat that is located within the area of affected modeled habitat. Permanent indirect effects on occupied bank swallow habitat will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

A small, but indeterminable, amount of direct take of individual juvenile and adult bank swallow could be associated with collisions with vehicles and other human uses (e.g., illegal harvest) adjacent to permanent development projects and with vehicles operation on new roadways.

4.4.3.6 Overall Impact Likely to Result from Take

The primary threat to bank swallow has been the historical loss and degradation of its nonleveed bank habitat (see Appendix A). The most significant current threat along the Sacramento and Feather rivers is loss of suitable colony sites due to continuing bank protection and flood control projects (Garrison et al. 1987). Currently bank swallow is a locally common to uncommon breeding season resident in portions of northern and central California (Garrison 1999). Humphrey and Garrison (1987) report 17 colonies along the Sacramento River within or immediately adjacent to the Plan Area (nine on the eastern bank and eight on the western bank), which support approximately 5,019 breeding pairs. Hight (pers. comm.) reports an estimated 27 percent decline in the number of burrows along this stretch between 1986 and 1999 while an initial decline and gradual increase in number of colonies has allowed total colony number to remain about the same. This indicates that the number of burrows per colony along this stretch of the Sacramento River decreased in this period. Laymon et al. (1988) also report 23 colonies along the Feather River between the confluence with the Sacramento River and Oroville. Several of these colonies occur within the Plan Area and are considered extant. Despite an apparent continuing decline in local populations, the Butte County stretch of the Sacramento and Feather Rivers remain a key area for the bank swallow nesting population in California.

The covered activities will not result in the loss of modeled bank swallow nesting habitat (Table 4–8). Given the low likelihood of harassment and take of bank swallow by covered activities, bank swallow will not be adversely affected by the covered activities. Furthermore, implementation of the applicable AMMs indicated in Table 4–7 will avoid and minimize the indirect effects to occupied habitat by covered activities and minimize the potential for harassment of nests and individuals.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on bank swallow or adversely affect its Plan Area distribution or abundance.

4.4.4 Western Burrowing Owl

The maximum acreage of modeled western burrowing owl nesting and foraging habitat that will be permanently affected, directly and indirectly, with implementation of the covered activities is 26,433 acres representing approximately 16 percent of the current extent of modeled western burrowing owl nesting and foraging habitat in the Plan Area (see Table 4–8, Appendix K, and Figure 4–24, *Western Burrowing Owl: Direct Impacts of Covered Activities* [separate files]). The current guidance on impact assessments, avoidance and mitigation of covered activities for

western burrowing owl (DFG 2012) was considered and pertinent recommendations are reflected herein and in the Avoidance and Minimization measures (see Chapter 6, *Conditions on Covered Activities*).

4.4.4.1 Effects Common among Covered Activities

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction of new developments, restoration of habitat, and maintenance of existing facilities) could result in injury or mortality of western burrowing owl. Mortality or injury of adults, eggs and nestlings in breeding burrows may occur from construction activities or operation and maintenance activities that fill or collapse burrows or nests while occupied by owls. At sites where construction and other traffic occur close to active burrows or nests, vehicle strikes may cause accidental mortality of adults and primarily juveniles. In addition, individual western burrowing owls could collide with construction-related fencing or adults could abandon care of eggs and nestlings as a result of excessive construction-related noise and visual disturbances near nest sites in remote locations where habituation of adults to human presence has not occurred. The risk for collision of adult birds with construction-related equipment or fences, however, is considered low because construction equipment is expected to be operated at speeds that will be avoided by adult birds, which are highly mobile. Implementation of the applicable AMMs indicated in Table 4–7 will also avoid direct disturbance to active breeding sites and mortality or injury of individuals at occupied breeding sites.

The probability that the accidental introduction of contaminants associated with construction and maintenance activities (e.g., fuel spills) will adversely affect individual western burrowing owls is considered low because birds are expected to avoid work sites with ongoing noise and visual construction-related disturbances. Long-term effects of bioaccumulation of toxicants spilled during construction is unlikely due to the restricted size of such spills and their location outside the foraging habitat of western burrowing owls. In addition, implementation of the applicable AMMs indicated in Table 4–7 provides for containment and rapid cleanup of releases that may occur, thus reducing exposure risk and the period that individuals could be exposed to contaminants.

4.4.4.2 Permanent Development Projects

Direct effects of permanent development projects will result in the permanent removal of up to 14,496 acres modeled nesting and foraging habitat, representing approximately 9 percent of the existing acreage of modeled nesting and foraging habitat in the Plan Area (Table 4–8, Figure 4–24). Indirect effects of permanent development projects will result in reduced functions of up to 11,947 acres of modeled nesting and foraging habitat for the western burrowing owl, 7,627 acres of which overlap with areas subject to ongoing effects of existing permanent developments (Appendix K). Figure O–9, *Western Burrowing Owl Habitat in the Plan Area with full BRCP Implementation* in Appendix O and Table 4–8 provide the acreage of western burrowing owl

habitat remaining within the Plan Area (including BRCP protected lands and lands that are not impacted by the covered activities) with full implementation of the covered activities.

Implementation of the permanent development projects could isolate or fragment owl use of modeled nesting and foraging habitat within the Plan Area. Death or injury could occur from implementation of many covered activities if active burrows or nests are not avoided. However, the potential for this is avoided through the implementation of the AMMs. Filling burrows used by owls when the owls are foraging off site could cause the owl to abandon the site and subsequently die off site if the owls are not able to find new shelter or are otherwise put in harm's way (e.g., excessive exposure leading to predation by other species). Vehicle strikes are also possible, particularly when traffic occurs close to active burrows or nests. Covered activities could also reduce the number of occurrences by permanently removing modeled nesting habitat. However, implementation of the applicable AMMs (Table 4–7) will minimize these affects. In addition, implementation of the conservation strategy is expected to benefit western burrowing owls.

4.4.4.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects within the Chico, State Route 99, Foothill Area, Neal Road Drop-Off and Recycling Facility, Honcut, Oroville, Bangor, Nelson, and Richvale UPAs will result in permanent direct effects on up to 13,657 acres of modeled western burrowing owl breeding and foraging habitat (see Table 4–9). Loss of this habitat area will reduce the area of any actual western burrowing owl habitat that is located within affected modeled habitat and thus will reduce the area of habitat available to western burrowing owl. Covered activities will not remove existing known active nesting sites, because removals during the nesting season will be avoided with of implementation of the applicable AMMs indicated in Table 4–7.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise, visual, and other disturbances (e.g., ground vibrations, dust emissions) associated with operating equipment and other activities necessary to construct new developments (see Table 4–1). These impact mechanisms could cause western burrowing owl to reduce their foraging use of affected habitat areas during the period these activities are implemented. Temporary displacement from foraging habitat and increased numbers of flight responses to disturbance may elevate energetic costs to western burrowing owl. The potential for temporary direct effects on nesting western burrowing owl will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 500-foot distance from permanent new developments within which temporary indirect effects will occur (see Table 4–5), up to 11,947 acres of modeled western burrowing owl nesting and foraging habitat Plan Area-wide[60] will be temporarily and directly affected by permanent development covered activities, 7,627 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). The potential for adverse effects of temporary construction-related disturbances on western burrowing owl foraging behavior, however, is considered low because foraging habitat is not a factor limiting the species in the Plan Area (see Appendix A) and, given the distribution of modeled foraging habitat (Figure 4–24), there is a high probability that alternate foraging habitat areas will be available near affected areas.

Permanent Indirect Effects

Covered activities may cause increasing traffic volumes and vehicle speeds, especially where roads are widened, straightened or otherwise enhanced. Collisions with automobiles constitute a significant source of mortality for western burrowing owls as they forage in rights-of way. Mortality associated with owl-vehicle collisions is the most likely permanent indirect effect of covered activities on western burrowing owls. Their vulnerability is exacerbated by the species' attraction to roadside environments, including its propensity perch on fence lines. In fragmented environments, higher post-fledgling mortality from vehicle collisions has been observed relative to an unfragmented habitat (Clayton and Schmutz 1997, Todd and James 2001). Western burrowing owls populations are sensitive to increased levels of adult mortality due to accidents and predation (see Appendix A) and increasing mortality levels can cause a population decline. Fragmentation may also result in the introduction of novel predators and changes in the distribution and abundance of the prey base.

Other permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other equipment), pet-related, building maintenance, and other disturbances associated with human occupancy following construction of permanent developments (see Table 4–1). These disturbances could cause western burrowing owl to reduce their foraging use of habitat adjacent to permanent development areas or could affect burrowing owl prey (e.g., rodents, insects). Noise and visual disturbances from humans, pets and vehicles are likely to preclude western burrowing owl from nesting in patches of vegetation adjacent to permanent developments that otherwise would be suitable for nesting. Increasing human and pet presence could also increase the frequency of flight responses that could increase energy demand.

Based on an average 500-foot distance from permanent new developments within which permanent indirect effects will occur (see Table 4–5), up to 11,947 acres of modeled western burrowing owl nesting and foraging habitat Plan Area-wide[61] will be permanently and indirectly

[60] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.
[61] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

affected by permanent development covered activities, 7,627 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). These permanent indirect effects will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.4.2.2 Outside Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects will result in permanent direct effects on up to 839 acres of modeled western burrowing owl nesting and foraging habitat outside the UPAs distributed among all of the CAZs (see Table 4–9). The effects of such loss of modeled habitat on western burrowing owl are the same as described for the permanent direct effects of implementing permanent development projects in the UPAs (see Section 4.4.4.2.1, *Within Urban Permit Areas*). Covered activities will not remove existing known nesting colonies because none are located in the footprint of permanent development projects located outside of the UPAs. The potential for permanent direct effects on active nesting colony sites that may be established in the future will be avoided with implementation of the applicable AMMs indicated in Table 4–7.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise, visual, and other disturbances (e.g., ground vibrations) associated with operating equipment and other activities necessary to construct new developments (see Table 4–1). The effects of these impact mechanisms on western burrowing owl are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.4.2.1). The potential for temporary direct effects on western burrowing owl nesting colonies will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 500-foot distance from permanent new developments within which temporary indirect effects will occur (see Table 4–5), up to 11,947 acres of modeled western burrowing owl nesting and foraging habitat Plan Area-wide [62] will be temporarily and directly affected by permanent development covered activities, 7,627 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

The potential for adverse effects on individual western burrowing owls of construction-related noise and visual disturbances is considered to be low because of the following factors.

[62] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

1. Less than 1 percent of the available modeled foraging habitat would be affected if all permanent development activities outside UPAs were implemented simultaneously, but permanent development projects would not be implemented simultaneously and thus a much smaller area of habitat would be affected by construction-related disturbances at any point in time.
2. The majority of covered activities implemented outside of the UPAs are linear infrastructure projects. As such, the period over which a given area of habitat adjacent to project footprints will be subjected to temporary direct construction-related disturbances will be limited as the area under construction moves along the project ROW.
3. Affected modeled habitat areas are within or near larger patches of modeled habitat that would not be disturbed and would be available for use by displaced individuals.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include:

- Increased risk for mortality or injury of individual western burrowing owls associated with vehicle strikes associated with traffic using newly constructed roads (see above).
- Ongoing visual (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other equipment), pet-related, building maintenance, and other disturbances associated with human occupancy following construction of permanent developments (see Table 4–1). The level of these effects are expected to be less than that associated with permanent development projects within UPAs because they do not include residential developments, which are expected to support higher levels of human activity than nonresidential developments. Ongoing noise and visual disturbances associated with vehicle traffic that could affect use of habitat areas adjacent to newly constructed roads.

Noise and visual disturbances are likely to preclude western burrowing owl from nesting in patches of vegetation adjacent to new agricultural services facilities and new roads that otherwise would be suitable for nesting. Although unlikely, if western burrowing owl were to nest adjacent to these new facilities and roads, the effects on western burrowing owl are the same as described for the permanent indirect effects of implementing permanent development projects in the UPAs (see Section 4.4.4.2.1). Indirect permanent effects of permanent development projects outside of UPAs may cause abandonment of known active nesting sites that are located near the proposed footprints of new agricultural services facilities and new roads. If western burrowing owls were to establish nesting colonies outside UPAs near proposed project footprints before full build out of agricultural services facility and new roads, noise, visual and other disturbances associated with use of these development projects could result in site abandonment or reduced nesting success. The potential for this effect, however, is considered low because the incidence of nesting in the Plan Area is low and the affected area is small (less than 1 percent of the modeled western burrowing owl habitat located outside the UPAs).

Based on an average 500-foot distance from permanent new agricultural services facilities and new roads within which permanent indirect effects will occur (see Table 4–5), up to 11,947 acres of modeled western burrowing owl nesting and foraging habitat will be permanently and indirectly affected, 7,627 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). Adverse effects of these disturbances, however, will be low for the reasons described above for temporary direct effects of construction-related noise and visual disturbances. Permanent indirect effects of new agricultural services facilities will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.4.3 Recurring Maintenance Activities

4.4.4.3.1 Within Urban Permit Areas

Permanent Direct Effects

There are few impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on modeled western burrowing owl habitat (see Table 4–1). Road and ditch maintenance, modification of water conveyance structures and discing to control weeds in fallow fields may destroy burrows (Rosenberg and Haley 2004, Catlin and Rosenberg 2006), which may trap or crush owls or remove nesting habitat. Activities associated with maintaining flood control and other infrastructure will result in the permanent removal of small patches of open grassland or agricultural habitat that could support burrowing owl foraging habitat. These removed patches are included in the extent of habitat permanently removed by permanent development activities described for construction impacts. Mowing of roadsides and right of ways along newly constructed agricultural facilities and roads could potentially increase the risk of mortality related to vehicle collisions by attracting western burrowing owls to sites with high traffic speed or volumes.

Effects of the operation of maintenance equipment on burrowing owl for maintenance actions are the same as described for construction-related effects. Noise and visual disturbances associated with maintaining permanent developments will not affect burrowing owl behaviors because the locations in which these activities would occur are currently or will be subject to high levels of ongoing human disturbances associated with existing and planned development (e.g., vehicle traffic). Impacts of ongoing maintenance activities will be minimized with implementation of the avoidance and minimization measures described in Chapter 5, *Conservation Strategy*.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (e.g., ground vibrations; see Table 4–1). The effects of these impact mechanisms on western burrowing owl are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see

Section 4.4.4.2.1) except that the duration of maintenance-related activities is generally expected to be less than that of construction-related activities. The potential for temporary direct effects on western burrowing owl nesting colonies will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

As described in Table 4–2, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on western burrowing owl.

4.4.4.3.2 Outside Urban Permit Areas

Permanent Direct Effects

As described in Section 4.2.2, there are no impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on modeled western burrowing owl habitat. Maintenance removal of tall grasses, shrubs and other vegetation may benefit western burrowing owl foraging because the species prefers low vegetation height for foraging and nesting. Mowing of roadsides and right of ways along newly constructed agricultural facilities and roads could potentially increase the risk of mortality by attracting western burrowing owls to sites with high traffic speed or volumes.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (e.g., ground vibrations). The effects of these impact mechanisms on western burrowing owl are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.4.2.1) except that the duration of maintenance-related activities is generally expected to be less than that of construction-related activities. The potential for temporary direct effects on western burrowing owl nest sites will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

As described in Table 4–2, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on western burrowing owl.

4.4.4.4 Effects of Covered Activities within Conservation Lands

4.4.4.4.1 Permanent Direct Effects

Implementation of conservation measures to restore riparian habitat will convert up to 189 acres of agricultural land and grassland that support modeled western burrowing owl habitat to riparian

vegetation types that do not support modeled western burrowing owl habitat (see Table 5-7). The effects of such loss of modeled habitat on western burrowing owl are the same as described for the permanent direct effects of implementing permanent development projects in the UPAs (see Section 4.4.4.2.1). Implementation of applicable AMMs indicated in Table 4–7 will avoid permanent direct effects on active nesting pairs.

4.4.4.4.2 Temporary Direct Effects

Temporary direct effects are associated with the operation of equipment and other activities related to implementing habitat restoration, enhancement, and management actions in or adjacent to BRCP conservation lands that cause temporary noise, visual, and other disturbances to western burrowing owl (see Table 4–2). The effects of these impact mechanisms on western burrowing owl are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.4.2.1). The potential for temporary direct effects on western burrowing owl nesting colonies will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.4.4.3 Permanent Indirect Effects

Implementation of conservation measures will not result in permanent indirect effects on western burrowing owl because restored and protected habitats will not be associated with increasing human or pet presence, noise, traffic risks, or other impact mechanisms that could result in indirect effects (Table 4–2). Restored habitat types, although they may not support western burrowing owl, are highly unlikely to impose additional risk factors or stressors on western burrowing owl.

4.4.4.5 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of western burrowing owl within the Plan Area.

4.4.4.5.1 Permanent Direct Effects

Loss of up to 14,496 acres of model western burrowing owl foraging and nesting habitat may result from implementing the covered activities (see Table 4–8). The acreage of take (i.e., harm) will be the amount of actual habitat that is located within the area of affected modeled habitat. Permanent direct effects on habitat supporting active western burrowing owl nesting colony sites will be avoided with implementation of the applicable AMMs indicated in Table 4–7.

A small, but indeterminable, amount of direct take of individual juvenile and adult western burrowing owl could be associated with operation of equipment to construct permanent development projects or during recurring maintenance activities. Permanent direct effects on western burrowing owl eggs, nestlings, juveniles, and adults in nesting colonies will be avoided with implementation of the applicable AMMs indicated in Table 4–7.

4.4.4.5.2 Temporary Direct Effects

A temporary reduction in the functions of up to 11,947 acres of modeled western burrowing owl foraging and nesting habitat would result from harassment associated with covered activities, 7,627 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Management-related activities on 36,388 acres of conservation lands supporting modeled western burrowing owl habitat (Table 5-10) will result in temporary direct effects on a relatively small acreage of additional habitat that cannot be estimated. The acreage of take (i.e., harassment) will be the amount of actual habitat that is located within the area of affected modeled habitat. Temporary direct effects on western burrowing owl nesting colonies will be minimized with implementation the applicable AMMs indicated in Table 4–7.

4.4.4.5.3 Permanent Indirect Effects

A permanent reduction in the functions of up to 11,947 acres of modeled western burrowing owl nesting and foraging habitat would result from harassment associated with covered activities, 7,627 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K. Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). The acreage of take (i.e., harassment) will be the amount of actual habitat that is located within the area of affected modeled habitat. Permanent indirect effects on western burrowing owl nesting colonies will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

A small, but indeterminable, amount of direct take of individual juvenile and adult western burrowing owl could be associated with collisions with vehicles and other human uses adjacent to permanent development projects (e.g., illegal harvest) and with vehicles operation on new roadways.

4.4.4.6 Overall Impact Likely to Result from Take

The primary threat to western burrowing owl has been the historical loss of its grassland nesting habitat, elimination of ground squirrel burrows and other stressors (e.g., native and nonnative predators, and illegal shooting; see Appendix A). Surveys conducted in 2006/2007 throughout California covered 860 5 km by 5 km blocks that were surveyed by citizen scientists for presence of western burrowing owl pairs. At that time, a total of 8,526 pairs were estimated to occur in California, approximately 70 percent of which were located in the Imperial Valley of Southern California, and only 12 estimated pairs (0.1 percent of the entire California population) were estimated to exist in the Northern Central Valley, where all pairs were detected on lowland blocks in Tehama and Yuba counties (Wilkerson and Siegel 2010). The estimated number of breeding western burrowing owl pairs within the Plan Area has declined from 1 observed pair in 1991–1993 (Wilkerson and Siegel 2010) to zero pairs 2006/2007, despite a considerable survey effort (6,177 acres surveyed). Other sighting records (ebird.org) suggest that breeding sites for

western burrowing owls occur in the Plan Area, e.g., along Coal Canyon Road near Elsey, along the Durham-Pentz Highway near Hwy 99, at Hamilton Nord Cana Hwy near the HW 99 intersection, at Reknow and Railcar Road, and off Munjar Road. These locations, however, are not within the footprint of covered activities and effects from covered activities on birds possibly present in these locations are not likely.

The covered activities will result in the permanent direct impact on of up to 14,496 acres of modeled western burrowing owl nesting and foraging habitat (see Table 4–8), representing approximately 8 percent of the extent of modeled habitat present in the Plan Area. Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. The most recent available survey information indicates that the Plan Area population has declined substantially (see above). Implementation of the covered activities will reduce the amount of modeled nesting and foraging habitat within the Plan Area, may further fragment known occurrences, and may contribute to further population declines within the Plan Area. However, as described above, implementation of the applicable AMMs in Table 4–7, is expected to minimize these effects and avoid direct injury and mortality of individual birds. In addition, implementation of the conservation strategy is expected to benefit western burrowing owl by improving habitat conditions by restoring and permanently protecting habitat.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on western burrowing owl or adversely affect its distribution or abundance in the Plan Area.

4.4.5 Western Yellow-Billed Cuckoo

The maximum acreage of modeled western yellow-billed cuckoo nesting habitat that will be permanently affected, directly and indirectly, with implementation of the covered activities is 283 acres, representing approximately 5 percent of the current extent of modeled breeding and foraging habitat (see Table 4–8, Appendix K and Figure 4–25, *Western Yellow-Billed Cuckoo: Direct Impacts of Covered Activities* [separate files]).

4.4.5.1 Effects Common among Covered Activities

Actions undertaken to implement the covered activities (e.g., removal of habitat, operation of equipment for construction of new developments, restoration of habitat, and maintenance of existing facilities) could result in injury or mortality of western yellow-billed cuckoo. For example, individual western yellow-billed cuckoos could collide with moving construction-related equipment, eggs and nestlings could be crushed by equipment operating in nesting habitat, and adults could abandon care of eggs and nestlings as a result of excessive construction-related noise and visual disturbances near nest sites. The risk for collision of adult birds with construction-related equipment, however, is considered low because equipment is expected to be operated at speeds that will be avoided by adult birds, which are highly mobile. Implementation

of the applicable AMMs indicated in Table 4–7 will avoid or minimize direct disturbance to active nests and mortality or injury of individuals at nest sites. Because adult western yellow-billed cuckoo are highly mobile, actions associated with implementation of the covered activities (e.g., operation of construction equipment) will not result in mortality or injury of adult individuals.

The probability that the accidental introduction of contaminants associated with construction and maintenance activities (e.g., fuel spills) will adversely affect individual western yellow-billed cuckoo is considered low because birds are expected to avoid work sites with ongoing noise and visual construction-related disturbances. In addition, implementation of the applicable AMMs indicated in Table 4–7 provides for containment and rapid cleanup of releases that may occur, thus reducing exposure risk and the period that individuals could be exposed to contaminants.

4.4.5.2 Permanent Development Projects

Direct effects of permanent development projects will result in the permanent removal of up to 50 acres of modeled nesting habitat, representing less than 1 percent of the existing acreage of modeled nesting habitat in the Plan Area, (Table 4–8, Figure 4–25). Indirect effects of permanent development projects will result in reduced functions of up to 233 acres of modeled nesting habitat as habitat for the western yellow-billed cuckoo, 134 acres of which overlap with areas subject to ongoing effects of existing permanent developments (Appendix K). Figure O–10, *Western Yellow-Billed Cuckoo Habitat in the Plan Area with full BRCP Implementation* in Appendix O and Table 4–8 provide the acreage of modeled western yellow-billed cuckoo habitat remaining within the Plan Area (including BRCP protected lands and lands that are not impacted by the covered activities) with full implementation of the covered activities. Implementation of the covered activities will not isolate or fragment modeled western yellow-billed cuckoo nesting habitat because only 50 acres, spread out over the entire Plan Area, will be removed, which would not result in patches of modeled habitat too small for western yellow-billed cuckoo to use, as relatively large patches are typically required for western yellow-billed cuckoo (Laymon 1998).

4.4.5.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects within the Oroville UPA will result in permanent direct effects on up to 40 acres of modeled western yellow-billed cuckoo nesting habitat (Table 4–9). Loss of this habitat area may result in individual eggs or juveniles being killed or injured by the covered activities; it also may not allow individuals to complete their life cycle. The potential for this impact will be avoided and minimized with the implementation of the applicable AMMs in Table 4–7.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise, visual, and other disturbances (e.g., ground vibrations) associated with operating equipment and other activities necessary to construct new developments. These impact mechanisms could cause western yellow-billed cuckoo to reduce their foraging use of affected habitat areas during the period these activities are implemented. Temporary displacement from foraging habitat and increased numbers of flight responses to disturbance may elevate energetic costs to western yellow-billed cuckoo. The potential for temporary direct effects on western yellow-billed cuckoo will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 1,300-foot distance from permanent new developments within which temporary indirect effects will occur (see Table 4–5), up to 233 acres of modeled western yellow-billed cuckoo nesting habitat will be temporarily and directly affected by permanent development covered activities Plan Area-wide, 134 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).[63] The potential for adverse effects of temporary construction-related disturbances on western yellow-billed cuckoo behavior, however, is considered low because the covered activities are small in nature and do not occur in the areas where western yellow-billed cuckoo has been observed in the Plan Area (see Appendix A). In addition, the BRCP will protect 100 acres and restore 50 acres modeled yellow-billed cuckoo nesting habitat, as well as restoring 189 acres of riparian vegetation habitat (see Table 5-7) as part of the overall conservation strategy.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other equipment), pet-related, building maintenance, and other disturbances associated with human occupancy following construction of permanent developments (see Table 4–1). These disturbances could cause western yellow-billed cuckoo to reduce their foraging use of habitat adjacent to permanent development areas. Noise and visual disturbances are likely to preclude western yellow-billed cuckoo from nesting in patches of vegetation adjacent to permanent developments that otherwise would be suitable for nesting. Although unlikely, if western yellow-billed cuckoo were to nest adjacent to new permanent developments, indirect effects could include nest abandonment and changes in incubation, brooding, and foraging behavior of adult birds that could reduce nesting success. Increasing human and pet presence could also increase the frequency of flight responses that could increase energy demand and expose incubating eggs to nest predation or cooling. If western yellow-billed cuckoo were to establish nests in UPAs near proposed project footprints before all of the permanent development projects have been implemented, noise, visual, and other disturbances associated with occupancy of

[63] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

permanent development projects near new nests could result in nest abandonment or reduced nesting success. The potential for this effect, however, is considered low because the incidence of nesting in the Plan Area is low, all western yellow-billed cuckoo observations have been in areas that will not be affected by development, and nesting habitat near the areas that will be affected by proposed project footprints are in areas that already support development.

Based on an average 1,300-foot distance from permanent new developments within which permanent indirect effects will occur (see Table 4–5), up to 233 acres of modeled western yellow-billed cuckoo nesting habitat Plan Area-wide[64] will be permanently and indirectly affected by permanent development covered activities, 134 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). These permanent indirect effects will be minimized with implementation the applicable AMMs indicated in Table 4–7.

Permanent indirect effects associated with alteration in local hydrology[65] may alter the vegetation composition and structure of foraging habitat but will not affect the acreage of available nesting and foraging habitat. Based on an average 500-foot distance from permanent new developments within which these permanent indirect effects are expected to occur (see Section 4.2.4.3), up to 477 acres of riparian habitat Plan Area-wide[66] that may support nesting habitat will be indirectly affected if permanent development projects alter the supporting hydrology, 395 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). The potential for adverse effects of any such nesting habitat losses on western yellow-billed cuckoo is expected to be low because western yellow-billed cuckoo only use a small portion of available modeled habitat to nest in, all western yellow-billed cuckoo observations have been in areas that will not be affected by development, and most riparian habitat that may be affected is already located near development and is therefore already less desirable as nesting habitat than other less disturbed areas.

4.4.5.2.2 Outside Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects will result in permanent direct effects on up to 10 acres of modeled western yellow-billed cuckoo nesting habitat outside the UPAs in the Northern Orchards and Southern Orchards CAZs (see Table 4–9). The effects of such loss of

[64] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.
[65] Alterations in local hydrology could potentially be caused from covered activities that require in channel work, such as new and replacement bridges, and construction of flood control and stormwater management facilities. Water diversions are not a covered activity, therefore changes in local hydrology and vegetation compositions resulting from water diversions are not covered by the BRCP.
[66] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

modeled habitat on western yellow-billed cuckoo are the same as described for the permanent direct effects of implementing permanent development projects in the UPAs (see Section 4.4.5.2.1, *Within Urban Permit Areas*).

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise, visual, and other disturbances (e.g., ground vibrations) associated with operating equipment and other activities necessary to construct new developments (see Table 4–1). The effects of these impact mechanisms on western yellow-billed cuckoo are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.5.2.1). The potential for temporary direct effects on western yellow-billed cuckoo will be minimized with implementation of the applicable AMMs indicated in Table 4–7

Based on an average 1,300-foot distance from permanent new developments within which temporary indirect effects will occur (see Table 4–5), up to 233 acres of modeled western yellow-billed cuckoo nesting habitat Plan Area-wide[67] will be temporarily and directly affected by permanent development covered activities, 134 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

The potential for adverse effects on individual western yellow-billed cuckoos of construction-related noise and visual disturbances is considered to be low because of the following factors.

[67] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

1. Eleven percent of the modeled nesting habitat would be affected if all permanent development activities outside UPAs were implemented simultaneously, but permanent development projects would not be implemented simultaneously and thus a much smaller area of habitat would be affected by construction-related disturbances at any point in time.
2. The majority of covered activities implemented outside of the UPAs are linear transportation infrastructure projects (e.g., bridge replacements, intersection improvements). As such, the period over which a given area of habitat adjacent to project footprints will be subjected to temporary direct construction-related disturbances will be limited as the area under construction moves along the project ROW.
3. Affected modeled habitat areas are within or near larger patches of modeled habitat that would not be disturbed and would be available for use by displaced individuals.
4. The area of affected habitat is extremely small and unlikely to be occupied by western yellow-billed cuckoo.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include the following.

- Ongoing visual (e.g., operation of vehicles, lighting, human activity) and noise (e.g., operation of vehicles and other equipment), disturbances associated with human activity following construction of permanent developments (see Table 4–1). The level of these effects are expected to be less than that associated with permanent development projects within UPAs because they do not include residential developments that are expected to support higher levels of human activity than nonresidential developments.
- Ongoing noise and visual disturbances associated with vehicle traffic that could affect use of habitat areas adjacent to newly constructed roads and bridges; and
- Increased risk for mortality or injury of individual western yellow-billed cuckoos associated with vehicle strikes associated with traffic using newly constructed roads.

Noise and visual disturbances are likely to preclude western yellow-billed cuckoos from nesting in patches of vegetation adjacent to new roads and bridges that otherwise would be suitable for nesting. Although unlikely, if western yellow-billed cuckoo were to nest adjacent to these new facilities, the effects on western yellow-billed cuckoo are the same as described for the permanent indirect effects of implementing permanent development projects in the UPAs (see Section 4.4.5.2.1). If western yellow-billed cuckoos were to establish nests outside UPAs near proposed project footprints before full completion of new roads and bridges, noise, visual, and other disturbances associated with use of these development projects could result in nest abandonment or reduced nesting success. The potential for this effect, however, is considered low because the incidence of nesting in the Plan Area is low and the affected area is small (less than 1 percent of the modeled western yellow-billed cuckoo habitat located outside the UPAs).

Based on an average 1,300-foot distance from new roads and bridges within which permanent indirect effects will occur (see Table 4–5), up to 233 acres of modeled western yellow-billed cuckoo nesting habitat Plan Area-wide[68] will be permanently and indirectly affected, 134 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). Adverse effects of these disturbances, however, will be low for the reasons described above for temporary direct effects of construction-related noise and visual disturbances.

Permanent indirect effects associated with alteration in local hydrology[69] may alter the vegetation composition and structure of foraging habitat but will not affect the acreage of available habitat. Based on an average 250-foot distance from permanent new developments within which these permanent indirect effects are expected to occur (see Table 4–5), up to 477 acres of riparian habitat that may support nesting habitat will be indirectly affected if permanent development projects alter the supporting hydrology, 395 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

4.4.5.3 Recurring Maintenance Activities

4.4.5.3.1 Within Urban Permit Areas

Permanent Direct Effects

With the exception of the potential impact mechanisms and associated effects on western yellow-billed cuckoo described in Section 4.4.5.1, *Effects Common among Covered Activities*, there are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on western yellow-billed cuckoo (see Table 4–1). Maintenance removal of riparian vegetation that potentially support western yellow-billed cuckoo habitat will not adversely affect western yellow-billed cuckoo because 1) maintenance will only affect a very small area of vegetation and 2) maintenance will only affect vegetation adjacent to development that is very unlikely to be occupied by western yellow-billed cuckoo.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (e.g., ground vibrations see Table 4–1). The effects

[68] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

[69] Alterations in local hydrology could potentially be caused from covered activities that require in channel work, such as new and replacement bridges, and construction of flood control and stormwater management facilities. Water diversions are not a covered activity, therefore changes in local hydrology and vegetation compositions resulting from water diversions are not covered by the BRCP.

of these impact mechanisms on western yellow-billed cuckoo are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.5.2.1) except that the duration of maintenance-related activities is generally expected to be less than that of construction-related activities. The potential for temporary direct effects on occupied western yellow-billed cuckoo habitat, in the unlikely event they occur (due to the likely absence of western yellow-billed cuckoo), will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

The potential for adverse effects of temporary recurring maintenance-related disturbances on western yellow-billed cuckoo foraging behavior is considered low within the UPAs because western yellow-billed cuckoo only use a small portion of available modeled habitat to nest in. All western yellow-billed cuckoo observations have been in areas that will not be affected by development (see Appendix A), many of these activities will be implemented in developed areas that are already subject to high levels of disturbance (e.g., traffic), and there is a high probability that alternate foraging habitat areas will be available near affected areas during a generally short period of disturbance for most activities (e.g., a few hours to a few days).

Permanent Indirect Effects

As described in Table 4–2, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on western yellow-billed cuckoo.

4.4.5.3.2 Outside Urban Permit Areas

Permanent Direct Effects

Maintenance removal of riparian vegetation that potentially support western yellow-billed cuckoo nesting habitat will not adversely affect western yellow-billed cuckoo for the reasons described for permanent direct effects of recurring maintenance activities inside UPAs (see Section 4.2.2). In addition, the area of modeled nesting western yellow-billed cuckoo habitat permanent directly affected by covered activities outside of UPAs is very small, and therefore it is even less likely that maintenance will adversely affect western yellow-billed cuckoo.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (e.g., ground vibrations). The effects of these impact mechanisms on western yellow-billed cuckoo are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.5.2.1) except that the duration of maintenance-related activities is generally expected to be less than that of construction-related activities.

The potential for adverse effects of temporary maintenance-related disturbances on western yellow-billed cuckoo behavior is considered low for the same reasons as the reasons described

for temporary direct effects of recurring maintenance activities inside UPAs and, the area of modeled habitat that will be temporarily directly affected by maintenance outside of UPAs is small.

Permanent Indirect Effects

As described in Table 4–2, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on western yellow-billed cuckoo.

4.4.5.4 Effects of Covered Activities within Conservation Lands

4.4.5.4.1 Permanent Direct Effects

The operation of equipment and other activities related to implementing habitat enhancement and management actions in or adjacent to protected riparian habitats during the western yellow-billed cuckoo nesting period could result in injury to or mortality of individuals if nest sites are present in affected areas. The potential for this permanent direct effect on western yellow-billed cuckoo will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.5.4.2 Temporary Direct Effects

Temporary direct effects are associated with the operation of equipment and other activities related to implementing habitat restoration, enhancement, and management actions in or adjacent to BRCP conservation lands that cause temporary noise, visual, and other disturbances to western yellow-billed cuckoo (see Table 4–2). The effects of these impact mechanisms on western yellow-billed cuckoo are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.5.2.1). The potential for temporary direct effects on occupied western yellow-billed cuckoo habitat will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.5.4.3 Permanent Indirect Effects

Implementation of conservation measures will not result in permanent indirect effects on western yellow-billed cuckoo because restored and protected habitats will not be associated with increasing human or pet presence, noise, traffic risks, or other impact mechanisms that could result in indirect effects (Table 4–2). Restored habitat types, although they may not support western yellow-billed cuckoo, are highly unlikely to impose additional risk factors or stressors on western yellow-billed cuckoo.

4.4.5.5 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of western yellow-billed cuckoo within the Plan Area.

4.4.5.5.1 Permanent Direct Effects

Loss of up to 50 acres of modeled western yellow-billed cuckoo nesting habitat (Table 4–8). The acreage of take (i.e., harm) will be the amount of actual habitat that is located within the area of affected modeled habitat.

A small, but indeterminable, amount of direct take of individual juvenile and adult western yellow-billed cuckoo could be associated with collisions with vehicle operation of equipment used to construct permanent development projects and conduct recurring maintenance activities. Permanent direct effects on western yellow-billed cuckoo eggs, nestlings, juveniles, and adults in nesting colonies will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.5.5.2 Temporary Direct Effects

A temporary reduction in the functions of up to 233 acres of modeled western yellow-billed cuckoo nesting habitat would result from harassment associated with covered activities, 134 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Management-related activities on 1,835 acres of conservation lands supporting modeled western yellow-billed cuckoo habitat will result in temporary direct effects on a relatively small acreage of additional habitat that cannot be estimated. The acreage of take (i.e., harassment) will be the amount of actual habitat that is located within the area of affected modeled habitat. Temporary direct effects on occupied western yellow-billed cuckoo habitat will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.5.5.3 Permanent Indirect Effects

A permanent reduction in the functions of up to 233 acres of modeled western yellow-billed cuckoo nesting habitat would result from harassment associated with covered activities, 134 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). The acreage of take (i.e., harassment) will be the amount of actual habitat that is located within the area of affected modeled habitat. Permanent indirect effects on occupied western yellow-billed cuckoo habitat will be minimized with implementation the applicable AMMs indicated in Table 4–7. A small, but indeterminable, amount of direct take of individual juvenile and adult western yellow-billed cuckoo could be associated with collisions with vehicles and other human uses adjacent to permanent development projects (e.g., illegal harvest) and with vehicles operation on new roadways.

4.4.5.6 Overall Impact Likely to Result from Take

The primary threat to western yellow-billed cuckoo has been the historical loss and degradation of its riparian habitat and associated stressors (e.g., lack of habitat patches large enough to support breeding activity, increased nest parasitism and depredation; see Appendix A) (Hughes 1999). There may be fewer than 50 breeding pairs of western yellow-billed cuckoo in California (Gaines 1977, Laymon and Halterman 1987, Halterman 1991, Laymon et al. 1997). The only locations in California known to currently sustain breeding populations include the Colorado River system, the South Fork Kern River, and isolated sites along the Sacramento River (Laymon and Halterman 1989, Laymon 1998). The largest portion of the current range of the western yellow-billed cuckoo along the Sacramento River as described by the CDFW California Wildlife Habitat Relationships Program occurs along the western border of the Plan Area. Breeding pairs have been reported the Sacramento River area long the western border of the Plan Area as well as the Feather River between Oroville and the Butte County border.

The covered activities will result in the permanent direct impact on up to 50 acres of modeled western yellow-billed cuckoo nesting habitat (Table 4–8), representing approximately 1 percent of the extent of modeled habitat present in the Plan Area. Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. Implementation of the covered activities will reduce the amount of modeled nesting and foraging habitat within the Plan Area and may contribute to further population declines within the Plan Area. However, as described above, implementation of the applicable AMMs in Table 4–7, is expected to minimize these effects and avoid direct injury and mortality of individual birds. In addition, implementation of the conservation strategy is expected to benefit western yellow-billed cuckoo and improving habitat conditions by restoring and permanently protecting habitat.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on western yellow-billed cuckoo or adversely affect its Plan Area distribution or abundance.

4.4.6 Greater Sandhill Crane

The maximum acreage of modeled greater sandhill crane roosting and foraging habitat that will be permanently affected, directly and indirectly, with implementation of the covered activities is 3,710 acres, representing less than 3 percent of the current extent of modeled habitat in the Plan Area (see Table 4–8, Appendix K and Figure 4–26, *Greater Sandhill Crane: Direct Impacts of Covered Activities* [separate files]).

4.4.6.1 Effects Common among Covered Activities

Effects of covered activities that are in common are those that could result in injury or mortality of greater sandhill crane. The greater sandhill crane, however, is a CDFW-designated fully protected species and, as such, implementation of the applicable avoidance and minimization

measures in Table 4–7 will avoid actions associated with implementation of the covered activities that could result in the mortality of individuals.

4.4.6.2 Permanent Development Projects

Direct effects of permanent development projects will result in the permanent removal of up to 1,627 acres of modeled roosting and foraging habitat, representing approximately 1 percent of the existing acreage of modeled roosting and foraging habitat in the Plan Area (Table 4–8, Figure 4–26). Direct effects of permanent development projects will result in the permanent removal of up to 137 acres of traditional upland use area, representing approximately 5 percent of the existing acreage of traditional upland use area in the Plan Area (Table 4–8, Figure 4–26). Indirect effects of permanent development projects will result in reduced functions of up to 1,946 acres of modeled habitat for the greater sandhill crane, 411 acres of which overlap with areas subject to ongoing effects of existing permanent developments (Appendix K).

Figure O–11, *Greater Sandhill Crane Habitat in the Plan Area with full BRCP Implementation* in Appendix O and Table 4–8 provide the acreage of modeled greater sandhill crane habitat remaining within the Plan Area (including BRCP protected lands and lands that are not impacted by the covered activities) with full implementation of the covered activities. Implementation of the covered activities will not isolate or fragment greater sandhill crane use of the Plan Area because greater sandhill crane is a highly mobile species that can easily move among patches of habitat that become disconnected with implementation of the covered activities.

4.4.6.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects within UPAs (e.g., Chico and Gidley-Biggs UPA) will result in permanent direct effects on up to 1,131 acres of modeled greater sandhill crane winter roosting and foraging habitat (see Table 4–9) and 131 acres of Traditional upland use area. Loss of this habitat area will reduce the area of any actual greater sandhill crane habitat that is located within affected modeled habitat and thus will reduce the area of habitat available to greater sandhill crane. Due to the proximity of the covered activities to existing developed areas, which are generally avoided by wintering greater sandhill cranes, the permanent direct effects of covered activities on actual use by greater sandhill cranes are expected to be minimal, because wintering cranes typically avoid areas within the proximity of existing human developments.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise, visual, and other disturbances (e.g., ground vibrations, dust emissions) associated with operating equipment and other activities necessary to construct new developments (see Table 4–1). These impact mechanisms could cause greater sandhill crane to reduce their foraging use of affected habitat areas during the period these activities are

implemented. Temporary displacement from foraging habitat and increased numbers of flight responses to disturbance may elevate energetic costs to greater sandhill crane. The potential for temporary direct effects on roosting greater sandhill crane will be minimized with implementation of the applicable AMMs indicated in Table 4–7. Based on an average 500-foot distance from permanent new developments within which temporary indirect effects will occur (see Table 4–5), up to 1,946 acres of modeled greater sandhill crane habitat Plan Area-wide will be temporarily and directly affected by permanent development covered activities, 411 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K) Likewise, up to 75 acres of acres of modeled greater sandhill crane traditional upland use area will be temporarily and directly affected by permanent development covered activities (see Appendix K). The potential for adverse effects of temporary construction-related disturbances on greater sandhill crane foraging behavior, however, is considered low because foraging habitat is not a factor limiting the species in the Plan Area (see Appendix A) and, given the distribution of modeled foraging habitat (Figure 4–26), there is a high probability that alternate foraging habitat areas will be available near affected areas.

Permanent Indirect Effects

Covered activities may cause increasing traffic volumes and vehicle speeds, especially where roads are widened, straightened or otherwise enhanced (e.g., the SR 99 capacity enhancement project). Collisions with automobiles are not a significant source of mortality for greater sandhill cranes as they avoid habitat within close proximity of rights-of way. Other permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other equipment), pet-related, building maintenance, and other disturbances associated with human occupancy following construction of permanent developments (see Table 4–1). These disturbances could cause greater sandhill crane to reduce their foraging use of habitat adjacent to permanent development areas or may increase energy expenditure of wintering cranes due to increased flight and avoidance reactions. Noise and visual disturbances from humans, pets and vehicles are likely to preclude greater sandhill crane from roosting in patches of vegetation near permanent developments that otherwise would be suitable for roosting.

Based on an average 500-foot distance from permanent new developments within which permanent indirect effects will occur (see Table 4–5), up to 1,946 acres of modeled greater sandhill crane habitat Plan Area-wide will be permanently and indirectly affected by permanent development covered activities, 411 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). These permanent indirect effects will be minimized with implementation of applicable AMMs indicated in Table 4–7.

4.4.6.2.2 Outside Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects will result in permanent direct effects on up to 496 acres of modeled greater sandhill crane winter roosting and foraging habitat and up to 6 acres of traditional upland use area outside the UPAs distributed among all of the CAZs (see Table 4–9). The effects of such loss of modeled habitat on greater sandhill crane are the same as described for the permanent direct effects of implementing permanent development projects in the UPAs (see Section 4.4.6.2.1, *Within Urban Permit Areas*). The construction of new power lines or modification of existing transmission lines to accommodate covered activities in agricultural service areas of the Plan Area could impose a greater risk to wintering greater sandhill cranes. Cranes are known to suffer injury or mortality when colliding with power lines (Tacha et al. 1978, Morkill and Anderson 1991, Brown and Drewien 1995, Janss 2000), especially when cranes fly from roosting to foraging areas in the early morning and when visibility is obscured by fog or inclement weather. Implementation of the applicable AMMs indicated in Table 4–7 will avoid permanent direct effects of power lines on greater sandhill crane.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise, visual, and other disturbances (e.g., ground vibrations) associated with operating equipment and other activities necessary to construct new developments (see Table 4–1). The effects of these impact mechanisms on greater sandhill crane are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.6.2.1). The potential for temporary direct effects on greater sandhill crane roosting areas will be minimized with implementation of the applicable AMMs indicated in Table 4–7. Based on an average 500-foot distance from permanent new developments within which temporary indirect effects will occur (see Table 4–5), up to 1,946 acres of modeled greater sandhill crane habitat Plan Area-wide [70]will be temporarily and directly affected by permanent development covered activities, 411 acres of which overlap with areas subject to ongoing effects of existing permanent developments s (see Appendix K).

The potential for adverse effects on individual greater sandhill cranes of construction-related noise and visual disturbances is considered to be low because of the following factors.

1. Less than 1 percent of the available modeled foraging habitat would be affected if all permanent development activities outside UPAs were implemented simultaneously, but permanent development projects would not be implemented simultaneously and thus a much smaller area of habitat would be affected by construction-related disturbances at any point in time.

[70] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

2. The majority of covered activities implemented outside of the UPAs are linear infrastructure projects. As such, the period over which a given area of habitat adjacent to project footprints will be subjected to temporary direct construction-related disturbances will be limited as the area under construction moves along the project ROW.
3. Affected modeled habitat areas are within or near larger patches of modeled habitat that would not be disturbed and would be available for use by displaced individuals.
4. Implementation of AMM9 will avoid construction-related activities within 2,600 feet of active roosting cranes during the wintering season (see Tables 4-5, 4-7, and 5-25).

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other equipment), pet-related, infrastructure maintenance, and other disturbances associated with operation and human occupancy following construction of permanent developments (see Table 4–1). The level of these effects are expected to be less than that associated with permanent development projects within UPAs because they do not include residential developments, which are expected to support higher levels of human activity than nonresidential developments. Ongoing noise and visual disturbances associated with vehicle traffic that could affect use of habitat areas adjacent to newly constructed roads.

Noise and visual disturbances are likely to preclude greater sandhill crane from roosting in patches of vegetation adjacent to new agricultural services facilities and new roads that otherwise would be suitable for roosting. Although unlikely, if greater sandhill crane were to roost adjacent to these new facilities and roads, the effects on greater sandhill crane are the same as described for the permanent indirect effects of implementing permanent development projects in the UPAs (see Section 4.4.5.2.1). Indirect permanent effects of permanent development projects outside of UPAs may cause abandonment of known active roosting sites that are located near the proposed footprints of new agricultural services facilities and new roads. If greater sandhill cranes were to establish roost sites outside UPAs near proposed project footprints before full build out of agricultural services facility and new roads, noise, visual and other disturbances associated with use of these development projects could result in site abandonment. The potential for this effect, however, is low considering that the incidence of roosting in the Plan Area is low and the affected area is small (less than 1 percent of the affected modeled greater sandhill crane habitat located outside the UPAs).

Based on an average 500-foot distance from permanent new agricultural services facilities and new roads within which permanent indirect effects will occur (see Table 4–5), up to 1,946 acres of modeled greater sandhill crane habitat will be permanently and indirectly affected, 411 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see

Appendix K). Adverse effects of these disturbances, however, will be low for the reasons described above for temporary direct effects of construction-related noise and visual disturbances. Permanent indirect effects of new agricultural services facilities will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.6.3 Recurring Maintenance Activities

4.4.6.3.1 Within Urban Permit Areas

Permanent Direct Effects

With the exception for the potential impact mechanisms and associated effects described in Section 4.4.6.1, *Effects Common among Covered Activities*, there are no impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on modeled greater sandhill crane habitat (see Table 4–1). Vegetation maintenance activities associated with maintaining roadways are not expected to affect greater sandhill crane habitat, because the species tends to avoid roads and associated disturbed areas. Mowing and clearing of vegetation along roads does not affect the existing structure and condition of crane foraging or roosting habitats. Activities associated with maintaining flood control and other infrastructure will result in the permanent removal of small patches of open grassland or agricultural habitat that could support greater sandhill crane foraging habitat. These removed patches are included in the extent of habitat permanently removed by permanent development activities described for construction impacts.

Effects of the operation of maintenance equipment on greater sandhill cranes for maintenance actions are the same as described for construction-related effects. Noise and visual disturbances associated with maintaining permanent developments will not affect crane behaviors because the locations in which these activities would occur are currently or will be subject to high levels of ongoing human disturbances associated with existing and planned development (e.g., vehicle traffic). Impacts of ongoing maintenance activities will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (e.g., ground vibrations; see Table 4–1). The effects of these impact mechanisms on greater sandhill crane are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.6.2.1) except that the duration of maintenance-related activities is generally expected to be less than that of construction-related activities. The potential for adverse effects of temporary maintenance-related disturbances on crane foraging behavior, however, is considered low because foraging habitat is not a factor limiting the species in the Plan Area (see Appendix A) and, given the distribution of modeled foraging habitat (Figure 4–26) there is a high probability that alternate foraging habitat areas will be available near affected areas. The

potential for temporary direct effects on greater sandhill crane roost sites will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

As described in Table 4–2, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on greater sandhill crane.

4.4.6.3.2 Outside Urban Permit Areas

Permanent Direct Effects

As described in Section 4.2.2, there are no impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on modeled greater sandhill crane habitat. Maintenance removal of tall grasses, shrubs and other vegetation will not affect greater sandhill crane foraging because the species generally avoids areas near roads and other human occupied infrastructure or buildings. In addition, maintenance activities are unlikely to occur outside of daylight hours, and thus disturbance of roosting cranes is minimized.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (e.g., ground vibrations). The effects of these impact mechanisms on greater sandhill crane are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.6.2.1) except that the duration of maintenance-related activities is generally expected to be less than that of construction-related activities and it typically limited to daylight hours when cranes are away from roost sites.

The potential for adverse effects of temporary maintenance-related disturbances on greater sandhill crane foraging behavior, however, is considered low because foraging habitat is not a factor limiting the species in the Plan Area (see Appendix A) and, given the distribution of modeled foraging habitat (Figure 4–26), there is a high probability that alternate foraging habitat areas will be available near affected areas. The potential for temporary direct effects on greater sandhill crane roosting and foraging sites will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

As described in Table 4–2, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on greater sandhill crane.

4.4.6.4 Effects of Covered Activities within Conservation Lands

4.4.6.4.1 Permanent Direct Effects

Implementation of conservation measures to restore emergent wetland habitat may alter the composition and structure of up to 500 acres of existing rice agriculture, some of which is used as foraging habitat by wintering cranes (see Table 5-7). The effects of such loss of modeled habitat on greater sandhill crane are initially similar to those described for the permanent direct effects of implementing permanent development projects in the UPAs (see Section 4.4.6.2.1). However, overtime because restoration of existing lower quality habitat to high quality wetland habitat is expected to have permanent long term benefits to sandhill crane these short term direct effects are likely to be small. Implementation of applicable AMMs indicated in Table 4–7 will avoid permanent direct effects on active roosting sites.

4.4.6.4.2 Temporary Direct Effects

Temporary direct effects are associated with the operation of equipment and other activities related to implementing habitat restoration, enhancement, and management actions in or adjacent to BRCP conservation lands that cause temporary noise, visual, and other disturbances to greater sandhill crane (see Table 4–2). The effects of these impact mechanisms on greater sandhill cranes are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.6.2.1). The potential for temporary direct effects on actually used crane roosting or foraging habitat will be minimized with implementation of applicable AMMs indicated in Table 4–7.

4.4.6.4.3 Permanent Indirect Effects

Implementation of conservation measures will not result in permanent indirect effects on greater sandhill cranes because restored and protected habitats will not be associated with increasing human or pet presence, noise, traffic risks, or other impact mechanisms that could result in indirect effects (Table 4–2). In particular, protected roost sites will be monitored to prevent disturbances of roosting cranes. Hunting and other recreational uses of these areas is prohibited to prevent harassment of roosting cranes. Restored habitat types, although they may not support greater sandhill cranes, are highly unlikely to impose additional risk factors or stressors on greater sandhill cranes.

4.4.6.5 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of greater sandhill cranes within the Plan Area.

4.4.6.5.1 Permanent Direct Effects

Loss of up to 1,627 acres of modeled greater sandhill cranes winter roosting and foraging habitat and 137 acres of traditional upland use areas will result from covered activities (Table 4–8). The acreage of take (i.e., harm) will be the amount of actual habitat that is located within the area of affected modeled habitat. A small, but indeterminable, amount of direct take of individual greater sandhill cranes could be associated with collisions with power lines and equipment used to construct permanent development projects. Permanent direct effects on greater sandhill cranes adults in roost areas will be minimized with implementation of the applicable AMMs indicated in Table 4–7. Since greater sandhill crane is protected by the MBTA, take in the form of death or injury will not be allowed under the federal permit for any covered activity. The NCCP permit serves as authorization by CDFW for take of greater sandhill crane consistent with this Plan under the Fish and Game Code. If greater sandhill crane is listed under the federal ESA, the section 10(a)(1)(B) permit can at that point serve as a Special Purpose Permit under the MBTA.

4.4.6.5.2 Temporary Direct Effects

A temporary reduction in the functions of up to 1,946 acres of modeled greater sandhill crane habitat would result from harassment associated with covered activities, 411 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Management-related activities on 22,160 acres of conservation lands supporting modeled greater sandhill cranes habitat (Table 5-10) will result in temporary direct effects on a relatively small acreage of additional habitat that cannot be estimated. The acreage of take (i.e., harassment) will be the amount of actual habitat that is located within the area of affected modeled habitat. Temporary direct effects on occupied greater sandhill cranes habitat will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.6.5.3 Permanent Indirect Effects

A temporary reduction in the functions of up to 1,946 acres of modeled greater sandhill crane habitat would result from harassment associated with covered activities, 411 acres of which overlap with areas subject to ongoing effects of existing permanent developments (Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). The acreage of take (i.e., harassment) will be the amount of actual habitat that is located within the area of affected modeled habitat. Permanent indirect effects on occupied greater sandhill crane habitat will be minimized with implementation of the applicable AMMs indicated in Table 4–7. A small, but indeterminable, amount of direct take of individual greater sandhill cranes could be associated with collisions with power lines and other human uses adjacent to permanent development projects (e.g., illegal harvest).

4.4.6.6 Overall Impact Likely to Result from Take

The major stressor of greater sandhill cranes on the wintering areas is the presence of humans and human activities. Greater sandhill cranes do not tolerate regular disturbances, including low-level recreational disturbances (e.g., birding, photography); and levels of disturbance may play a role in habitat selection (Lovvorn and Kirkpatrick 1981). Excessive disturbances have caused cranes to abandon foraging and roosting sites; and repeated disturbance may affect their ability to feed and store the energy needed for survival. Cranes are especially sensitive to pre-dawn disruptions (e.g., by hunters accessing waterfowl hunting areas, Ivey and Herziger 2003), which can cause cranes to abandon a site (Littlefield and Ivey 2000) or to collide with power lines and other poorly visible obstacles during flight. Foraging areas within 100 yards of occupied dwellings are not considered suitable (Sacramento County 2008). Lovvorn and Kirkpatrick (1981) found that cranes tended to avoid roosting in areas close to human activity with minimal distances from human activity ranging from 140 m to 380 m depending on degree of visual isolation (for example short distances with high degree of visual isolation and longer distances with low visual isolation). Other human disturbances such as boating, aircraft, and operating equipment for habitat management can cause birds to abandon otherwise suitable habitats. Flooding of agricultural fields for waterfowl hunting also reduces available foraging habitat for wintering cranes.

The covered activities will result in the loss of up to 1,627 acres of modeled greater sandhill crane winter roosting or foraging habitat and up to 137 acres of traditional upland use area (Table 4–8), representing approximately 1 and 5 percent, respectively of the extent of modeled habitat present in the Plan Area. Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. Given that less than 6 percent of modeled habitat will be removed by covered activities and that most of the modeled habitat that will be permanently affected by development is located near existing, disturbed areas, the species will not be adversely affected by the covered activities.

Consequently, given that cranes are not limited by available foraging areas in the Plan area, it is unlikely the Plan Area wintering population will be adversely affected by the acreage of modeled foraging and roosting habitat removed by covered activities. Furthermore, implementation of the applicable AMMs indicated in Table 4–7 will minimize the removal of occupied habitat by covered activities and minimize the potential for harassment of individuals or roost sites.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on greater sandhill crane or adversely affect its Plan Area distribution or abundance.

4.4.7 California Black Rail

A habitat model has not been developed for California black rail because there is insufficient information regarding the distribution of the physical attributes that supports its habitat in the

Plan Area (e.g., water depths in permanent wetlands). There are few locations within the Plan Area that are known to be occupied by California black rail (see Appendix A). Implementation of the covered activities requires that all permanent direct impacts on occupied California black rail habitat be avoided and that indirect effects be minimized (see applicable AMMs in Table 4–7 and Chapter 6, *Conditions on Covered Activities*). Since California black rail is protected by the MBTA, take in the form of death or injury will not be allowed under the federal permit for any covered activity. The NCCP permit serves as authorization by CDFW for take of California black rail consistent with this Plan under the Fish and Game Code. If California black rail is listed under the federal ESA, the section 10(a)(1)(B) permit can at that point serve as a Special Purpose Permit under the MBTA.

4.4.7.1 Effects Common among Covered Activities

Effects of covered activities that are in common are those that could result in injury or mortality of California black rail. The California black rail, however, is a CDFW-designated fully protected species and, as such, implementation of the applicable avoidance and minimization measures in Table 4–7 will avoid actions associated with implementation of the covered activities that could result in the mortality of individuals.

4.4.7.2 Permanent Development Projects

Direct and indirect effects of permanent development projects will be avoided and minimized with implementation the applicable AMMs indicated in Table 4–7.

4.4.7.2.1 Within Urban Permit Areas

Permanent Direct Effects

Permanent direct effects on California black rail and its occupied habitat will be avoided with application of the applicable AMMs in Table 4–7.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise, visual, and other disturbances (Table 4–1) associated with operating equipment and other activities necessary to construct new developments. The potential for temporary adverse effects on California black rail will be avoided and minimized with implementation of the applicable AMMs in Table 4–7.

Permanent Indirect Effects

Indirect effects of permanent development activities include ongoing visual, noise, pet-related, building maintenance, and other disturbances associated with human occupancy following construction of permanent developments (Table 4–1). These indirect effects could affect California black rail if they are present immediately adjacent to new permanent developments. The potential for this effect, however, is considered low because California black rails are not

known to occur near any proposed footprints of covered activities and black rail would be unlikely to establish in habitat areas near new developments because they are subject to high levels of existing disturbance. If California black rail were to be present or establish in areas near proposed project footprints before all of the permanent development projects have been implemented, noise, visual, and other disturbances associated with occupancy of permanent development projects near occupied habitat could result in changed behavior and reduced survival. These permanent indirect effects will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.7.2.2 Outside Urban Permit Areas

Permanent Direct Effects

Permanent direct effects on California black rail and its occupied habitat will be avoided with application of the applicable AMMs in Table 4–7.

Temporary Direct Effects

Temporary direct effects impact mechanisms on California black rail, if they are present, are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.7.2.1, *Within Urban Permit Areas*). The potential for temporary adverse effects on California black rail will be avoided and minimized with implementation of the applicable AMMs in Table 4–7.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects are the same as for permanent indirect effects of covered activities in UPAs. These permanent indirect effects will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.7.3 Recurring Maintenance Activities

4.4.7.3.1 Within Urban Permit Areas

Permanent Direct Effects

As described in Table 4–1, there are no impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on California black rail habitat. All direct impacts on individual California black rails must be avoided and it is unlikely that, given the secretive nature of California black rail (see Appendix A), it would occur in habitat areas subject to recurring maintenance activities, which will be located in areas subject to relatively high levels of ongoing disturbance.

Temporary Direct Effects

Temporary direct effects and impact mechanisms on California black rail are the same as described for the temporary direct effects of implementing permanent development projects in

the UPAs (see Section 4.4.7.2.1), except that the duration of maintenance-related activities is generally expected to be less than that of construction-related activities. The potential for temporary adverse effects on California black rail will be avoided and minimized with implementation of the applicable AMMs in Table 4–7.

Permanent Indirect Effects

As described in Table 4–2, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on California black rail.

4.4.7.3.2 Outside Urban Permit Areas

Permanent Direct Effects

As described in Table 4–2, there are no impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on California black rail habitat. All direct impacts on individual California black rails must be avoided and it is unlikely that, given the secretive nature of California black rail (see Appendix A), it would occur in habitat areas subject to recurring maintenance activities, which will be located in areas subject to relatively high levels of ongoing disturbance.

Temporary Direct Effects

Temporary direct effects and impact mechanisms on California black rail are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.7.2.1), except that the duration of maintenance-related activities is generally expected to be less than that of construction-related activities. The potential for temporary adverse effects on California black rail will be avoided and minimized with implementation of the applicable AMMs in Table 4–7.

Permanent Indirect Effects

As described in Table 4–2, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on California black rail.

4.4.7.4 Effects of Covered Activities within Conservation Lands

4.4.7.4.1 Permanent Direct Effects

Implementation of conservation measures, with implementation of the applicable AMMs in Table 4–7, will avoid all permanent direct impacts on California black and occupied habitat.

4.4.7.4.2 Temporary Direct Effects

Temporary direct effects are associated with the operation of equipment and other activities related to implementing habitat restoration, enhancement, and management actions in or adjacent to BRCP conservation lands that cause temporary noise, visual, and other disturbances to California black rail. The effects of these impact mechanisms on California black rails are the same as described for the temporary direct effects of implementing permanent development projects within and outside UPAs (see Section 4.4.7.2.1). The potential for temporary adverse effects on California black rail will be avoided and minimized with implementation of the applicable AMMs in Table 4–7.

4.4.7.4.3 Permanent Indirect Effects

Implementation of conservation measures will not result in permanent indirect effects on California black rails because restored and protected habitats will not be associated with increasing human or pet presence, noise, traffic risks, or other impact mechanisms that could result in indirect effects (Table 4–1). In particular, any occupied emergent wetland habitat sites protected and managed under the BRCP will be subject to fewer disturbance-related effects than those under active agriculture.

4.4.7.5 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of California black rail within the Plan Area.

4.4.7.5.1 Permanent Direct Effects

All direct take of California black rail and occupied habitat will be avoided with implementation of the applicable AMMs indicated in Table 4–7.

4.4.7.5.2 Temporary Direct Effects

Implementation of covered activities adjacent to occupied habitat could result in a temporary reduction in the functions of the habitat (e.g., alter the behavior of individuals as a result of lowered ability to remain concealed from disturbances) and result in take (i.e., harassment). Temporary direct effects on occupied California black rails habitat will be minimized with implementation of the applicable AMMs indicated in Tables 4-6 and 4-7.

4.4.7.5.3 Permanent Indirect Effects

Construction of permanent development projects adjacent to occupied habitat could result in a permanent reduction in the functions of the habitat (e.g., alter the behavior of individuals as a result of lowered ability to remain concealed from disturbances) and result in take (i.e., harassment). If new residential developments are located near occupied habitat, there could be a small, but indeterminable amount of direct take of individual California black rails could be

associated with human occupancy (e.g., predation by domestic cats). Permanent indirect effects on occupied California black rails habitat will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.7.6 Overall Impact Likely to Result from Take

California black rail is a highly specialized species adapted to a narrow range of wetland and tidal marsh habitat conditions. The species has been affected by the loss of more than 80 percent of historic habitat, as well as habitat fragmentation and degradation (see Appendix A). Its current distribution is characterized by small population sizes in a patchy and spatially clumped landscape pattern. The major stressor of California black rails in the Plan Area is the loss of specific wetland structure and hydrology. California black rails are very sensitive to wetland area and isolation. The likelihood that local populations of black rails disappear is directly related to the patch size and the degree of isolation from other occupied habitat patches (Richmond et al. 2010, Risk et al. 2011). Implementation of the AMMs requires that permanent direct impacts on all occupied habitat must be avoided (see Table 4–7). Up to 35 acres of emergent wetland will be removed by the covered activities some of which could support suitable, but unoccupied habitat. All but 8 acres of this emergent wetland is located inside the UPAs, which currently support substantial existing development, rendering it unlikely that these habitat areas would be suitable for future colonization. Consequently, it is unlikely that the California black rail population of the Plan Area will be adversely affected by implementation of the covered activities.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on California black rail or adversely affect its distribution or abundance throughout the Plan Area.

4.4.8 American Peregrine Falcon

The maximum acreage of modeled American peregrine falcon nesting habitat, year-round foraging habitat, and seasonal foraging habitat that will be permanently affected, directly and indirectly, with implementation of the covered activities is 7,836 acres, representing approximately 4 percent of the current extent of its modeled habitat (see Table 4–8, Appendix K and Figure 4–27, *American Peregrine Falcon: Direct Impacts of Covered Activities* [separate files]).

4.4.8.1 Effects Common among Covered Activities

Effects of covered activities that are in common are those that could result in injury or mortality of American peregrine falcon. The American peregrine falcon, however, is a CDFW-designated fully protected species and, as such, implementation of the applicable avoidance and minimization measures in Table 4–7 will avoid actions associated with implementation of the covered activities that could result in the mortality of individuals. Since American peregrine falcon is protected by the MBTA, take in the form of death or injury will not be allowed under

the federal permit for any covered activity. The NCCP permit serves as authorization by CDFW for take of American peregrine falcon consistent with this Plan under the Fish and Game Code. If American peregrine falcon is listed under the federal ESA, the section 10(a)(1)(B) permit can at that point serve as a Special Purpose Permit under the MBTA.

4.4.8.2 Permanent Development Projects

Direct effects of permanent development projects will result in the permanent removal of up to 1,817 acres of modeled American peregrine falcon year-round foraging habitat and 1,943 acres of modeled seasonal foraging habitat, representing approximately 1 percent and 6 percent, respectively of the existing acreage of modeled habitat in the Plan Area (Table 4–8, Figure 4–27). No nesting habitat will be removed by covered activities. Indirect effects of permanent development projects will result in reduced functions of up to 4,077 acres of modeled American peregrine falcon habitat, 1,267 acres of which overlap with areas subject to ongoing effects of existing permanent developments. Indirect effects of permanent development projects are not expected to affect any modeled American peregrine falcon nesting habitat (Appendix K).

Figure O–12, *American Peregrine Falcon Habitat in the Plan Area with full BRCP Implementation* in Appendix O and Table 4–8 provide the acreage of modeled American peregrine falcon habitat remaining within the Plan Area (including BRCP protected lands and lands that are not impacted by the covered activities) with full implementation of the covered activities.

4.4.8.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects within the Chico, State Route 99, Foothill Area, Oroville, Neal Road Drop-Off and Recycling Facility, Oroville, Bangor, Gridley-Biggs, Nelson, and Richvale UPAs will result in permanent direct effects on up to 1,308 acres of modeled American peregrine falcon year-round foraging habitat and 1,838 acres of modeled seasonal foraging habitat (Table 4–9). Loss of this habitat area will reduce the area of any actual American peregrine falcon habitat that is located within affected modeled habitat and thus will reduce the area of habitat available to American peregrine falcon. No known American peregrine falcon nest sites will be removed by permanent development projects (Table 4–9).

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise and visual disturbances associated with operating equipment and other activities necessary to construct new developments (Table 4–1). These impact mechanisms could cause American peregrine falcon to reduce their foraging use of affected habitat areas during the period these activities are implemented. Temporary displacement from foraging habitat and increased numbers of flight responses to disturbance may elevate energetic costs to American peregrine falcon. However, because American peregrine falcons primarily forage

aerially by flying high in the air in order to locate birds from a distance and enter a steep dive to deliver the killing blow (White et al. 2002), noise and visual disturbance is not expected to affect American peregrine falcon as they forage. Foraging from a perch would expose them to the disturbances mentioned here, but the potential for adverse effects of temporary construction-related disturbances on American peregrine falcon behavior, is considered low because the species has shown a high tolerance for human activities and disturbance to nesting and foraging habitat, establishing itself in many cities on the East Coast and achieving high densities and productivity rates similar to rural areas (Gahbauer 2009). The potential for temporary direct effects on American peregrine falcon will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 500-foot distance from permanent new developments within which temporary indirect effects could occur for nesting and foraging American peregrine falcon (see Table 4–5), up to 4,077 acres of modeled American peregrine falcon of modeled habitat Plan Area-wide[71] will be temporarily and directly affected by permanent development covered activities, 1,267 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). No modeled nesting habitat will be affected.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other equipment), building maintenance, and other disturbances associated with human occupancy following construction of permanent developments (see Table 4–1). These disturbances could cause American peregrine falcon to reduce their foraging use of habitat adjacent to permanent development areas. Noise and visual disturbances may preclude American peregrine falcon from nesting on cliffs or other suitable habitat adjacent to permanent developments that otherwise would be suitable for nesting, however, if American peregrine falcon were to nest adjacent to new permanent developments, indirect effects could include nest abandonment and changes in incubation, brooding, and foraging behavior of adult birds that could reduce nesting success. However, the AMMs listed in Table 4–7 will prevent American peregrine falcon nest abandonment.

Based on an average 500-foot distance from permanent new developments within which permanent indirect effects will occur (see Table 4–5), up to 4,077 acres of modeled American peregrine falcon of modeled habitat Plan Area- wide[72] will be permanently and indirectly affected by permanent development covered activities, 1,267 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as

[71] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.
[72] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

and not in addition to the acreage of temporary direct effects (see Appendix K). These permanent indirect effects will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.8.2.2 Outside Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects will result in permanent direct effects on up to 509 acres of modeled American peregrine falcon year-round foraging habitat and 104 acres of modeled seasonal foraging habitat outside the UPAs in all CAZs except the Sacramento River CAZ (see Table 4–9). Loss of this habitat area will reduce the area of any actual American peregrine falcon habitat that is located within affected modeled habitat and thus will reduce the area of habitat available to American peregrine falcon. The effects of such loss of modeled habitat on American peregrine falcon are the same as described for the permanent direct effects of implementing permanent development projects in the UPAs (see Section 4.4.8.2.1, *Within Urban Permit Areas*). No active American peregrine falcon nest sites will be removed by permanent development projects (Table 4–7).

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise and visual disturbances associated with operating equipment and other activities necessary to construct new developments (Table 4–1). The effects of these impact mechanisms on American peregrine falcon are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.8.2.1). The potential for temporary direct effects on American peregrine falcon will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 500-foot distance from permanent new developments within which temporary indirect effects could occur for foraging and nesting American peregrine falcon (see Table 4–5), up to 4,077 acres of modeled American peregrine falcon of modeled habitat Plan Area-wide[73] will be temporarily and directly affected by permanent development covered activities, 1,267 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

The potential for adverse effects on individual American peregrine falcon of construction-related noise and visual disturbances is considered to be low because of the following factors.

1. Approximately 1 percent of the available modeled year-round foraging habitat and 4 percent of modeled seasonal foraging habitat would be affected if all permanent development activities were implemented simultaneously, but permanent development

[73] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

projects would not be implemented simultaneously and thus a much smaller area of habitat would be affected by construction-related disturbances at any point in time.

2. The majority of covered activities implemented outside of the UPAs are linear transportation infrastructure projects (e.g., bridge replacements, intersection improvements). As such, the period over which a given area of habitat adjacent to project footprints will be subjected to temporary direct construction-related disturbances will be limited as the area under construction moves along the project ROW.
3. Affected modeled foraging habitat areas are within or near larger patches of modeled foraging habitat that would not be disturbed and would be available for use by displaced individuals.
4. American peregrine falcon seem to be tolerant of human activities and disturbance as demonstrated by the high population densities and similar productive rates compared to rural areas of urban populations on the East Coast.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity) and noise (e.g., operation of vehicles and other equipment), building maintenance, and other disturbances associated with human activity following construction of permanent developments (see Table 4–1). The effects of these impact mechanisms on American peregrine falcon are the same as described for the permanent indirect effects of implementing permanent development projects within UPAs (see Section 4.4. 8.2.1). The level of these effects are expected to be less than that associated with permanent development projects within UPAs because they do not include residential developments, which are expected to support higher levels of human activity than nonresidential developments. Permanent indirect effects of new roads include ongoing noise and visual disturbances associated with vehicle traffic that could affect use of adjacent habitat areas and increased risk for mortality or injury of individual American peregrine falcon associated with collisions with vehicles. The potential for collisions with vehicles is considered to be low because American peregrine falcon forages aerially.

Noise and visual disturbances may preclude American peregrine falcon from nesting on cliffs or other suitable locations adjacent to new roads and bridges that otherwise would be suitable for nesting. However, this is considered unlikely because, as discussed above, American peregrine falcons are tolerant of disturbance and have been highly successful in some urban areas breeding on skyscrapers and bridges. In addition, noise and visual disturbance will not affect any modeled nesting habitat in the Plan Area. The likelihood that noise and visual disturbances adversely affect American peregrine falcon foraging behavior is considered low for the reasons described for the assessment of temporary direct effects. If American peregrine falcon were to nest adjacent to these new facilities, the effects on American peregrine falcon are the same as described for the permanent indirect effects of implementing permanent development projects in the UPAs (see Section 4.4.8.2.1). If American peregrine falcon were to establish nests outside of

UPAs near proposed project footprints before full completion of new roads and bridges, noise, visual, and other disturbances associated with use of these development projects could result in nest abandonment or reduced nesting success. The potential for this effect, however, is considered low because the incidence of nesting in the Plan Area is low, modeled nesting habitat will not be affected by noise and visual disturbances (see Appendix K), American peregrine falcon are tolerant of human disturbance, and the AMMs listed in Table 4–7 will prevent American peregrine falcon nest abandonment.

Based on an average 500-foot distance from permanent new developments within which permanent indirect effects will occur (see Table 4–5), up to 4,077 acres of modeled American peregrine falcon habitat Plan Area-wide[74] will be permanently and indirectly affected by permanent development covered activities, 1,267 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). Adverse effects of these disturbances, however, will be low for the reasons described above for temporary direct effects of construction-related noise and visual disturbances.

4.4.8.3 Recurring Maintenance Activities

4.4.8.3.1 Within Urban Permit Areas

Permanent Direct Effects

With the exception of the potential impact mechanisms and associated effects on American peregrine falcon described in Section 4.4.8.1, *Effects Common among Covered Activities*, there are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on American peregrine falcon. Maintenance removal of vegetation that potentially support American peregrine falcon foraging habitat would reduce the amount of available foraging habitat. However, this effect is expected to be low because maintenance will only affect a very small area and other modeled foraging habitat is abundant. Nest sites are inaccessible and unvegetated and therefore no maintenance will affect nesting habitat. However, if occupied American peregrine falcon nest sites are located near locations where recurring maintenance activities will be implemented, the potential for impacts on American peregrine falcon nesting success associated with maintenance-related noise and visual disturbances will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

[74] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (Table 4–1). The effects of these impact mechanisms on American peregrine falcon are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.8.2.1), except that the duration of maintenance-related activities is generally expected to be less than that of construction-related activities. The potential for temporary direct effects on American peregrine falcon will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

The potential for adverse effects of temporary recurring maintenance-related disturbances on American peregrine falcon foraging behavior is considered low for the reasons discussed above for the temporary direct effects of permanent development within UPAs section. In addition, the potential for adverse effects of temporary recurring maintenance-related disturbances on American peregrine falcon behavior, however, is considered low within the UPAs because many of these activities will be implemented in developed areas that are already subject to high levels of disturbance (e.g., traffic), foraging habitat is not a factor limiting the species in the Plan Area (see Appendix A) and, given the distribution of modeled foraging habitat (Figure 4–27), there is a high probability that alternate foraging habitat areas will be available near affected areas during a generally short period of disturbance for most activities (e.g., a few hours to a few days).

Permanent Indirect Effects

As described in Table 4–2, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on American peregrine falcon.

4.4.8.3.2 Outside Urban Permit Areas

Permanent Direct Effects

The impacts of recurring maintenance activities on American peregrine falcon are the same as described above for these activities within UPAs.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (e.g., ground vibrations). The effects of these impact mechanisms on American peregrine falcon are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.8.2.1), except that the duration of maintenance-related activities is generally expected to be less than that of construction-related activities. The potential for temporary direct effects on American peregrine falcon will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

As described in Table 4–2, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on American peregrine falcon.

4.4.8.4 Effects of Covered Activities within Conservation Lands

4.4.8.4.1 Permanent Direct Effects

Implementation of conservation measures to restore riparian habitat will convert up to 189 acres of habitat (i.e., pasture lands with potholes or vernal pools that provide habitat for waterfowl and other water birds) that could support modeled American peregrine falcon foraging habitat to riparian vegetation types that do not support modeled American peregrine falcon foraging habitat. The actual impact will be less, however, because a portion of the restored riparian habitat will not be restored on land cover types used by American peregrine falcon to forage. The effects of such loss of modeled habitat on American peregrine falcon are the same as described for the permanent direct effects of implementing permanent development projects in the UPAs (see Section 4.4.8.2.1).

4.4.8.4.2 Temporary Direct Effects

Temporary direct effects are associated with the operation of equipment and other activities related to implementing habitat restoration, enhancement, and management actions in or adjacent to BRCP conservation lands that cause temporary noise, visual, and other disturbances to American peregrine falcon (see Table 4–1). The effects of these impact mechanisms on American peregrine falcon are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.8.2.1). The potential for temporary direct effects on American peregrine falcon will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.8.4.3 Permanent Indirect Effects

Implementation of conservation measures will not result in permanent indirect effects on American peregrine falcon because restored and protected habitats will not be associated with increasing human presence, noise, traffic risks, or other impact mechanisms that could result in indirect effects (Table 4–1). Restored habitat types, although they may not support American peregrine falcon, are highly unlikely to impose additional risk factors or stressors on American peregrine falcon.

4.4.8.5 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of American peregrine falcon within the Plan Area.

4.4.8.5.1 Permanent Direct Effects

Loss of up to 1,817 acres of modeled American peregrine falcon year-round foraging habitat and 1,943 acres of modeled seasonal foraging habitat (Table 4–8) associated with implementation of the permanent development projects and up to an additional 189 acres of modeled foraging habitat removed to restore habitat types that do not support American peregrine falcon foraging habitat.[75]

A small, but indeterminable, amount of direct take of individual juvenile and adult American peregrine falcon could be associated with loss of eggs and juveniles if nest sites are abandoned as a result of the covered activities, but will be avoided with implementation of the applicable AMMs indicated in Table 4–7.

4.4.8.5.2 Temporary Direct Effects

A temporary reduction in the functions of up to 4,077 acres of modeled American peregrine falcon habitat[76] would result from harassment associated with covered activities, 1,267 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Management-related activities on up to 29,192 acres of conservation lands supporting modeled American peregrine falcon habitat will result in temporary direct effects on a relatively small acreage of additional habitat that cannot be estimated. The acreage of take (i.e., harassment) will be the amount of actual habitat that is located within the area of affected modeled habitat. Temporary direct effects on American peregrine falcon will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.8.5.3 Permanent Indirect Effects

A permanent reduction in the functions of up to 4,077 acres of modeled American peregrine falcon habitat would result from harassment associated with covered activities, 1,267 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). The acreage of take (i.e., harassment) will be the amount of actual habitat that is located within the area of affected modeled habitat. Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). Permanent indirect effects on occupied American peregrine falcon habitat will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

[75] Habitat impacts of restoration are not included in Tables 4–8 and 4–9 and therefore total impact acreages will differ.

[76] Does not include temporary impacts on habitat function that could be associated with restoration of 306 acres of vernal pool and other seasonal wetlands, 613 acres of riparian habitat, 121 acres of emergent wetland, and 500 acres of giant garter snake habitat.

A small, but indeterminable, amount of direct take of individual juvenile and adult American peregrine falcon could be associated with collisions/electrocutions at newly constructed or retrofitted power lines, collisions with vehicles associated with new or increased traffic on new and improved roadways, and with loss of eggs and juveniles if nest sites are abandoned as a result of noise, visual, and other disturbances associated with new permanent development projects. However, these permanent indirect effects on American peregrine falcon will be avoided with implementation of the applicable AMMs indicated in Table 4–7.

4.4.8.6 Overall Impact Likely to Result from Take

The primary threat to American peregrine falcon has been the use of organochlorine pesticides, mainly dichlorodiphenyltrichloroethane (DDT), which cause serious eggshell thinning and nesting failure as a result of ingesting prey contaminated with DDE, a metabolite of DDT (White et al. 2002). As a result, there was a slow but drastic decline after World War II in the number of peregrine falcons in most areas of its range in North America. By 1975, there was no reported breeding in the eastern population and only 324 known nesting pairs in the west[77] (White et al. 2002, Wheeler 2003). Since the banning of DDT and subsequent recovery efforts, the population has recovered and is no longer listed under the federal ESA[78] (White et al. 2002, USFWS 2003). While CNDDB has no reports of peregrine falcon in Butte County, a relatively substantial number of occurrences have been reported by state agencies and local experts within the Plan Area. Nests and/or breeding activity have been reported in upper Butte Creek Canyon (reported by Altacal Audubon Society), Upper Bidwell Park (reported by CDFW and Altacal Audubon Society), on suspension bridges across Lake Oroville (reported by California Department of Water Resources [DWR] and Altacal Audubon Society), and the western bluffs of Table Mountain Ecological Reserve (reported by CDFW).

The covered activities will result in the loss of up to 1,817 acres of modeled American peregrine falcon year-round foraging habitat and 1,943 acres of modeled seasonal foraging habitat, representing approximately 1 percent and 6 percent of the extent of modeled habitat present in the Plan Area, respectively (Table 4–8). Up to an additional 189 acres of modeled year-round foraging habitat could be removed to restore habitat types that do not support American peregrine falcon foraging habitat. The distribution and abundance of American peregrine falcon does not seem to be limited by the availability of foraging habitat in the Plan Area and, following implementation of the covered activities, over 98 percent of its modeled habitat types will remain in the Plan Area with implementation of all applicable AMMs (Table 4–7).

Based on this evaluation, implementation of the covered activities, with implementation of all applicable AMMs (Table 4–7), is not expected to result in adverse population-level effects on American peregrine falcon or adversely affect its Plan Area distribution or abundance.

[77] 64 *Federal Register* (FR) 46542, August 25, 1999.
[78] 68 FR 67697, December 3, 2003.

4.4.9 Swainson's Hawk

The maximum acreage of modeled Swainson's hawk modeled nesting habitat, nesting and foraging habitat, and foraging habitat that will be permanently affected, directly and indirectly, with implementation of the covered activities is 20,947 acres, representing approximately 14 percent of the current extent of its modeled habitat (see Table 4–8, Appendix K, and Figure 4–28, *Swainson's Hawk: Direct Impacts of Covered Activities* [separate files]).

4.4.9.1 Effects Common among Covered Activities

Actions associated with implementation of the covered activities (e.g., operation of equipment for construction of new developments, restoration of habitat, and maintenance of existing facilities) could result in injury or mortality of Swainson's hawk. For example, individual Swainson's hawks could collide with construction-related equipment, cranes or guy wires and adults could abandon care of eggs and nestlings as a result of excessive construction-related noise and visual disturbances near nest sites. The risk of collision of adult birds with construction-related equipment, however, is considered low because construction sites are expected to be avoided by adult birds, which are highly mobile and typically fly at altitudes too high to collide with equipment. Electrocution on newly constructed or modified power distribution or transmission lines is a potential risk for Swainson's hawks, especially when these power lines intersect foraging habitat. The potential for these impacts will be avoided with implementation of the applicable AMMs indicated in Table 4–7.

The probability that the accidental introduction of contaminants associated with construction and maintenance activities (e.g., fuel spills) will adversely affect individual Swainson's hawks is considered low because birds are expected to avoid work sites with ongoing noise and visual construction-related disturbances. In addition, Swainson's hawks typically have little to no contact with the ground other than immediately following a successful prey strike. In addition, implementation of the applicable AMMs indicated in Table 4–7 provides for containment and rapid cleanup of releases that may occur, thus reducing exposure risk and the period that individuals could be exposed to contaminants.

4.4.9.2 Permanent Development Projects

Direct effects of permanent development projects will result in the permanent removal of up to 315 acres of modeled Swainson's hawk nesting habitat, 557 acres of modeled nesting and foraging habitat, and 10,441 acres of modeled foraging habitat (Table 4–9), representing approximately 2 percent, 22 percent, and 8 percent, respectively, of the existing acreage of modeled habitat in the Plan Area (Table 4–8, Figure 4–28). Indirect effects of permanent development projects will result in reduced functions of up to 9,635 acres of modeled Swainson's hawk habitat, 5,835 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Implementation of the covered activities will not isolate or fragment Swainson's hawk use of the Plan Area because Swainson's hawk is a

highly mobile species that can easily move among patches of habitat that become disconnected with implementation of the covered activities. Figure O–13, *Swainson's Hawk Habitat in the Plan Area with full BRCP Implementation* in Appendix O and Table 4–8 provide the acreage of modeled Swainson's hawk habitat remaining within the Plan Area (including BRCP protected lands and lands that are not impacted by the covered activities) with full implementation of the covered activities.

4.4.9.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects within the Chico, State Route 99, Foothill Area, Oroville, Neal Road Drop-Off and Recycling Facility, Honcut, Durham, and Gridley-Biggs UPAs will result in permanent direct effects on up to 9,650 acres of modeled Swainson's hawk foraging habitat, 556 acres of modeled nesting and foraging habitat, and 270 acres of modeled nesting habitat (Table 4–9). Loss of this habitat area will reduce the area of any actual Swainson's hawk habitat that is located within affected modeled habitat and thus will reduce the area of habitat available to Swainson's hawk. No known Swainson's hawk nest sites will be removed by permanent development projects (Table 4–9).

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise and visual disturbances associated with operating equipment and other activities necessary to construct new developments (Table 4–1). These impact mechanisms could cause Swainson's hawk to reduce their foraging use of affected habitat areas during the period these activities are implemented. Temporary displacement from foraging habitat and increased numbers of flight responses to disturbance may elevate energetic costs to Swainson's hawk. However, because Swainson's hawk primarily aerially, noise and visual disturbance is not expected to affect Swainson's hawk as they forage. Noise and visual disturbance to nesting Swainson's hawks, can cause displacement of incubating or brooding adults from the nest or may interfere with the provisioning of the brooding female by the male. However, in the Central Valley, individual Swainson's Hawks have been found to be able to tolerate the routine disturbances associated with automobile traffic on city streets and rural highways, agricultural machinery, and small airplanes, especially if they are present and ongoing at the time of nest site selection (England et al. 1997). These and other disturbances can be disruptive if intermittent or if exceedingly loud or extensive. The potential for temporary direct effects on Swainson's hawk will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 500-foot distance from permanent new developments within which temporary direct effects could occur for foraging Swainson's hawks and the 1,300-foot distance from permanent new developments within which temporary direct effects could occur for nesting

Swainson's hawks (see Table 4–5), up to 9.635 acres of modeled Swainson's hawk habitat Plan Area-wide[79] will be temporarily and directly affected by permanent development covered activities, 5,835 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other equipment), building maintenance, and other disturbances associated with human occupancy following construction of permanent developments (see Table 4–1). These disturbances could cause Swainson's hawk to reduce their foraging use of habitat adjacent to permanent development areas. Excessive noise and visual disturbances may preclude Swainson's hawk from nesting in suitable habitat adjacent to permanent developments, however, if Swainson's hawk were to nest adjacent to new permanent developments, permanent indirect effects could include nest abandonment and changes in incubation, brooding, and foraging behavior of adult birds that could reduce nesting success. However, the likelihood for this impact is low because Swainson's hawks are typically tolerant of human activities in the vicinity of nest sites in both urban and agricultural areas (Estep 1989, England et al. 1995).

Based on an average 500- and 1,300-foot distance from permanent new developments within which permanent indirect effects will occur (see Table 4–5), up to 9,635 acres of modeled Swainson's hawk habitat Plan Area-wide[80] will be temporarily and directly affected by permanent development covered activities, 5,835 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). These permanent indirect effects will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.9.2.2 Outside Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects will result in permanent direct effects on up to 791 acres of modeled Swainson's hawk foraging habitat, 1 acre of modeled nesting and foraging habitat, and 44 acres of modeled nesting habitat outside of UPAs distributed among all the CAZs (Table 4–9). Loss of this habitat area will reduce the area of any actual Swainson's hawk habitat that is located within affected modeled habitat and thus will reduce the area of habitat available to Swainson's hawk. The effects of such loss of modeled habitat on Swainson's hawk are the same as described for the permanent direct effects of implementing permanent

[79] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.
[80] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

development projects in the UPAs (see Section 4.4.9.2.1, *Within Urban Permit Areas*). No known Swainson's hawk nest sites will be removed by permanent development projects (Table 4–9).

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise and visual disturbances associated with operating equipment and other activities necessary to construct new developments (Table 4–1). The effects of these impact mechanisms on Swainson's hawk are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.9.2.1). The potential for temporary direct effects on Swainson's hawk will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 500-foot distance from permanent new developments within which temporary indirect effects could occur for foraging Swainson's hawks and the 1,300-foot distance from permanent new developments within which temporary indirect effects could occur for nesting Swainson's hawks (see Table 4–5), up to 9,635 acres of modeled Swainson's hawk habitat Plan Area-wide[81] will be temporarily and directly affected by permanent development covered activities, 5,835 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

The potential for adverse effects on individual Swainson's hawk of construction-related noise and visual disturbances is considered to be low because of the following factors.

1. Approximately 0.6 percent of the available modeled foraging habitat and foraging and nesting habitat would be affected if all permanent development activities were implemented simultaneously, but permanent development projects would not be implemented simultaneously and thus a much smaller area of habitat would be affected by construction-related disturbances at any point in time.
2. The majority of covered activities implemented outside of the UPAs are linear transportation infrastructure projects (e.g., bridge replacements, intersection improvements). As such, the period over which a given area of habitat adjacent to project footprints will be subjected to temporary direct construction-related disturbances will be limited as the area under construction moves along the project ROW.
3. Affected modeled foraging habitat and foraging and nesting habitat areas are within or near larger patches of modeled foraging habitat that would not be disturbed and would be available for use by displaced individuals.

[81] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

4. Swainson's hawks seem to be tolerant of human activities and disturbance during foraging activities, as indicated by their high-level of use of agricultural landscapes in the Central Valley.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity) and noise (e.g., operation of vehicles and other equipment), building maintenance, and other disturbances associated with human activity following construction of permanent developments (see Table 4–1). The effects of these impact mechanisms on Swainson's hawk are the same as described for the permanent indirect effects of implementing permanent development projects within UPAs (see Section 4.4.9.2.1). The level of these effects are expected to be less than that associated with permanent development projects within UPAs because they do not include residential developments, which are expected to support higher levels of human activity than nonresidential developments. These permanent indirect effects will be minimized with implementation of the applicable AMMs indicated in Table 4–7. Permanent indirect effects of new roads include ongoing noise and visual disturbances associated with vehicle traffic that could affect use of adjacent habitat areas and increased risk for mortality or injury of individual Swainson's hawk associated with collisions with vehicles. The potential for collisions with vehicles is considered to be low because Swainson's hawk forages aerially.

Noise and visual disturbances may preclude Swainson's hawk from nesting in trees adjacent to new roads and bridges that otherwise would be suitable for nesting. However, this is considered unlikely because, as discussed above, Swainson's hawks are known to nest in locations with similar levels of disturbance. The likelihood that noise and visual disturbances adversely affect Swainson's hawk foraging behavior is considered low for the reasons described for the assessment of temporary direct effects. If Swainson's hawk were to nest adjacent to these new facilities, the effects on Swainson's hawk are the same as described for the permanent indirect effects of implementing permanent development projects in the UPAs (see Section 4.4.9.2.1).

Based on an average 500- and 1,300-foot distance from permanent new developments within which permanent indirect effects will occur (see Table 4–5), up to 9,635 acres of modeled Swainson's hawk habitat Plan Area-wide[82] will be temporarily and directly affected by permanent development covered activities, 5,835 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). Adverse effects of these disturbances, however, will be low for the reasons described above for temporary direct effects of construction-related noise and visual disturbances.

[82] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

4.4.9.3 Recurring Maintenance Activities

4.4.9.3.1 Within Urban Permit Areas

Permanent Direct Effects

With the exception of the potential impact mechanisms and associated effects on Swainson's hawk described in Section 4.4.9.1, *Effects Common among Covered Activities*, there are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on Swainson's hawk. Maintenance removal of vegetation that potentially support Swainson's hawk foraging habitat will not adversely affect Swainson's hawk because maintenance will only affect a very small area of vegetation and other modeled foraging habitat is abundant. If occupied Swainson's hawk nest sites are located near locations where recurring maintenance activities will be implemented, the potential for impacts on Swainson's hawk nesting success associated with maintenance-related noise and visual disturbances will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (Table 4–1). The effects of these impact mechanisms on Swainson's hawk are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.9.2.1), except that the duration of maintenance-related activities is generally expected to be less than that of construction-related activities. The potential for temporary direct effects on Swainson's hawk will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

The potential for adverse effects of temporary recurring maintenance-related disturbances on Swainson's hawk foraging behavior is considered low for the reasons discussed above for the temporary direct effects of permanent development within UPAs. In addition, the potential for adverse effects of temporary recurring maintenance-related disturbances on Swainson's hawk behavior, however, is considered low within the UPAs because many of these activities will be implemented in developed areas that are already subject to high levels of disturbance (e.g., traffic), foraging habitat is not a factor limiting the species in the Plan Area (see Appendix A) and, given the distribution of modeled foraging habitat (Figure 4–28), there is a high probability that alternate foraging habitat areas will be available near affected areas during a generally short period of disturbance for most activities (e.g., a few hours to a few days).

Permanent Indirect Effects

As described in Table 4–2, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on Swainson's hawk.

4.4.9.3.2 Outside Urban Permit Areas

Permanent Direct Effects

The impacts of recurring maintenance activities on Swainson's hawk are the same as described above for these activities within UPAs

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (e.g., ground vibrations). The effects of these impact mechanisms on Swainson's hawk are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.9.2.1), except that the duration of maintenance-related activities is generally expected to be less than that of construction-related activities. The potential for temporary direct effects on Swainson's hawk will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

As described in Table 4–2, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on Swainson's hawk.

4.4.9.4 Effects of Covered Activities within Conservation Lands

4.4.9.4.1 Permanent Direct Effects

Implementation of conservation measures to restore riparian habitat will convert up to 178 acres of habitat that supports modeled Swainson's hawk foraging habitat to riparian vegetation types that support modeled Swainson's hawk nesting habitat. Up to an additional 621 acres of modeled foraging habitat could be removed if all of BRCP restored giant garter snake habitat and emergent wetland restoration is located on managed wetlands. Most or all of this restoration, however, will be implemented on rice lands that do not support modeled habitat. The effects of such loss of modeled habitat on Swainson's hawk are the same as described for the permanent direct effects of implementing permanent development projects in the UPAs (see Section 4.4.9.2.1). If occupied Swainson's hawk nest sites are located near locations where restoration projects will be implemented, the potential for impacts on Swainson's hawk nesting success associated with restoration-related noise and visual disturbances will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.9.4.2 Temporary Direct Effects

Temporary direct effects are associated with the operation of equipment and other activities related to implementing habitat restoration, enhancement, and management actions in or adjacent to BRCP conservation lands that cause temporary noise, visual, and other disturbances to Swainson's hawk (see Table 4–1). While the effects of these impact mechanisms on Swainson's

hawk are similar as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.9.2.1), the likelihood of these effects are somewhat greater because the presence of Swainson's hawks outside UPAs is expected to be higher than inside UPAs. The potential for temporary direct effects on occupied Swainson's hawk will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.9.4.3 Permanent Indirect Effects

Implementation of conservation measures will not result in permanent indirect effects on Swainson's hawk because restored and protected habitats will not be associated with increasing human presence, noise, traffic risks, or other impact mechanisms that could result in indirect effects (Table 4–1). Restored habitat types, although they may not support Swainson's hawk, are highly unlikely to impose additional risk factors or stressors on Swainson's hawk.

4.4.9.5 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of Swainson's hawk within the Plan Area.

4.4.9.5.1 Permanent Direct Effects

Loss of up to 315 acres of modeled Swainson's hawk nesting habitat, 557 acres of modeled nesting and foraging habitat, and 10,441 acres of modeled foraging habitat (Table 4–8) associated with implementation of the permanent development projects and up to an additional 799 acres of modeled foraging habitat removed to restore habitat types that do not support Swainson's hawk foraging habitat. The acreage of take (i.e., harm) will be the amount of actual habitat that is located within the area of affected modeled habitat.

A small, but indeterminable, amount of direct take of individual juvenile and adult Swainson's hawk could be associated with loss of eggs and juveniles if nest sites are abandoned as a result of the covered activities. Permanent direct effects of these impacts will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.9.5.2 Temporary Direct Effects

A temporary reduction in the functions of up to 9,635 acres of modeled Swainson's hawk habitat would result from harassment associated with covered activities, 5,835 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Management-related activities on 23,185 acres of conservation lands supporting modeled Swainson's hawk habitat (Table 5-10) will result in temporary direct effects on a relatively small acreage of additional habitat that cannot be estimated. The acreage of take (i.e., harassment) will be the amount of actual habitat that is located within the area of affected modeled habitat. Temporary direct effects on Swainson's hawk will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.9.5.3 Permanent Indirect Effects

A permanent reduction in the functions of up to 9,635 acres of modeled Swainson's hawk habitat would result from harassment associated with covered activities, 5,835 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). The acreage of take (i.e., harassment) will be the amount of actual habitat that is located within the area of affected modeled habitat. Permanent indirect effects on occupied Swainson's hawk habitat will be minimized with implementation of the applicable AMMs indicated in Table 4–7. A small, but indeterminable, amount of direct take of individual juvenile and adult Swainson's hawk could be associated with collisions/electrocutions at newly constructed or retrofitted power lines, collisions with vehicles associated with new or increased traffic on new and improved roadways, and with loss of eggs and juveniles if nest sites are abandoned as a result of noise, visual, and other disturbances associated with new permanent development projects. Permanent indirect effects on Swainson's hawk will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.9.6 Overall Impact Likely to Result from Take

The primary threat to Swainson's hawk in the Central Valley has been the loss or degradation of its nesting range habitat. In addition, the species has been negatively affected by mortality during migration and on the wintering grounds in South America by toxic chemicals, including pesticides, eggshell thinning and bioaccumulation of contaminants. One or more local factors on the breeding grounds in California are also presumed to be the reason for observed declines (Risebrough et al. 1989). For example, approximately 98 percent of the original Central Valley riparian forest has been removed (Katibah 1984) with similar losses of grasslands and other wetland habitats. Compared to native conditions, the Central Valley has few trees due to agricultural clearing, and common crops such as vineyards and cotton are unsuitable foraging cover (Estep 1989). Continued loss of mature tree and riparian woodland habitats to urban and agricultural developments could further reduce or eliminate both nesting and foraging habitat. Direct loss of Swainson's hawk as a result of shooting has also historically contributed to the population decline (England et al. 1997).

The covered activities will result in the loss of up to 315 acres of modeled Swainson's hawk nesting habitat, 557 acres of modeled nesting and foraging habitat, and 10,441 acres of modeled foraging habitat, representing approximately 2 percent, 22 percent, and 8 percent of the acreage of these modeled habitat types in the Plan Area (Table 4–8). Up to an additional 2,734 acres of modeled foraging habitat could be removed to restore habitat types that do not support Swainson's hawk foraging habitat. The distribution and abundance of Swainson's hawk does not seem to be limited by the availability foraging or nesting habitat in the Plan Area and, following implementation of the covered activities, over 92 percent of its modeled nesting and foraging

habitat types will remain in the Plan Area with implementation of all applicable AMMs (Table 4–7).

Based on this evaluation, implementation of the covered activities, with implementation of all applicable AMMs (Table 4–7), is not expected to result in adverse population-level effects on Swainson's hawk or adversely affect its Plan Area distribution or abundance.

4.4.10 White-Tailed Kite

The maximum acreage of modeled white-tailed kite nesting habitat, breeding season foraging habitat, and modeled year-round foraging habitat that will be permanently affected, directly and indirectly, with implementation of the covered activities is 33,745 acres, representing approximately 11 percent of the current extent of its modeled habitat (see Table 4–8, Appendix K, and Figure 4–29, *White-Tailed Kite: Direct Impacts of Covered Activities* [separate files]).

4.4.10.1 Effects Common among Covered Activities

Effects of covered activities that are in common are those that could result in injury or mortality of white-tailed kite. The white-tailed kite, however, is a CDFW-designated fully protected species and, as such, implementation of the applicable avoidance and minimization measures in Tables 4-6 and 4-7 will avoid actions associated with implementation of the covered activities that could result in the mortality of individuals. Because white-tailed kite is protected by the MBTA, take in the form of death or injury will not be allowed under the federal permit for any covered activity. The NCCP permit serves as authorization by CDFW for take of white-tailed kite consistent with this Plan under the Fish and Game Code. If white-tailed kite is listed under the federal ESA, the section 10(a)(1)(B) permit can at that point serve as a Special Purpose Permit under the MBTA.

4.4.10.2 Permanent Development Projects

Direct effects of permanent development projects will result in the permanent removal of up to 2,598 acres of modeled white-tailed kite nesting habitat, 6,599 acres of modeled year-round foraging habitat, and 6,986 acres of modeled breeding season foraging habitat, representing approximately 8 percent, approximately 4 percent, and 7 percent, respectively, of the existing acreage of modeled habitat in the Plan Area (Table 4–8, Figure 4–29). Indirect effects of permanent development projects will result in reduced functions of up to 17,562 acres of modeled white-tailed kite habitat, 11,081 acres of which overlap with areas subject to ongoing effects of existing permanent developments (Appendix K).

Figure O–14, *White-Tailed Kite Habitat in the Plan Area with full BRCP Implementation* in Appendix O and Table 4–8 provide the acreage of modeled white-tailed kite habitat remaining within the Plan Area (including BRCP protected lands and lands that are not impacted by the covered activities) with full implementation of the covered activities.

4.4.10.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects within the Chico, State Route 99, Foothill Area, Oroville, Neal Road Drop-Off and Recycling Facility, Honcut, Bangor, Durham, Gridley-Biggs, Nelson, and Richvale UPAs will result in permanent direct effects on up to 2,545 acres of modeled white-tailed kite nesting habitat, 5,673 acres of modeled year-round foraging habitat, and 6,665 acres of modeled breeding season foraging habitat (Table 4–9). Loss of this habitat area will reduce the area of any actual white-tailed kite habitat that is located within affected modeled habitat and thus will reduce the area of habitat available to white-tailed kite.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise and visual disturbances associated with operating equipment and other activities necessary to construct new developments (Table 4–1). These impact mechanisms could cause white-tailed kite to reduce their foraging use of affected habitat areas during the period these activities are implemented. Temporary displacement from foraging habitat and increased numbers of flight responses to disturbance may elevate energetic costs to white-tailed kite. Noise and visual disturbance to nesting or perching white-tailed kites may cause displacement of incubating or brooding adults from the nest or may interfere with the provisioning of the brooding female by the male. These and other disturbances can be disruptive if intermittent or if exceedingly loud or extensive. The potential for temporary direct effects on white-tailed kite will be minimized with implementation of the AMMs indicated in Table 4–7.

Based on an average 500-foot distance from permanent new developments within which temporary indirect effects could occur for foraging white-tailed kites and the 1,300-foot distance from permanent new developments within which temporary indirect effects could occur for nesting white-tailed kites (see Table 4–5), up to 17,562 acres of modeled white-tailed kite habitat Plan Area- wide[83] will be temporarily and directly affected by permanent development covered activities, 11,081 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other equipment), building maintenance, and other disturbances associated with human occupancy following construction of permanent developments (see Table 4–1). These disturbances could cause white-tailed kite to reduce their foraging use of habitat adjacent to permanent development areas. Excessive noise and visual disturbances may preclude white-tailed kite from nesting in

[83] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

suitable habitat adjacent to permanent developments, however, if white-tailed kite were to nest adjacent to new permanent developments, permanent indirect effects could include nest abandonment and changes in incubation, brooding, and foraging behavior of adult birds that could reduce nesting success. However, the AMMs listed in Table 4–7 will prevent white-tailed kite nest abandonment.

Based on an average 500 and 1,300-foot distance from permanent new developments within which permanent indirect effects will occur (see Table 4–5), up to 17,562 acres of modeled white-tailed kite habitat Plan Area-wide[84] will be permanently and indirectly affected by permanent development covered activities, 11,081 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). These permanent indirect effects will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.10.2.2 Outside Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects will result in permanent direct effects on up to 53 acres of modeled white-tailed kite nesting habitat, 926 acres of modeled year-round foraging habitat, and 321 acres of modeled breeding season foraging habitat outside the UPAs distributed among all the CAZs (see Table 4–9). Loss of this habitat area will reduce the area of any actual white-tailed kite habitat that is located within affected modeled habitat and thus will reduce the area of habitat available to white-tailed kite. The effects of such loss of modeled habitat on white-tailed kite are the same as described for the permanent direct effects of implementing permanent development projects in the UPAs (see Section 4.4.10.2.1, *Within Urban Permit Areas*). Implementation of the AMMs will ensure no active white-tailed kite nest sites will be removed by permanent development projects (Tables 4-6 and 4-76).

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise and visual disturbances associated with operating equipment and other activities necessary to construct new developments (Table 4–1). The effects of these impact mechanisms on white-tailed kite are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.10.2.1). The potential for temporary direct effects on white-tailed kite will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

[84] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

Based on an average 500-foot distance from permanent new developments within which temporary indirect effects could occur for foraging white-tailed kite and the 1,300-foot distance from permanent new developments within which temporary indirect effects could occur for nesting white-tailed kite (see Table 4–5), up to 17,652 acres of modeled white-tailed kite habitat Plan Area-wide[85] will be temporarily and directly affected by permanent development covered activities, 11,081 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

The potential for adverse effects on individual white-tailed kite of construction-related noise and visual disturbances is considered to be low because of the following factors.

1. Approximately 0.2 percent of the available modeled nesting habitat, 0.6 percent of modeled year-round foraging habitat, and 0.4 percent of modeled breeding season foraging habitat would be affected if all permanent development activities were implemented simultaneously, but permanent development projects would not be implemented simultaneously and thus a much smaller area of habitat would be affected by construction-related disturbances at any point in time.
2. The majority of covered activities implemented outside of the UPAs are linear transportation infrastructure projects (e.g., bridge replacements, intersection improvements). As such, the period over which a given area of habitat adjacent to project footprints will be subjected to temporary direct construction-related disturbances will be limited as the area under construction moves along the project ROW.
3. Affected modeled foraging habitat areas are within or near larger patches of modeled foraging habitat that would not be disturbed and would be available for use by displaced individuals.
4. White-tailed kites seem to be tolerant of human activities and disturbance during foraging and even nesting activities, as indicated by their high-level of use of agricultural landscapes in the Central Valley.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity) and noise (e.g., operation of vehicles and other equipment), building maintenance, and other disturbances associated with human activity following construction of permanent developments (see Table 4–1). The effects of these impact mechanisms on white-tailed kite are the same as described for the permanent indirect effects of implementing permanent development projects within UPAs (see Section 4.4.10.2.1). The level of these effects are expected to be less than that associated with permanent development projects within UPAs because they do not include residential developments, which are expected to support higher levels of human activity than nonresidential developments. Permanent indirect

[85] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

effects of new roads include ongoing noise and visual disturbances associated with vehicle traffic that could affect use of adjacent habitat areas and increased risk for mortality or injury of individual white-tailed kite associated with collisions with vehicles. The potential for collisions with vehicles is considered to be low because white-tailed kite forage aerially.

Noise and visual disturbances may preclude white-tailed kite from nesting in trees adjacent to new roads and bridges that otherwise would be suitable for nesting. However, this is considered unlikely because, as discussed above, white-tailed kite are known to nest in locations with similar levels of disturbance. The likelihood that noise and visual disturbances adversely affect white-tailed kite foraging behavior is considered low for the reasons described for the assessment of temporary direct effects. If white-tailed kite were to nest adjacent to these new facilities, the effects on white-tailed kite are the same as described for the permanent indirect effects of implementing permanent development projects in the UPAs (see Section 4.4.10.2.1).

Based on an average 500- and 1,300-foot distance from permanent new developments within which permanent indirect effects will occur (see Table 4–5), up to 17,562 acres of modeled white-tailed kite habitat Plan Area-wide[86] will be permanently and indirectly affected by permanent development covered activities, 11,081 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). Adverse effects of these disturbances, however, will be low for the reasons described above for temporary direct effects of construction-related noise and visual disturbances.

4.4.10.3 Recurring Maintenance Activities

4.4.10.3.1 Within Urban Permit Areas

Permanent Direct Effects

With the exception of the potential impact mechanisms and associated effects on white-tailed kite described in Section 4.4.10.1, *Effects Common among Covered Activities*, there are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on white-tailed kite. Maintenance removal of vegetation that potentially support white-tailed kite foraging habitat may adversely affect white-tailed kite. However, this affect will likely be low, but because maintenance will only affect a very small area of vegetation and would be occurring within areas that already experience a high level of human disturbance. If occupied white-tailed kite nest sites are located near locations where recurring maintenance activities will be implemented, the potential for impacts on white-tailed kite nesting success associated with maintenance-related

[86] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

noise and visual disturbances will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (Table 4–1). The effects of these impact mechanisms on white-tailed kite are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.10.2.1), except that the duration of maintenance-related activities is generally expected to be less than that of construction-related activities. The potential for temporary direct effects on white-tailed kite will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

The potential for adverse effects of temporary recurring maintenance-related disturbances on white-tailed kite foraging behavior is considered low for the reasons discussed above for the temporary direct effects of permanent development within UPAs. In addition, the potential for adverse effects of temporary recurring maintenance-related disturbances on white-tailed kite behavior, however, is considered low within the UPAs because many of these activities will be implemented in developed areas that are already subject to high levels of disturbance (e.g., traffic), foraging habitat is not a factor limiting the species in the Plan Area (see Appendix A) and, given the distribution of modeled foraging habitat (Figure 4–29), there is a high probability that alternate foraging habitat areas will be available near affected areas during a generally short period of disturbance for most activities (e.g., a few hours to a few days).

Permanent Indirect Effects

As described in Table 4–2, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on white-tailed kite.

4.4.10.3.2 Outside Urban Permit Areas

Permanent Direct Effects

The impacts of recurring maintenance activities on white-tailed kite are the same as described above for these activities within UPAs.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (e.g., ground vibrations). The effects of these impact mechanisms on white-tailed kite are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.10.2.1), except that the duration of maintenance-related activities is generally expected to be less than that of construction-related activities. The potential for temporary direct effects on white-tailed kite will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

As described in Table 4–2, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on white-tailed kite.

4.4.10.4 Effects of Covered Activities within Conservation Lands

4.4.10.4.1 Permanent Direct Effects

Implementation of conservation measures to restore riparian habitat will convert up to 11 acres of habitat that could support modeled white-tailed kite foraging habitat to willow scrub, which does not support modeled white-tailed kite habitat, and convert up to 178 acres of potential foraging habitat to nesting habitat. Up to an additional 621 acres of modeled foraging habitat could be removed if all of BRCP restored giant garter snake habitat and emergent wetland restoration is located on managed wetlands, rice, or irrigated agricultural land. The actual impact will be less, however, because a portion of the restored giant garter snake habitat will include uplands that will support white-tailed kite foraging habitat.[87] The effects of such loss of modeled foraging habitat on white-tailed kite are similar in nature as described for the permanent direct effects of implementing permanent development projects in the UPAs (see Section 4.4.10.2.1). However, many of the restoration actions would convert to a habitat type that does support white-tailed kite. If occupied white-tailed kite nest sites are located near locations where restoration projects will be implemented, the potential for impacts on white-tailed kite nesting success associated with restoration-related noise and visual disturbances will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.10.4.2 Temporary Direct Effects

Temporary direct effects are associated with the operation of equipment and other activities related to implementing habitat restoration, enhancement, and management actions in or adjacent to BRCP conservation lands that cause temporary noise, visual, and other disturbances to white-tailed kite (see Table 4–1). The effects of these impact mechanisms on white-tailed kite are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.10.2.1). The potential for temporary direct effects on white-tailed will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.10.4.3 Permanent Indirect Effects

Implementation of conservation measures will not result in permanent indirect effects on white-tailed kite because restored and protected habitats will not be associated with increasing human

[87] For example, if restored giant garter snake habitat is designed to restore 60 percent wetland/open water and 40 percent upland refugia habitat, the net loss of white-tailed kite foraging habitat associated with restoring all of the giant garter snake and emergent wetland habitat on managed wetlands or other suitable foraging habitat would only be 1,273 acres.

presence, noise, traffic risks, or other impact mechanisms that could result in indirect effects (Table 4–1). Restored habitat types, although they may not support white-tailed kite, are highly unlikely to impose additional risk factors or stressors on white-tailed kite.

4.4.10.5 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of white-tailed kite within the Plan Area.

4.4.10.5.1 Permanent Direct Effects

Loss of up to 2,598 acres of modeled white-tailed kite nesting habitat, 6,599 acres of modeled year-round foraging habitat, and up to 6,986 acres of modeled breeding season foraging habitat (Table 4–8) associated with implementation of the permanent development projects and up to an additional 632 acres of modeled foraging habitat removed to restore habitat types that do not support white-tailed kite foraging or nesting habitat and up to 178 acres of foraging habitat removed to restore modeled nesting habitat[88].

A small, but indeterminable, amount of direct take of individual juvenile and adult white-tailed kite could be associated with loss of eggs and juveniles if nest sites are abandoned as a result of the covered activities, but will be avoided with implementation of the applicable AMMs indicated in Table 4–7.

4.4.10.5.2 Temporary Direct Effects

A temporary reduction in the functions of up to 17,562 acres of modeled white-tailed kite habitat[89] would result from harassment associated with covered activities, 11,081 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Management-related activities on up to 56,241 acres of conservation lands supporting modeled white-tailed kite habitat (Table 5-10) will result in temporary direct effects on a relatively small acreage of additional habitat that cannot be estimated. The acreage of take (i.e., harassment) will be the amount of actual habitat that is located within the area of affected modeled habitat. Temporary direct effects on white-tailed kite will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.10.5.3 Permanent Indirect Effects

A permanent reduction in the functions of up to 17,562 acres of modeled white-tailed kite habitat would result from harassment associated with covered activities Includes temporary impacts of habitat function (see Appendix K). Because temporary direct effects associated with projects

[88] Habitat impacts of restoration are not included in Tables 4–8 and 4–9 and therefore total impact acreages will differ.
[89] Does not include temporary impacts on habitat function that could be associated with restoration of 306 acres of vernal pool and other seasonal wetlands, 613 acres of riparian habitat, 121 acres of emergent wetland, and 500 acres of giant garter snake habitat.

have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). The acreage of take (i.e., harassment) will be the amount of actual habitat that is located within the area of affected modeled habitat. Permanent indirect effects on occupied white-tailed kite habitat will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

A small, but indeterminable, amount of direct take of individual juvenile and adult white-tailed kite could be associated with collisions/electrocutions at newly constructed or retrofitted power lines, collisions with vehicles associated with new or increased traffic on new and improved roadways, and with loss of eggs and juveniles if nest sites are abandoned as a result of noise, visual, and other disturbances associated with new permanent development projects. However, these permanent indirect effects on white-tailed kite will be avoided with implementation of the applicable AMMs indicated in Table 4–7.

4.4.10.6 Overall Impact Likely to Result from Take

The primary threat to white-tailed kite in the Central Valley has been the loss, degradation, and fragmentation of its nesting habitat. In the past, the species has increased considerably throughout its range, and is currently most numerous in California, but its distribution is patchy throughout the Central Valley. White-tailed kites forage in grasslands, agricultural fields, and wetlands in California. Stendell (1972) and Dunk and Cooper (1994) noted the dependence of kite populations on the California vole (*Microtus californicus*) and that localized fluctuations in kite numbers may be related to the population dynamics of their microtine rodent prey.

The covered activities will result in the loss of up to 2,598 acres of modeled white-tailed kite nesting habitat, 6,599 acres of modeled year-round foraging habitat, and 6,986 acres of modeled breeding season foraging habitat, representing approximately 8 percent, 4 percent, and 7 percent of the extent of modeled habitat present in the Plan Area, respectively (Table 4–8). Up to an additional 632 acres of modeled foraging habitat could be removed to restore habitat types that do not support white-tailed kite foraging habitat, and an additional 178 acres of modeled foraging habitat could be converted to nesting habitat. The distribution and abundance of white-tailed kite does not seem to be limited by the availability of foraging or nesting habitat in the Plan Area and, following implementation of the covered activities, over 94 percent of its modeled nesting and foraging habitat types will remain in the Plan Area with implementation of all applicable AMMs (Table 4–7).

Based on this evaluation, implementation of the covered activities, with implementation of all applicable AMMs (Table 4–7), is not expected to result in adverse population-level effects on white-tailed kite or adversely affect its Plan Area distribution or abundance.

4.4.11 Bald Eagle

The maximum acreage of modeled bald eagle nesting habitat and modeled seasonal foraging habitat that will be permanently affected, directly and indirectly, with implementation of the covered activities is 16,003 acres, representing approximately 7.5 percent of the current extent of its modeled habitat (see Table 4–8, Appendix K, and Figure 4–30, *Bald Eagle: Direct Impacts of Covered Activities* [separate files]).

4.4.11.1 Effects Common among Covered Activities

Effects of covered activities that are in common are those that could result in injury or mortality of bald eagle. The bald eagle, however, is a CDFW-designated fully protected species and, as such, implementation of the applicable avoidance and minimization measures in Table 4–7 will avoid actions associated with implementation of the covered activities that could result in the mortality of individuals.

4.4.11.2 Permanent Development Projects

Direct effects of permanent development projects will result in the permanent removal of up to 2,708 acres of modeled bald eagle nesting habitat and 3,570 acres of modeled seasonal foraging habitat, representing approximately 11 percent and 2 percent, respectively, of the existing acreage of modeled habitat in the Plan Area (Table 4–8, Figure 4–30). No year-round foraging habitat will be removed by covered activities. Indirect effects of permanent development projects will result in reduced functions of up to 9,726 acres of modeled bald eagle, 6,574 acres of which overlap with areas subject to ongoing effects of existing permanent developments (Appendix K). Indirect effects of permanent development projects will not affect any modeled bald eagle year-round foraging habitat.

Figure O–15, *Bald Eagle Habitat in the Plan Area with full BRCP Implementation* in Appendix O and Table 4–8 provide the acreage of modeled bald eagle habitat remaining within the Plan Area (including BRCP protected lands and lands that are not impacted by the covered activities) with full implementation of the covered activities.

4.4.11.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects within the Chico, State Route 99, Foothill Area, Oroville, Neal Road Drop-Off and Recycling Facility, Durham, Gridley-Biggs, Nelson, and Richvale UPAs will result in permanent direct effects on up to 2,691 acres of modeled bald eagle nesting habitat and 2,969 acres of modeled seasonal foraging habitat (Table 4–9). Loss of this habitat area will reduce the area of any actual bald eagle habitat that is located within affected modeled habitat and thus will reduce the area of habitat available to bald eagle. No known bald eagle nest sites will be removed by permanent development projects (Table 4–9).

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise and visual disturbances associated with operating equipment and other activities necessary to construct new developments (Table 4–1). These impact mechanisms could cause bald eagle to reduce their foraging use of affected habitat areas during the period these activities are implemented. Temporary displacement from foraging habitat and increased numbers of flight responses to disturbance may elevate energetic costs to bald eagle. The potential for temporary direct effects on bald eagle will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 1,300-foot distance from permanent new developments for nesting habitat and an average 500-foot distance from permanent new developments for foraging habitat within which temporary indirect effects could occur for nesting and foraging bald eagle (see Table 4–5), up to 9,726 acres of modeled bald eagle habitat Plan Area- wide[90] will be temporarily and directly affected by permanent development covered activities, 6,574 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). No modeled year-round foraging habitat will be affected.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other equipment), building maintenance, and other disturbances associated with human occupancy following construction of permanent developments (see Table 4–1). These disturbances could cause bald eagle to reduce their foraging use of habitat adjacent to permanent development areas. Noise and visual disturbances are likely to preclude bald eagle from nesting in patches of vegetation adjacent to permanent developments, however, if bald eagle were to nest adjacent to new permanent developments, permanent indirect effects could include nest abandonment and changes in incubation, brooding, and foraging behavior of adult birds that could reduce nesting success. However, the AMMs listed in Table 4–7 will prevent bald eagle nest abandonment.

Based on an average 1,300-foot distance from permanent new developments for nesting habitat and an average 500-foot distance from permanent new developments for foraging habitat within which permanent indirect effects will occur (see Table 4–5), up to 9,726 acres of modeled bald eagle habitat Plan Area- wide[91] will be permanently and indirectly affected by permanent development covered activities, 6,574 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the

[90] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.
[91] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

acreage of temporary direct effects (see Appendix K). These permanent indirect effects will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.11.2.2 Outside Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects will result in permanent direct effects on up to 17 acres of modeled bald eagle nesting habitat, and 600 acres of modeled seasonal foraging habitat outside the UPAs in all CAZs except Basin and Cascade Foothills (see Table 4–9). Loss of this habitat area will reduce the area of any actual bald eagle habitat that is located within affected modeled habitat and thus will reduce the area of habitat available to bald eagle. The effects of such loss of modeled habitat on bald eagle are the same as described for the permanent direct effects of implementing permanent development projects in the UPAs (see Section 4.4.11.2.1, *Within Urban Permit Areas*). No active bald eagle nest sites will be removed by permanent development projects (Table 4–7).

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise and visual disturbances associated with operating equipment and other activities necessary to construct new developments (Table 4–1). The effects of these impact mechanisms on bald eagle are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.11.2.1). The potential for temporary direct effects on bald eagle will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 1,300-foot distance from permanent new developments for nesting habitat and an average 500-foot distance from permanent new developments for foraging habitat within which temporary indirect effects could occur for foraging and nesting bald eagle (see Table 4–5), up to 9,726 acres of modeled bald eagle habitat Plan Area-wide[92] will be temporarily and directly affected by permanent development covered activities, 6,574 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

The potential for adverse effects on individual bald eagle of construction-related noise and visual disturbances is considered to be low because of the following factors.

1. Approximately 11 percent of the available modeled nesting habitat and 2 percent of modeled seasonal foraging habitat would be affected if all permanent development activities were implemented simultaneously, but permanent development projects would not be implemented simultaneously and thus a much smaller area of habitat would be affected by construction-related disturbances at any point in time.

[92] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

2. The majority of covered activities implemented outside of the UPAs are linear transportation infrastructure projects (e.g., bridge replacements, intersection improvements). As such, the period over which a given area of habitat adjacent to project footprints will be subjected to temporary direct construction-related disturbances will be limited as the area under construction moves along the project ROW.
3. Affected modeled habitat areas are within or near larger patches of modeled habitat that would not be disturbed and would be available for use by displaced individuals.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include the following ongoing visual (e.g., operation of vehicles, lighting, human activity) and noise (e.g., operation of vehicles and other equipment), building maintenance, and other disturbances associated with human activity following construction of permanent developments (see Table 4–1). The effects of these impact mechanisms on bald eagle are the same as described for the permanent indirect effects of implementing permanent development projects within UPAs (see Section 4.4.11.2.1). The level of these effects are expected to be less than that associated with permanent development projects within UPAs because they do not include residential developments, which are expected to support higher levels of human activity than nonresidential developments. Permanent indirect effects of new roads include ongoing noise and visual disturbances associated with vehicle traffic that could affect use of adjacent habitat areas and increased risk for mortality or injury of individual bald eagle associated with collisions with vehicles. The potential for collisions with vehicles is considered to be low because bald eagles forage primarily on or very near water.

Noise and visual disturbances are likely to preclude bald eagle from nesting in patches of vegetation adjacent to new agricultural services facilities and new roads that otherwise would be suitable for nesting. Although unlikely, if bald eagle were to nest adjacent to these new facilities and roads, the effects on bald eagle are the same as described for the permanent indirect effects of implementing permanent development projects in the UPAs (see Section 4.4.11.2.1). If bald eagle were to establish nests outside of UPAs near proposed project footprints before full completion of new roads and bridges, noise, visual, and other disturbances associated with use of these development projects could result in nest abandonment or reduced nesting success. The potential for this effect, however, is considered low because the incidence of nesting in the Plan Area is low and the AMMs listed in Table 4–7 will prevent bald eagle nest abandonment.

Based on an average 1,300-foot distance from permanent new developments for nesting habitat and an average 500-foot distance from permanent new developments for foraging habitat within which permanent indirect effects will occur (see Table 4–5), up to 9,726 acres of modeled bald eagle habitat Plan Area-wide[93] will be permanently and indirectly affected by permanent development covered activities, 6,574 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects

[93] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). Adverse effects of these disturbances, however, will be low for the reasons described above for temporary direct effects of construction-related noise and visual disturbances.

4.4.11.3 Recurring Maintenance Activities

4.4.11.3.1 Within Urban Permit Areas

Permanent Direct Effects

With the exception of the potential impact mechanisms and associated effects on bald eagle described in Section 4.4.11.1, *Effects Common among Covered Activities*, there are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on bald eagle. Maintenance removal of vegetation that potentially support bald eagle foraging habitat may adversely affect bald eagle. However, these effects are expected to be small because maintenance will only affect a very small area of modeled foraging habitat. Also nests are typically placed in large tall trees and located to avoid disturbance from development, which makes it unlikely that bald eagles would site nests within areas of the UPAs that are already subject to a high degree of human disturbance. If occupied bald eagle nest sites are located near locations where recurring maintenance activities will be implemented, the potential for impacts on bald eagle nesting success associated with maintenance-related noise and visual disturbances will be avoided with implementation of the applicable AMMs indicated in Tables 4-6 and 4-7.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances. The effects of these impact mechanisms on bald eagle are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.11.2.1) except that the duration of maintenance-related activities is generally expected to be less than that of construction-related activities. The potential for temporary direct effects on bald eagle will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

The potential for adverse effects of temporary recurring maintenance-related disturbances on bald eagle foraging behavior is considered low because many of these activities will be implemented in developed areas that are already subject to high levels of disturbance (e.g., traffic), foraging habitat is not a factor limiting the species in the Plan Area (see Appendix A) and, given the distribution of modeled foraging habitat (Figure 4–30), there is a high probability that alternate foraging habitat areas will be available near affected areas during a generally short period of disturbance for most activities (e.g., a few hours to a few days).

Permanent Indirect Effects

As described in Table 4–2, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on bald eagle.

4.4.11.3.2 Outside Urban Permit Areas

Permanent Direct Effects

The impacts of recurring maintenance activities on bald eagle are the same as described above for these activities within UPAs.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (e.g., ground vibrations). The effects of these impact mechanisms on bald eagle are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.11.2.1), except that the duration of maintenance-related activities is generally expected to be less than that of construction-related activities. The potential for temporary direct effects on bald eagle will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

As described in Table 4–2, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on bald eagle.

4.4.11.4 Effects of Covered Activities within Conservation Lands

Permanent Direct Effects

Implementation of conservation measures to restore riparian habitat will convert up to 178 acres of habitat that could support modeled bald eagle seasonal foraging habitat to riparian vegetation types that support bald eagle nesting habitat and 11 acres of habitat that do not support bald eagle nesting habitat. The actual amount converted will be less, however, because a portion of the restored riparian habitat will not be restored on seasonal foraging land cover types used by bald eagle. Restoration of giant garter snake breeding and movement habitat could also convert up to 500 acres of bald eagle seasonal foraging habitat to land cover types not used by bald eagle, if all restoration occurs on managed wetland or flooded rice. The effects of such loss of modeled habitat on bald eagle are the same as described for the permanent direct effects of implementing permanent development projects in the UPAs (see Section 4.4.11.2.1). However, the amount converted will be less because a portion of restored giant garter snake habitat will consist of open water and upland habitat that will serve as habitat for bald eagle.

Temporary Direct Effects

Temporary direct effects are associated with the operation of equipment and other activities related to implementing habitat restoration, enhancement, and management actions in or adjacent to BRCP conservation lands that cause temporary noise, visual, and other disturbances to bald eagle (Table 4–1). The effects of these impact mechanisms on bald eagle are similar as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.11.2.1). The potential for temporary direct effects on bald eagle will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

Implementation of conservation measures will not result in permanent indirect effects on bald eagle because restored and protected habitats will not be associated with increasing human presence, noise, traffic risks, or other impact mechanisms that could result in indirect effects (Table 4–1). Restored habitat types, although they may not support bald eagle, are highly unlikely to impose additional risk factors or stressors on bald eagle.

4.4.11.5 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of bald eagle within the Plan Area.

4.4.11.5.1 Permanent Direct Effects

Loss of up to 2,708 acres of modeled bald eagle nesting habitat and 3,570 acres of modeled seasonal foraging habitat (Table 4–8) associated with implementation of the permanent development projects and up to an additional 632 acres of modeled seasonal foraging habitat removed to restore habitat types that do not support bald eagle foraging habitat[94] and 178 acres converted from seasonal foraging habitat to modeled nesting habitat.

A small but indeterminable amount of direct take of individual juvenile and adult bald eagles could be associated with loss of eggs and juveniles if nest sites are abandoned as a result of the covered activities, but will be avoided with implementation of the applicable AMMs indicated in Table 4–7.

4.4.11.5.2 Temporary Direct Effects

A temporary reduction in the functions of up to 9,726 acres of modeled bald eagle habitat would result from harassment associated with covered activities, 6,574 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Management-related activities on up to 36,965 acres of conservation lands supporting modeled bald eagle habitat will result in temporary direct effects on a relatively small acreage of

[94]Habitat impacts of restoration are not included in Tables 4–8 and 4–9 and therefore total impact acreages will differ.

additional habitat that cannot be estimated. The acreage of take (i.e., harassment) will be the amount of actual habitat that is located within the area of affected modeled habitat. Temporary direct effects on bald eagle will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.11.5.3 Permanent Indirect Effects

A permanent reduction in the functions of up to 9,726 acres of modeled bald eagle nesting habitat and 2,441 acres of modeled seasonal foraging habitat would result from harassment associated with covered activities, 6,574 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). The acreage of take (i.e., harassment) will be the amount of actual habitat that is located within the area of affected modeled habitat. Permanent indirect effects on occupied bald eagle habitat will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

A small but indeterminable amount of direct take of individual juvenile and adult bald eagle could be associated with collisions/electrocutions at newly constructed or retrofitted power lines, collisions with vehicles associated with new or increased traffic on new and improved roadways, and with loss of eggs and juveniles if nest sites are abandoned as a result of noise, visual, and other disturbances associated with new permanent development projects. However, these permanent indirect effects on bald eagle will be avoided with implementation of the applicable AMMs indicated in Tables 4–6 and 4–7.

4.4.11.6 Overall Impact Likely to Result from Take

Loss of nesting habitat due to development along the coast, near inland rivers, and waterways is currently the greatest threat to the bald eagle, affecting all life stages, shoreline nesting, perching, roosting, foraging habitat, and dispersal (Buehler 2000). DWR reports two nesting territories within the Plan Area, one along the edge of the Diversion Pool approximately 1 mile downstream of the Oroville Dam and the other along the Feather River near the southeast end of the CDFW Oroville Wildlife Area (Dave Bogener pers. comm.). DWR also reports a recently discovered winter roost site near Lake Oroville that has been occupied by at least 60 individuals. Bald eagles regularly winter around the Plan Area, including at Lake Oroville, Thermalito Forebay and Afterbay, along the Feather and Sacramento Rivers, and in the wetlands associated with Llano Seco and the Gray Lodge Wildlife Area.

The covered activities will result in the loss of up to 2,708 acres of modeled bald eagle nesting habitat and 3,570 acres of modeled seasonal foraging habitat, representing approximately 11 percent and 2 percent of the extent of modeled habitat present in the Plan Area, respectively. Up to an additional 632 acres of modeled seasonal foraging habitat could be removed to restore habitat types that do not support bald eagle foraging habitat and an additional 178 acres of

modeled seasonal foraging habitat could be converted to modeled nesting habitat. The distribution and abundance of bald eagle does not seem to be limited by the availability of foraging habitat in the Plan Area and, following implementation of the covered activities, over 97 percent of its modeled habitat types will remain in the Plan Area with implementation of all applicable AMMs (Table 4–7).

Based on this evaluation, implementation of the covered activities with implementation of all applicable AMMs (Table 4–7), is not expected to result in adverse population-level effects on bald eagle or adversely affect its Plan Area distribution or abundance.

4.4.12 Giant Garter Snake

The maximum acreage of all land cover types supporting modeled giant garter snake breeding and movement habitat that will be permanently affected, directly and indirectly, with implementation of the covered activities is 6,267 acres, representing approximately 4 percent of the current extent of modeled giant garter snake breeding and movement habitat (see Table 4–8, Appendix K, and Figure 4–31, *Giant Garter Snake: Direct Impacts of Covered Activities* [separate files]). Permanent direct impacts include the removal of up to 18.1 miles of channels that support modeled movement habitat (see Table 4–8), representing approximately 4 percent of modeled movement habitat: connected waterways. Impacts of the removal of existing habitat by covered activities and BRCP measures to restore giant garter snake habitat could result in the injury or mortality of up to an estimated 61 giant garter snakes (see Appendix A for details on habitat-specific density calculations). In addition, BRCP restoration of giant garter snake habitat will temporarily reduce the habitat functions of to 621 acres of modeled giant garter snake habitat that is restored to higher functioning giant garter snake habitat until restored giant garter snake habitat has matured. As this habitat attains the characteristic functions of emergent wetlands, the number of snakes supported will likely increase and fully compensate for the temporary loss in habitat function.

4.4.12.1 Effects Common among Covered Activities

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction of new developments, restoration of habitat, and maintenance of existing facilities) could result in injury or mortality of giant garter snakes. For example, individual giant garter snakes could be crushed by construction- and maintenance-related equipment (e.g., maintenance of water conveyance infrastructure). Implementation of the applicable AMMs indicated in Table 4–7 will minimize the likelihood for this impact.

The probability that the accidental introduction of contaminants associated with construction and maintenance activities (e.g., fuel spills) will adversely affect individual giant garter snakes is considered low because snakes are generally expected to avoid work sites with ongoing noise and visual construction-related disturbances. In addition, implementation of the applicable AMMs indicated in Table 4–7 provides for containment and rapid cleanup of releases that may

occur, thus reducing exposure risk and the period that individuals could be exposed to contaminants.

4.4.12.2 Permanent Development Projects

Direct effects of permanent development projects will result in the permanent removal of up to 3,194 acres modeled giant garter snake breeding and movement habitat, representing approximately 2 percent of the existing acreage of modeled breeding and movement habitat in the Plan Area (Table 4–8, Figure 4–31). Permanent direct impacts include the removal of up to 18.1 miles of channels that support modeled movement habitat (Table 4–8), representing approximately 4 percent of modeled movement habitat: connected waterways. Indirect effects of permanent development projects will result in reduced functions of up to 3,073 acres of modeled breeding and movement habitat as habitat for the giant garter snake, 1,151 acres of which overlap with areas subject to ongoing effects of existing permanent developments (Appendix K. Removal of habitat by permanent development projects could result in injury or mortality of up to an estimated 61 giant garter snakes. Figure O–16, *Giant Garter Snake Habitat in the Plan Area with full BRCP Implementation* in Appendix O and Table 4–8 provide the acreage of modeled giant garter snake habitat remaining within the Plan Area (including BRCP protected lands and lands that are not impacted by the covered activities) with full implementation of the covered activities. Implementation of the covered activities will not increase the level of habitat fragmentation or isolation of existing population segments beyond the current degree of fragmentation and isolation.

4.4.12.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects within the Chico, Oroville, Gridley-Biggs, Norton, and Richvale UPAs will result in permanent direct effects on up to 2,496 acres of modeled giant garter snake breeding and movement habitat (see Table 4–9). Loss of this habitat area will reduce the area of any actual giant garter snake habitat that is located within affected modeled habitat and thus will reduce the area of habitat available to giant garter snake. Construction-related activities and activities that remove habitat could also injure or kill giant garter snakes that enter work areas. Depending on where permanent development projects are located, patches of habitat could be locally fragmented. The potential for this impact will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise, visual, and other disturbances (e.g., ground vibrations) associated with operating equipment and other activities necessary to construct new developments(see Table 4-1). These impact mechanisms could cause giant garter snake to reduce their use of affected habitat areas, especially basking sites, during the period covered activities are implemented. Temporary displacement and reduced ability to bask could compromise

thermoregulation in giant garter snakes and reduce their foraging efficiency. Repeated flight responses to disturbance may elevate energetic costs. The potential for temporary direct effects giant garter snake will be minimized with implementation the applicable AMMs indicated in Table 4–7. Based on an average 500-foot distance from permanent new developments within which temporary indirect effects will occur (see Table 4–5), up to 3,073 acres of modeled giant garter snake breeding and movement habitat Plan Area-wide[95] will be temporarily and directly affected by permanent development covered activities, 1,151 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). The equivalent estimated number of giant garter snakes affected by this temporary loss of habitat function is 73 snakes (see Appendix A for details on habitat-specific density calculations).

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other equipment), pet-related, building maintenance, and other disturbances associated with human occupancy following construction of permanent developments (see Table 4–1). These disturbances could cause giant garter snake to reduce their use of habitat adjacent to permanent development areas or may increase energy expenditure of giant garter snakes due to increased flight and avoidance reactions. Noise and visual disturbances from humans, pets and vehicles are likely to preclude giant garter snake from reproducing or overwintering in patches of vegetation near permanent developments that otherwise would be suitable habitat. Human occupancy and use of permanent development projects would increase the risk for injury or mortality of individual snakes associated with increased human activity adjacent to permanent development projects (e.g., capture or collection by residents, predation by pets, increased predation by more urban tolerant species (e.g., raccoons, opossums, etc.).

Road construction and improvement projects may cause increasing traffic volumes and vehicle speeds, especially where roads are widened, straightened or otherwise enhanced (e.g., the SR 99 capacity enhancement project). Vehicle strikes are a potential source of injury or mortality of individual snakes as they bask on warm pavements or move from aquatic to upland habitats for over-wintering.

Based on an average 500-foot distance from permanent new developments within which permanent indirect effects will occur (see Table 4–5), up to 3,073 acres of modeled giant garter snake breeding and movement habitat Plan Area-wide[96] will be permanently and indirectly affected by permanent development covered activities, 1,151 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as

[95] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.
[96] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

and not in addition to the acreage of temporary direct effects (see Appendix K). The equivalent estimated number of giant garter snakes affected by this temporary loss of habitat function is 73 snakes (see Appendix A for details on habitat-specific density calculations). These permanent indirect effects will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent indirect effects associated with alteration in local hydrology may alter the vegetation composition and structure of foraging habitat but will not affect the acreage of available foraging habitat. Based on an average 500-foot distance from permanent new developments within which these permanent indirect effects are expected to occur (see Section 4.2.4.3), up to 84 acres of emergent wetland and willow scrub that may support habitat Plan Area-wide[97] will be indirectly affected if permanent development projects alter the supporting hydrology (see Appendix K). The potential for adverse effects of any such habitat losses on giant garter snake is expected to be low because most habitat that may be affected is already located near development and is therefore already less desirable as habitat than other less disturbed areas. Conversely, alterations that increase local water availability may result in the establishment of patches of emergent wetland that could habitat.

4.4.12.2.2 Outside Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects will result in permanent direct effects on up to 698 acres of modeled giant garter snake breeding and movement habitat outside the UPAs distributed among all of the CAZs (see Table 4–9). Depending on where permanent development projects are located, patches of habitat and any giant garter snakes within them could be locally fragmented. Loss of this habitat area will reduce the area of any actual giant garter snake habitat that is located within affected modeled habitat and thus will reduce the area of habitat available to giant garter snake. Construction-related activities and activities that remove habitat could also injure or kill giant garter snakes that enter work areas. The potential for these impacts will be minimized with implementation of the applicable AMMs indicated in Table 4–7. The effects of such loss of modeled habitat on giant garter snake are the same as described for the permanent direct effects of implementing permanent development projects in the UPAs (see Section 4.4.12.1.1).

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise, visual, and other disturbances (e.g., ground vibrations) associated with operating equipment and other activities necessary to construct new developments (see Table 4–1). The effects of these impact mechanisms on giant garter snake are the same as described for the temporary direct effects of implementing permanent development projects in

[97] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

the UPAs (see Section 4.4.12.2.1, *Within Urban Permit Areas*). The potential for temporary direct effects on giant garter snake will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 500-foot distance from permanent new developments within which temporary indirect effects will occur (see Table 4–5), up to 3,073 acres of modeled giant garter snake breeding and movement habitat Plan Area-wide[98] will be temporarily and directly affected by permanent development covered activities, 1,151 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). The equivalent estimated number of giant garter snakes affected by this temporary loss of habitat function is 73 snakes (see Appendix A for details on habitat-specific density calculations).

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other equipment), pet-related, infrastructure maintenance, and other disturbances associated with operation and human occupancy following construction of permanent developments (see Table 4–1). The effects of these impact mechanisms on giant garter snake are the same as described for the permanent indirect effects of implementing permanent development projects within UPAs (see Section 4.4.12.2.1). The level of these effects, however, are expected to be less than that associated with permanent development projects within UPAs because they do not include residential developments, which are expected to support higher levels of human activity than nonresidential developments. Permanent indirect effects of improved roads that result in higher traffic volume and traffic on new roads include increased risk for injury or mortality associated with vehicles striking individual snakes that are basking on or crossing these roads.

Based on an average 500-foot distance from permanent new agricultural services facilities and new roads within which permanent indirect effects will occur (see Table 4–5), up to 3,073 acres of modeled giant garter snake breeding and movement habitat Plan Area-wide[99] will be permanently and indirectly affected, 1,151 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). Adverse effects of these disturbances, however, will be low for the reasons described above for temporary direct effects of construction-related noise and visual disturbances. Permanent indirect effects of new agricultural services facilities will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

[98] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.
[99] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

Permanent indirect effects associated with alteration in local hydrology may alter the vegetation composition and structure of aquatic habitat in and near occupied streams, canals or ponds but will not affect the acreage of available habitat. Based on an average 500-foot distance from permanent new developments within which these permanent indirect effects are expected to occur (see Table 4–2), up to 84 acres of emergent wetland and willow scrub Plan Area-wide[100] that may support suitable habitat will be indirectly affected if permanent development projects alter the supporting hydrology (see Appendix K). The equivalent estimated number of giant garter snakes affected by this temporary loss of habitat function is 21 snakes (see Appendix A for details on habitat-specific density calculations). The potential for adverse effects of any such habitat losses on giant garter snake is expected to be low because most habitat that may be affected is already located near development and is therefore already less desirable as habitat than other less disturbed areas. Conversely, alterations that increase local water availability may result in the establishment of patches of emergent wetland that could habitat.

4.4.12.3 Recurring Maintenance Activities

4.4.12.3.1 Within Urban Permit Areas

Permanent Direct Effects

With the exception for the potential impact mechanisms and associated effects on giant garter snake described in Section 4.4.12.1, *Effects Common among Covered Activities*, there are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on giant garter snake (see Table 4–1). Maintenance of water and irrigation district canals and other infrastructure in modeled giant garter snake breeding and movement habitat could result in injury or mortality of individuals during their aestivation period if they are aestivating in locations along canals where maintenance equipment is operating (e.g., by crushing of occupied burrows). The potential for this impact will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (e.g., ground vibrations). The effects of these impact mechanisms on giant garter snake are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.12.2.1) except that the duration of maintenance-related activities is generally expected to be less than that of construction-related activities. The potential for temporary direct effects on giant garter snake will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

[100] Impacts outside of UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

Periodic maintenance of canals maintained by water and irrigation districts will result in periodic alteration of habitat structure (e.g., removal of emergent vegetation) that will reestablish over time following maintenance events.

Permanent Indirect Effects

As described in Table 4–2, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on giant garter snake.

4.4.12.3.2 Outside Urban Permit Areas

Permanent Direct Effects

With the exception for the potential impact mechanisms and associated effects on giant garter snake described in Section 4.4.12.1, there are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on giant garter snake (see Table 4–1). Potential impacts of water and irrigation maintenance of canals are the same as described for permanent direct effects of recurring maintenance activities within UPAs (see Section 4.4.12.3.1, *Within Urban Permit Areas*).

Temporary Direct Effects

Temporary direct effects of recurring maintenance activities outside UPAs are the same as described for these activities within UPAs.

Permanent Indirect Effects

As described in Table 4–2, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on giant garter snake.

4.4.12.4 Effects of Covered Activities within Conservation Lands

4.4.12.4.1 Permanent Direct Effects

Implementation of conservation measures to restore 729 acres giant garter snake habitat, emergent wetland, and greater sandhill crane roost sites could result in injury or mortality of individual giant garter snake as a result of operating restoration-related equipment if they are present in restoration sites. The potential for this impact associated with the restoration of giant garter snake habitat and emergent wetland, however, will be minimized because habitat will only be restored during the giant garter snake active season (see Section 5.4.3.2, *CM8: Restore Giant Garter Snake Habitat*) and the applicable AMMs in Table 4–7 will be implemented. Furthermore, the likelihood for adverse population-level effects of injury or mortality of giant garter snake is expected to be minimal because the habitat restoration activities will be distributed over a 40-year implementation period (see Table 8–3, *BRCP Schedule for Restoration of Natural Communities for Conservation Component*). Operation of habitat enhancement- and management-related equipment on portions of up to 28,047 acres of BRCP conservation lands supporting modeled and restored giant garter

snake habitat over the term of the BRCP (see Table 5-10) could result in injury or mortality of snakes if present during those activities. The potential for this impact will be minimized with implementation of the applicable AMMs in Table 4–7.

4.4.12.4.2 Temporary Direct Effects

The primary temporary direct effect on giant garter snake will be associated with restoration of 2,121 acres of giant garter snake and emergent wetland (where implemented within its Plan Area range; see Table 5-7). Conversion of existing lower functioning rice or managed wetland habitat to higher functioning habitat comprised of a mosaic of interconnected wetlands and uplands will temporarily reducing the function of the restored habitat until the giant garter snake functions associated with the restored habitat have matured. In addition, the operation of equipment and other activities related to implementing habitat restoration, enhancement, and management actions in or adjacent to BRCP conservation lands that cause temporary noise, visual, and other disturbances to giant garter snake (see Table 4–1). The effects of these impact mechanisms on giant garter snakes are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.12.2.1).

4.4.12.4.3 Permanent Indirect Effects

Implementation of conservation measures will not result in permanent indirect effects on giant garter snakes because restored and protected habitats will not be associated with increasing human or pet presence, noise, traffic risks, or other impact mechanisms that could result in indirect effects (Table 4–1).

4.4.12.5 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of giant garter snakes within the Plan Area.

4.4.12.5.1 Permanent Direct Effects

Permanent direct effects include the loss of up to 3,194 acres of modeled giant garter snake breeding and movement habitat, including up to 18.1 miles of modeled movement habitat: connected waterway (Table 4–8). The acreage of take (i.e., harm) will be the amount of actual habitat that is located within the area of affected modeled habitat. Based on empirically determined landscape level density estimates for different habitat types in the BRCP Area (see Appendix A, for methods used to determine density estimates and estimate the number of individual snakes affected), the estimated level of take is up to 61 giant garter snakes. Because of the limited data regarding the distribution of giant garter snake in the Plan Area and uncertainties associated with the actual densities of giant garter snake that will be present in habitat impacted by the covered activities, it is estimated that up to 122 giant garter snakes could be taken over the term of the BRCP. This level of estimated take is based on the doubling of densities of giant garter snake assumed to be present in Plan Area habitats and is considered a

reasonable assumption based on the range of giant garter snake densities found in other locations (see Appendix A.12, *Giant Garter Snake (Thamnophis gigas)*. A small, but indeterminable, amount of direct take of individual giant garter snakes could be associated with operation of equipment to implement recurring maintenance activities and habitat enhancement, restoration, and management activities in modeled and restored giant garter snake habitat. Permanent direct effects on giant garter snakes will be minimized with implementation of the applicable AMMs indicated in Table 4–7 and restricting implementation of habitat restoration activities to the giant garter snake active period.

4.4.12.5.2 Temporary Direct Effects

A temporary reduction in the functions of up to 3,073 acres of modeled giant garter snake foraging habitat would result from harassment associated with covered activities, 1,151 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). In addition, the habitat functions of up to 569 acres of modeled giant garter snake habitat that is restored to higher functioning giant garter snake habitat could be temporarily reduced until restored giant garter snake habitat has matured. Habitat enhancement- and management-related activities on up to 28,047 acres of conservation lands supporting modeled giant garter snakes habitat (Table 5-10) will result in temporary direct effects on a relatively small acreage of additional habitat that cannot be estimated. The acreage of take (i.e., harassment) will be the amount of actual habitat that is located within the area of affected modeled habitat. Temporary direct effects on occupied giant garter snake habitat will be minimized with the applicable AMMs indicated in Table 4–7.

4.4.12.5.3 Permanent Indirect Effects

A permanent reduction in the functions of up to 3,073 acres of modeled giant garter snake breeding and movement habitat would result from harassment associated with covered activities, 1,151 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). The acreage of take (i.e., harassment) will be the amount of actual habitat that is located within the area of affected modeled habitat. Permanent indirect effects on giant garter snake habitat will be minimized with the applicable AMMs indicated in Table 4–7. A small, but indeterminable, amount of direct take of individual giant garter snakes could be associated with increased risk for injury or mortality associated with vehicles striking individual snakes that are basking or moving across the new roads, improved roads where traffic volume increases, and increased human activity adjacent to permanent development projects (e.g., illegal capture, predation by pets).

4.4.12.6 Overall Impact Likely to Result from Take

The major stressor of giant garter snakes in the Plan Area is the loss of habitat functions (including predation and competition by nonnative species), fragmentation and disturbances associated with human activities (USFWS 1999). Conversion of wetlands for agricultural, urban, and industrial development has caused the loss of over 90 percent of suitable giant garter snake habitat in the Central Valley. Similarly, loss of habitat function through maintenance of flood control and irrigation canals, rodent control, pesticide and improper grazing of wetlands or streamside habitats are known to affect giant garter snake populations (Brode and Hansen 1992, Hansen 1988, Hansen and Brode 1993). Nonnative predators (e.g., bullfrog, largemouth bass and catfish), have been identified as significant predators of giant garter snakes (*sensu* Bury and Whelan 1984, Treanor 1983) and compete with giant garter snakes for smaller forage species, (Hansen 1986, Schwalbe and Rosen 1989). Giant garter snakes are sensitive to the loss of upland habitat adjacent to aquatic habitats, where young are hatched and where some adult giant garter snakes retreat for the winter.

The covered activities will result in the loss of up to 3,194 acres of modeled giant garter snake breeding and movement habitat, representing approximately 2 percent of the extent of modeled habitat present in the Plan Area (Table 4–8). Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. A total of 6,847 giant garter snakes are estimated to inhabit the Plan Area (see Appendix A*)*. Based on empirically determined landscape level density estimates for different habitat types in the BRCP Area (see Appendix A*)* for methods used to determine density estimates and estimate the number of individual snakes affected), the removal of 3,194 acres if modeled giant garter snake habitat by permanent development covered activities could result in take of up to 61 giant garter snakes, or approximately 1 percent of the estimated Plan Area population over the term of BRCP implementation. For the reasons described in Section 4.4.12.5, *Estimated Level of Take*, however, the estimated level of take could be as high as 122 giant garter snakes, representing approximately 2 percent of the Plan Area population.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse, measurable population-level effects on giant garter snake or adversely affect its distribution or abundance throughout the Plan Area.

4.4.13 Blainville's Horned Lizard

A habitat model has not been developed for Blainville's horned lizard[101] because there is insufficient information regarding the distribution of the physical attributes that supports its habitat in the Plan Area (e.g., gravelly sandy substrates). There is only one known location within the Plan Area north of Oroville, on North Table Mountain, just east of Coal Canyon (see Appendix A), and no covered activities would occur at this location. Removal of individual

[101] Formerly California horned lizard (*Phrynosoma coronatum frontale*).

lizards in permanent development covered activity project footprints is permitted unless, in consultation with USFWS and CDFW, it is determined that the proposed project would remove a significant occurrence that is necessary to maintain the genetic diversity or regional distribution of the species.

4.4.13.1 Effects Common among Covered Activities

Blainville's horned lizard is a (Department of Fish and Game (DFG) Species of Concern. Although there is currently no known occurrence of Blainville's horned lizard at risk from covered activities, potential effects of covered activities on Blainville's horned lizard include:

- Construction-related activities associated with implementation of covered activities (e.g., operation of equipment for construction of new developments, restoration of habitat, and for maintenance of existing facilities) could result in injury or mortality of individual Blainville's horned lizard or their nests. For example, individual Blainville's horned lizards or nests could be crushed or injured by construction-related machinery.
- Introduction of nonnative species. Blainville's horned lizard are affected by the invasion of nonnative ant species, especially Argentine ants, which may affect the lizard's food base (Stephenson and Calcarone 1999, SDNHM 2008). Invasive ant species may be introduced by construction equipment and vehicles.
- Human-induced predators. Domestic cats are also known to threaten Blainville's horned lizards (Jennings and Hayes 1994). Increasing residential development near occupied habitat could increase predation by domestic cats.

The probability that the accidental introduction of contaminants associated with construction and maintenance activities (e.g., fuel spills) will adversely affect individual Blainville's horned lizards is considered low because Blainville's horned lizards are not expected to occur near work sites. The potential effects of these common effects of covered activities on Blainville's horned lizards will be addressed by the implementation of the applicable AMMs indicated in Table 4–7.

4.4.13.2 Permanent Development Projects

Direct and indirect effects of permanent development projects will be minimized with implementation the applicable AMMs indicated in Table 4–7.

4.4.13.2.1 Within Urban Permit Areas

Permanent Direct Effects

Direct effects of permanent development projects could result in the removal of Blainville's horned lizard habitat if present and operation of equipment could result in injury or mortality of individuals. Implementation of the applicable AMMs in Table 4–7, however, will avoid impacts on any occurrences that are necessary to maintain the distribution, abundance, and genetic diversity of Blainville's horned lizard in the Plan Area.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise, visual, and other disturbances (e.g., ground vibrations, dust emissions) associated with operating equipment and other activities necessary to construct new developments. The potential for temporary adverse effects on Blainville's horned lizard will be avoided and minimized with implementation of the applicable AMMs in Table 4–7.

Permanent Indirect Effects

Indirect effects of permanent development activities include ongoing visual, noise, pet-related, building maintenance, and other disturbances associated with human occupancy following construction of permanent developments (Table 4–1). These indirect effects could include the introduction of nonnative ants through construction equipment, or domestic cats associated with residential areas. These may affect Blainville's horned lizard if they are present immediately adjacent to new permanent developments The potential for this effect, however, is considered low because Blainville's horned lizards are not known to occur near any proposed footprints of covered activities and Blainville's horned lizard would be unlikely to establish in habitat areas near new developments because they are subject to high levels of existing disturbance. If Blainville's horned lizards were to be present or establish in areas near proposed project footprints before all of the permanent development projects have been implemented, noise, visual, and other disturbances associated with occupancy of permanent development projects near occupied habitat could result in changed behavior and reduced survival. These permanent indirect effects will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.13.2.2 Outside Urban Permit Areas

Permanent Direct Effects

Direct effects of permanent development projects could result in the removal of Blainville's horned lizard habitat if present and operation of equipment could result in injury or mortality of individuals. Implementation of the applicable AMMs in Table 4–7, however, will avoid impacts on any occurrences that are necessary to maintain the distribution, abundance, and genetic diversity of Blainville's horned lizard in the Plan Area.

Temporary Direct Effects

Temporary direct effects impact mechanisms on Blainville's horned lizard, if they are present, are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.13.2.1, *Within Urban Permit Areas*). The potential for temporary direct effects on Blainville's horned lizard will be minimized with implementation of the applicable AMMs in Table 4–7.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects are the same as for permanent indirect effects of covered activities in UPAs. These permanent indirect effects will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.13.3 Recurring Maintenance Activities

4.4.13.3.1 Within Urban Permit Areas

Permanent Direct Effects

As described in Table 4–1, there are no impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on Blainville's horned lizard habitat. It is unlikely, given that the only occurrence of Blainville's horned lizard is not located near any covered activities (see Appendix A), that it would occur in habitat areas subject to recurring maintenance activities, which will be located in areas subject to relatively high levels of ongoing disturbance.

Temporary Direct Effects

Temporary direct effects and impact mechanisms on Blainville's horned lizard are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.13.2.1), except that the duration of maintenance-related activities is generally expected to be less than that of construction-related activities. The potential for temporary adverse effects on Blainville's horned lizard will be minimized with implementation of the applicable AMMs in Table 4–7.

Permanent Indirect Effects

As described in Table 4–1, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on Blainville's horned lizard.

4.4.13.3.2 Outside Urban Permit Areas

Permanent Direct Effects

As described in Table 4–1, there are no impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on Blainville's horned lizard. All direct impacts on individual Blainville's horned lizards will be minimized with implementation of the applicable AMMs in Table 4–7and it is unlikely that, given that there is only one known occurrence of Blainville's horned lizard in the Plan Area (see Appendix A), it would occur in habitat areas subject to recurring maintenance activities, which will be located in areas subject to relatively high levels of ongoing disturbance.

Temporary Direct Effects

Temporary direct effects and impact mechanisms on Blainville's horned lizard are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.13.2.1) except that the duration of maintenance-related activities is generally expected to be less than that of construction-related activities. The potential for temporary adverse effects on Blainville's horned lizard will be minimized with implementation of the applicable AMMs in Table 4–7.

Permanent Indirect Effects

As described in Table 4–2, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on Blainville's horned lizard.

4.4.13.4 Effects of Covered Activities within Conservation Lands

4.4.13.4.1 Permanent Direct Effects

Implementation of conservation measures, with implementation of the applicable AMMs in Table 4–7, is not expected to affect habitat used by Blainville's horned lizards.

4.4.13.4.2 Temporary Direct Effects

Temporary direct effects are associated with the operation of equipment and other activities related to implementing habitat restoration, enhancement, and management actions in or adjacent to BRCP conservation lands that could cause temporary noise, visual, and other disturbances to Blainville's horned lizard if they occurred near project sites. The effects of these impact mechanisms on Blainville's horned lizards are the same as described for the temporary direct effects of implementing permanent development projects within and outside UPAs (see Section 4.4.13.2.1).

4.4.13.4.3 Permanent Indirect Effects

Implementation of conservation measures will not result in permanent indirect effects on Blainville's horned lizards because restored and protected habitats will not be associated with increasing human or pet presence, noise, traffic risks, or other impact mechanisms that could result in indirect effects (Table 4–1). In particular, any occupied habitat sites protected and managed under the BRCP will be subject to fewer disturbance-related effects than those not managed for conservation.

4.4.13.5 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of Blainville's horned lizard within the Plan Area.

4.4.13.5.1 Permanent Direct Effects

Implementation of the covered activities could remove up to two sites occupied by Blainville's horned lizard in permanent development covered activity project footprints (see Table 4–6). Other potential permanent direct effects will be minimized with implementation of the applicable AMMs in Table 4–7. If Blainville's horned lizard are found within project sites, coordination with USFWS and CDFW will prevent the removal of significant occurrences necessary to maintain the genetic diversity or regional distribution of the species.

4.4.13.5.2 Temporary Direct Effects

Implementation of covered activities adjacent to occupied habitat could result in a temporary reduction in the functions of Blainville's horned lizard habitat (e.g., alter the behavior of individuals as a result of lowered ability to remain concealed from disturbances) and result in take (i.e., harassment). Temporary direct effects on occupied Blainville's horned lizards habitat will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.13.5.3 Permanent Indirect Effects

Construction of permanent development projects adjacent to occupied habitat could result in a permanent reduction in the functions of the habitat (e.g., alter the behavior of individuals as a result of lowered ability to remain concealed from disturbances) and result in take (i.e., harassment). If new residential developments are located near occupied habitat, there could be a small, but indeterminable amount of direct take of individual Blainville's horned lizard associated with human occupancy (e.g., predation by domestic cats). Permanent indirect effects on occupied Blainville's horned lizard will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.13.6 Overall Impact Likely to Result from Take

Blainville's horned lizard has a localized and patchy distribution. Only one occurrence has been identified in the Plan Area, which is not near the footprint of any covered activities. The species has disappeared from 35 percent of its range in central and Northern California (see Appendix A). The major stressors of Blainville's horned lizards in the Plan Area and throughout its range are loss of habitat and the effects of nonnative ants on its food supply. Human disturbance has contributed to the invasion of nonnative Argentine Ant (*Linepithema humile*) and the Red Imported Fire Ant (*Solenopsis invicta),* both of which are known to displace native harvester ants, which are the preferred diet of horned lizards (Turner and Medica 1982, Suarez et al. 1998, Suarez et al. 2000, Suarez and Case 2002, Sherbrooke 2003). Blainville's horned lizards are not known to occupy habitat near or adjacent to covered activities. In addition, more than 97 percent of covered activities that will permanently remove land cover types that could possibly contain small patches of Blainville's horned lizard habitat will occur within UPAs. These areas already experience permanent disturbance to a greater degree than areas outside of UPAs, which makes the presence of Blainville's horned lizard in areas affected by covered activities even less likely.

The BRCP covers the removal of up to two currently unknown occupied Blainville's horned lizard habitat sites within permanent development covered activity project footprints. In addition, the removal of any occupied habitat site that USFWS and CDFW determines to be a significant occurrence that is necessary to maintain the genetic diversity or regional distribution of the species is prohibited (see Table 4–6). Consequently, it is unlikely that the Blainville's horned lizard population of the Plan Area will be adversely affected by the permanent development covered activities. Implementation of the AMMs will minimize the amount of potential Blainville's horned lizard habitat that is removed and minimize the potential for harassment of individuals Blainville's horned lizards (Table 4–7).

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on Blainville's horned lizard or adversely affect its distribution or abundance throughout the Plan Area.

4.4.14 Western Pond Turtle

The maximum acreage of modeled western pond turtle aquatic, nesting and movement habitat that will be permanently affected, directly and indirectly, with implementation of the covered activities is 9,434 acres representing approximately 11 percent of the current extent of modeled breeding and foraging habitat (see Table 4–8, Appendix K, and Figure 4–32, *Western Pond Turtle: Direct Impacts of Covered Activities* [separate files]).

4.4.14.1 Effects Common among Covered Activities

The western pond turtle requires aquatic and upland habitats in close proximity of each other; it is sensitive to activities that affect either terrestrial or aquatic habitats. Loss, degradation, and fragmentation of habitat are the primary factors contributing to the decline of the species (Hays et al. 1999). Common effects of covered activities include:

- Construction-related activities associated with implementation of covered activities (e.g., operation of equipment for construction of new developments, restoration of habitat, and maintenance of existing facilities) could result in injury or mortality of western pond turtle. For example, individual western pond turtles or their nests could be crushed or injured by construction-related machinery, become trapped in ditches or excavations at construction sites, be separated from aquatic foraging habitat by construction fencing and erosion control measures (e.g., silt fences) or be harassed or preyed upon by domestic dogs.
- Disturbance of thermoregulatory behavior. Western pond turtles rely on basking as a primary thermoregulatory behavior. If basking turtles are repeatedly disturbed off basking structures, turtles may seek more secluded basking structures, causing increased competition for these structures. Human disturbance may keep females from crossing over land to lay eggs, or may reduce the amount of time spent basking, which in turn, may be important for egg maturation (Hays et al. 1999).

- Road mortality. Increased vehicular traffic and vehicle speed may cause injury and mortality to western pond turtles if struck by vehicles (Holland 1994).
- Human-induced predators and competitors/disease vectors. Human construction activities and new developments may attract predators (e.g., raccoons, skunks, coyotes) that prey upon hatchling and juvenile turtles or nests. Residential developments may also facilitate the introduction of other nonnative species by creating habitat conditions favorable to such species (e.g., bullfrogs) or by deliberate releases especially of pet turtles. Dudley and Collins (1995) suggested that the introduction of nonnative competitors including red-eared sliders (*Trachemys scripta*) and painted turtles (*Chrysemys picta*) into California threatens western pond turtles; it also may facilitate transmission of fatal respiratory diseases to pond turtles (Holland 1994).
- Fragmentation of habitat. Covered activities that place barriers or unsuitable habitat (e.g., roads, agricultural fields, drainage ditches) between native aquatic and upland winter and nesting habitats reduce the overall function of habitat and thus may affect turtle populations by reducing reproductive success and/or adult survival. Passage barriers within streams and an increasingly fragmented landscape across the Plan Area threaten to divide the local western pond turtle population among a few disconnected occurrences.
- Pollution. Reproductive endocrine functions of aquatic and semi-aquatic turtles can be disrupted by water contaminants (Henny et al. 2003). Agricultural and residential runoff carrying pesticides and other contaminants and increased water turbidity due to erosion may affect the food availability for western pond turtles, causing reproductive failures. Western pond turtles are long-lived and nonreproducing populations may exist many years after recruitment of young has ceased (Holland 1991; USFWS 1999).
- Western pond turtle nesting sites could be affected during the incubation period by agricultural activities, leading to annual nesting failures (Jennings and Hayes 1994). In addition, cattle may trample and eat aquatic vegetation that serves as habitat for hatchlings, and they may crush pond turtle nests (Hays et al. 1999).

The potential effects of these common effects of covered activities on western pond turtles will be addressed by the implementation of the applicable AMMs indicated in Table 4–7. The probability that the accidental introduction of contaminants associated with construction and maintenance activities (e.g., fuel spills) will adversely affect individual western pond turtles is considered low because turtles are expected to avoid areas with noise and frequent disturbance. In addition, implementation of the applicable AMMs indicated in Table 4–7 provides for containment and rapid cleanup of releases that may occur, thus reducing exposure risk and the period that individuals could be exposed to contaminants.

4.4.14.2 Permanent Development Projects

Direct effects of permanent development projects will result in the permanent removal of up to 35 acres of modeled aquatic habitat (emergent wetland), up to 4,566 acres modeled nesting and

movement habitat, and up to 5 acres of modeled aquatic nesting and movement habitat representing approximately 5 percent of the existing acreage of modeled aquatic, nesting and movement habitat in the Plan Area. Up to 24 ponds and 5.3 miles of perennial stream channel supporting modeled habitat will also be removed by the covered activities (Table 4–8, Figure 4–32). Indirect effects of permanent development projects will result in reduced functions of up to 4,827 acres of modeled habitat for the western pond turtle, 3,294 acres of which overlap with areas subject to ongoing effects of existing permanent developments (Appendix K).

Figure O–17, *Western Pond Turtle Habitat in the Plan Area with full BRCP Implementation* in Appendix O and Table 4–8 provide the acreage of modeled western pond turtle habitat remaining within the Plan Area (including BRCP protected lands and lands that are not impacted by the covered activities) with full implementation of the covered activities. Implementation of the covered activities will not increase the level of habitat fragmentation or isolation of existing population segments beyond the current degree of fragmentation and isolation. However, western pond turtle is a poor disperser that cannot easily move among patches of habitat that become disconnected with implementation of the covered activities.

4.4.14.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects within the Chico, Foothill Area, Neal Road Drop-Off and Recycling Facility, Oroville, Bangor, Durham, State Route 99 UPAs will result in permanent direct effects on up to 27 acres of modeled aquatic habitat (emergent wetland), up to 4,368 acres of modeled nesting and movement habitat, and up to 24 ponds and 4.5 miles of perennial stream channel supporting modeled habitat (see Table 4–9). Loss of this habitat area will reduce the area of any actual western pond turtle habitat that is located within affected modeled habitat and thus will reduce the area of habitat available to western pond turtle.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise, visual, and other disturbances (e.g., ground vibrations, dust emissions) associated with operating equipment and other activities necessary to construct new developments (see Table 4–1). These impact mechanisms could cause western pond turtle to reduce their use of affected habitat areas, especially basking sites, during the period these activities are implemented. Temporary displacement from aquatic habitat and reduced ability to bask could compromise thermoregulation in turtles and may affect egg maturation in gravid females. Repeated flight responses to disturbance may elevate energetic costs. The potential for temporary direct effects on basking western pond turtle will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 500-foot distance from permanent new developments within which temporary indirect effects will occur (see Table 4–5), up to 4,827 acres of modeled western pond turtle aquatic, nesting and movement habitat Plan Area-wide[102] will be temporarily and directly affected by permanent development covered activities, 3,294 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Permanent Indirect Effects

Covered activities may cause increasing traffic volumes and vehicle speeds, especially where roads are widened, straightened or otherwise enhanced (e.g., the SR 99 capacity enhancement project). Collisions with automobiles are a possible source of mortality for western pond turtles as they move from aquatic to upland habitats for nesting and over-wintering. Other permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other equipment), pet-related, building maintenance, and other disturbances associated with human occupancy following construction of permanent developments (see Table 4–1). These disturbances could cause western pond turtle to reduce their use of habitat adjacent to permanent development areas or may increase energy expenditure of turtles due to increased flight and avoidance reactions. Noise and visual disturbances from humans, pets and vehicles are likely to preclude western pond turtle from nesting or overwintering in patches of vegetation near permanent developments that otherwise would be suitable for overwintering.

Based on an average 500-foot distance from permanent new developments within which permanent indirect effects will occur (see Table 4–5), up to 4,827 acres of modeled western pond turtle aquatic, nesting and movement habitat Plan Area wide[103] will be permanently and indirectly affected by permanent development covered activities, 3,294 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). These permanent indirect effects will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent indirect effects associated with alteration in local hydrology may alter the vegetation composition and structure of nesting or movement habitat but will not affect the acreage of available foraging habitat. Based on an average 500-foot distance from permanent new developments within which these permanent indirect effects are expected to occur (see Section 4.2.4.3), up to 36 acres of emergent wetland that may support western pond turtle nesting and movement habitat Plan Area wide[104] will be indirectly affected if permanent development projects alter the supporting hydrology (see Appendix K). The potential for adverse effects on

[102] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.
[103] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.
[104] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

nesting and movement habitat will be minimized with implementation of the applicable AMMs indicated in Table 4–7. Conversely, alterations that increase local water availability may result in the establishment of patches of emergent wetland that could support nesting and foraging habitat and provide for movement habitat.

4.4.14.2.2 Outside Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects will result in permanent direct effects on up to 212 acres of modeled western pond turtle aquatic, nesting and movement habitat and up to 0.8 mile of perennial stream channel supporting modeled habitat outside the UPAs distributed among CAZs (see Table 4–9). The effects of such loss of modeled habitat on western pond turtle are the same as described for the permanent direct effects of implementing permanent development projects in the UPAs (see above). The construction of new drainage ditches, roads or modification of existing ditches or roads to accommodate covered activities in agricultural service areas of the Plan Area could impose a greater risk to western pond turtles by fragmenting habitat, preventing turtles from using portions of the available habitat, or by causing mortality due to vehicle strikes. The potential for permanent direct effects on occurrences that may be established in the future will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise, visual, and other disturbances (e.g., ground vibrations) associated with operating equipment and other activities necessary to construct new developments. The effects of these impact mechanisms on western pond turtle are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see above). The potential for temporary direct effects on western pond turtle will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 500-foot distance from permanent new developments within which temporary indirect effects will occur (see Table 4–5), up to 4,827 acres of modeled western pond turtle aquatic, nesting and movement habitat Plan Area-, 3,294 acres of which overlap with areas subject to ongoing effects of existing permanent developments wide[105] will be temporarily and directly affected by permanent development covered activities (see Appendix K). The potential for adverse effects on individual western pond turtles of construction-related noise and visual disturbances is considered to be low because of the following factors.

1. Less than 1 percent of the modeled aquatic habitat would be affected if all permanent development activities outside UPAs were implemented simultaneously, but permanent development projects would not be implemented simultaneously and thus a much smaller

[105] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

area of habitat would be affected by construction-related disturbances at any point in time.

2. The majority of covered activities implemented outside of the UPAs are linear infrastructure projects. As such, the period over which a given area of habitat adjacent to project footprints will be subjected to temporary direct construction-related disturbances will be limited as the area under construction moves along the project ROW.
3. Affected modeled habitat areas are within or near larger patches of modeled habitat that would not be disturbed and would be available for use by displaced individuals.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other equipment), pet-related, infrastructure maintenance, and other disturbances associated with operation and human occupancy following construction of permanent developments (see Table 4–1). The level of these effects are expected to be less than that associated with permanent development projects within UPAs because they do not include residential developments, which are expected to support higher levels of human activity than nonresidential developments. Ongoing noise and visual disturbances associated with vehicle traffic that could affect use of habitat areas adjacent to newly constructed roads.

These disturbances could cause western pond turtle to reduce their foraging use of aquatic habitat adjacent to permanent development areas. Noise and visual disturbances are likely to preclude western pond turtle from breeding or foraging in habitat next to permanent developments that otherwise would be suitable for foraging or nesting. Although unlikely, if western pond turtles were to establish themselves adjacent to new permanent developments, indirect effects could include changes in water temperature associated with changes in vegetation structure (shading) that may affect individual basking patterns, changes in movement behavior associated with lighting, visual, and noise disturbance, and increased predation of western pond turtle juveniles from pets, native predators (e.g., raccoons) and nonnative species that benefit from human occupancy, such as bullfrogs. If western pond turtle were to be present or establish in UPAs near proposed project footprints before all of the permanent development projects have been implemented, noise, visual, and other disturbances associated with occupancy of permanent development projects near occupied habitat could result in changed behavior and reduced survival. The potential for this effect, however, is considered low because western pond turtles are poor colonizers. The likelihood that turtles will occupy habitat near permanent development construction sites within UPAs is considered low. However, permanent indirect effects of permanent development projects will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 500-foot distance from permanent new agricultural services facilities and new roads within which permanent indirect effects will occur (see Table 4–5), up to 4,827 acres of modeled western pond turtle aquatic, nesting and movement habitat Plan Area-wide[106] will be permanently and indirectly affected , 3,294 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). Adverse effects of these disturbances, however, will be low for the reasons described above for temporary direct effects of construction-related noise and visual disturbances. Permanent indirect effects of new agricultural services facilities will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent indirect effects associated with alteration in local hydrology may alter the vegetation composition and structure of aquatic habitat in and near occupied streams or ponds. Based on an average 500-foot distance from permanent new developments within which these permanent indirect effects are expected to occur (see Table 4–5), up to 36 acres of aquatic habitat that may support suitable habitat will be indirectly affected if permanent development projects alter the supporting hydrology (see Appendix K). The potential for adverse effects of any such nesting habitat losses on western pond turtle is expected to be low because most aquatic and riparian habitat that may be affected is already located near development and is therefore already less desirable as habitat than other less disturbed areas.

4.4.14.3 Recurring Maintenance Activities

4.4.14.3.1 Within Urban Permit Areas

Permanent Direct Effects

With the exception for the potential impact mechanisms and associated effects on western pond turtle described above (see Section 4.4.14.1, *Effects Common among Covered Activities)*, there are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on western pond turtle habitat (see Table 4–1). Vegetation maintenance activities associated with maintaining roadways are not expected to affect western pond turtle habitat, because the species tends to avoid roads and associated disturbed areas. Mowing and clearing of vegetation along roads may affect pond turtle foraging and nesting habitat by resetting vegetative communities to an earlier successional stage, which may result in a reduction of pond turtle foraging and or nesting habitat. This effect is expected to be low because vegetative communities tend to be reset to an early grassland successional stage, and grasslands are utilized by pond turtle. Mowing and vegetation clearing could increase the risk of injury and mortality of individuals within work areas. These effects

[106] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

should be minimized with the implementation of the applicable AMMs in Table 4–7. Activities associated with maintaining flood control and other infrastructure will result in the permanent removal of small patches of open grassland or agricultural habitat that could support western pond turtle nesting habitat. These removed patches are included in the extent of habitat permanently removed by permanent development activities described for construction impacts.

Effects of the operation of maintenance equipment on western pond turtles for maintenance actions are the same as described for construction-related effects. Noise and visual disturbances associated with maintaining permanent developments may affect turtle behaviors, but these effects are expected to be low because the locations in which these activities would occur are currently or will be subject to high levels of ongoing human disturbances associated with existing and planned development (e.g., vehicle traffic). Impacts of ongoing maintenance activities will be minimized with implementation of the implementation of the applicable AMMs indicated in Table 4–7.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (e.g., ground vibrations). The effects of these impact mechanisms on western pond turtle are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.14.2.1, *Within Urban Permit Areas*) except that the duration of maintenance-related activities is generally expected to be less than that of construction-related activities. The potential for temporary direct effects on occupied western pond turtle habitat will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

As described in Table 4–2, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on western pond turtle.

4.4.14.3.2 Outside Urban Permit Areas

Permanent Direct Effects

There are no additional impact mechanisms beyond those described for projects within the UPAs that are associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on modeled western pond turtle habitat (see Table 4–1).

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (e.g., ground vibrations). The effects of these impact mechanisms on western pond turtle are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.14.2.1)

except that the duration of maintenance-related activities is generally expected to be less than that of construction-related activities. The potential for adverse effects of temporary maintenance-related disturbances on western pond turtle behavior, however, is considered low within UPAs because most aquatic and upland habitat that may be affected is already located near development and is already subject to high levels of disturbance (e.g., traffic, noise).The potential for temporary direct effects on western pond turtle aquatic and upland habitats will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

As described in Table 4–2, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on western pond turtle.

4.4.14.4 Effects of Covered Activities within Conservation Lands

4.4.14.4.1 Permanent Direct Effects

Implementation of conservation measures to restore emergent wetland habitat, primarily for the conservation of the giant garter snake (see Section 4.4.12, *Giant Garter Snake*), may alter the composition and structure of up to 500 acres of existing low-functioning rice, wetland and agricultural canal habitats, some of which are used as foraging habitat by turtles (See Table 5-7). Restoration of up to 121 acres of emergent wetlands will support patches of high quality habitat suitable for pond turtle foraging and nesting that replaces the low quality rice agricultural habitat that existed before. Implementation of applicable AMMs indicated in Table 4–7 will avoid permanent direct effects existing occurrences.

4.4.14.4.2 Temporary Direct Effects

Temporary direct effects are associated with the operation of equipment and other activities related to implementing habitat restoration, enhancement, and management actions in or adjacent to BRCP conservation lands that cause temporary noise, visual, and other disturbances to western pond turtle (see Table 4–2). The effects of these impact mechanisms on western pond turtles are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.14.2.1). The potential for temporary direct effects on western pond turtle aquatic and upland habitats will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.14.4.3 Permanent Indirect Effects

Implementation of conservation measures will not result in permanent indirect effects on western pond turtles because restored and protected habitats will not be associated with increasing human or pet presence, noise, traffic risks, or other impact mechanisms that could result in indirect effects (Table 4–2). In particular, protected aquatic and upland habitat sites will be affected less by disturbances than those under active agriculture.

4.4.14.5 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of western pond turtles within the Plan Area.

4.4.14.5.1 Permanent Direct Effects

Loss of up to 4,606 acres of modeled western pond turtles aquatic, nesting and movement habitat and up to 24 ponds and 5.3 miles of perennial stream channel supporting modeled habitat. The acreage of take (i.e., harm) will be the amount of actual habitat that is located within the area of affected modeled habitat. Permanent direct effects on habitat supporting western pond turtle occurrences will be avoided with implementation of the applicable AMMs indicated in Table 4–7.

A small, but indeterminable, amount of direct take of individual western pond turtles could be associated with collisions with vehicles and other equipment used to construct permanent development projects. Permanent direct effects on western pond turtle adults will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.14.5.2 Temporary Direct Effects

A temporary reduction in the functions of up to 4,827 acres of modeled western pond turtle nesting habitat would result from harassment associated with covered activities, 3,294 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Management-related activities on up to 10,965 acres of conservation lands supporting modeled western pond turtle habitat (Table 5-10) will result in temporary direct effects on a relatively small acreage of additional habitat that cannot be estimated. The acreage of take (i.e., harassment) will be the amount of actual habitat that is located within the area of affected modeled habitat. Temporary direct effects on occupied western pond turtle habitat will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.14.5.3 Permanent Indirect Effects

A permanent reduction in the functions of up to 4,827 acres of modeled western pond turtle aquatic, nesting and movement habitat would result from harassment associated with covered activities, 3,294 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). The acreage of take (i.e., harassment) will be the amount of actual habitat that is located within the area of affected modeled habitat. Permanent indirect effects on occupied western pond turtle habitat will be minimized with implementation of the applicable AMMs indicated in Table 4–7. A small, but indeterminable, amount of direct take of individual western pond turtles could be associated with collisions with vehicles and

other human uses adjacent to permanent development projects (e.g., illegal capture, predation by nonnative and native predators).

4.4.14.6 Overall Impact Likely to Result from Take

The major stressor of western pond turtles in the Plan Area is the loss of habitat functions (including predation and competition by nonnative species), fragmentation and population isolation, and disturbances associated with human activities. Western pond turtles are sensitive to the loss of upland habitat adjacent to aquatic habitats, where young are hatched and where some adult turtles hibernate. In addition to hatching success, predation of hatchling and juvenile turtles by nonnative bullfrogs is widely recognized as a significant source of mortality affecting population growth and ultimately, population persistence. Due to their longevity, pond turtle populations can exist for long periods, even when reproduction no longer occurs and the population consists of adults only. Thus, it is necessary that western pond turtle populations show evidence of being sustained by natural recruitment of juveniles.

The covered activities will result in the loss of up to 4,606 acres of modeled western pond turtle aquatic and upland habitat, representing approximately 5 percent of the extent of modeled habitat present in the Plan Area. Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. Given that less than 5 percent of modeled habitat will be removed by covered activities and that most of the modeled habitat that will be permanently affected by development is located near existing, disturbed areas, the species will not be adversely affected by the covered activities.

Consequently, it is unlikely that the western pond turtle population of the Plan Area will be adversely affected by the acreage of modeled aquatic and upland habitat removed by covered activities. Furthermore, implementation of applicable AMMs (see Table 4–7) will minimize the removal of occupied habitat by covered activities and minimize the potential for harassment of individual western pond turtles.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on western pond turtle or adversely affect its distribution or abundance throughout the Plan Area.

4.4.15 Foothill Yellow-Legged Frog

The maximum acreage of modeled foothill yellow-legged frog perennial stream habitat and modeled intermittent stream habitat that will be permanently affected, directly and indirectly, with implementation of the covered activities is 3,035 acres of modeled foothill yellow-legged frog habitat, representing approximately 27.5 percent (Table 4–9 of the current extent of modeled breeding and foraging habitat (see Table 4–8, Appendix K, and Figure 4–33, *Foothill Yellow-Legged Frog: Direct Impacts of Covered Activities* [separate files]).

4.4.15.1 Effects Common among Covered Activities

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction of new developments, restoration of habitat, and maintenance of existing facilities) could result in injury or mortality of foothill yellow-legged frog. For example, individual foothill yellow-legged frogs could be crushed by moving construction-related equipment, eggs and larvae could suffer mortality from contamination or changes to the structure of aquatic habitat, and invasive species may find conditions in some habitat areas after covered activities are implemented more suitable, increasing the predation risk on foothill yellow-legged frog. These potential impacts will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

The probability that the accidental introduction of contaminants associated with construction and maintenance activities (e.g., fuel spills) will adversely affect individual foothill yellow-legged frogs is considered low because frogs are expected to avoid work sites with ongoing noise and visual construction-related disturbances. In addition, implementation of the applicable AMMs indicated in Table 4–7 provide for containment and rapid cleanup of releases that may occur, thus reducing exposure risk and the period that individuals could be exposed to contaminants.

4.4.15.2 Permanent Development Projects

Direct effects of permanent development projects will result in the permanent removal of up to 326 acres of modeled foothill yellow-legged frog perennial stream habitat and 836 acres of modeled foothill yellow-legged frog intermittent stream habitat, representing approximately 11 percent of the existing acreage of modeled habitat in the Plan Area (Table 4–8, Figure 4–33). Indirect effects of permanent development projects will result in reduced functions of up to 1,846 acres of modeled foothill yellow-legged frog habitat as habitat for the foothill yellow-legged frog, 1,535 acres of which overlap with areas subject to ongoing effects of existing permanent developments (Appendix K. Figure O–18, *Foothill Yellow-Legged Frog Habitat in the Plan Area with full BRCP Implementation* in Appendix O and Table 4–8 provide the acreage of modeled foothill yellow-legged frog habitat remaining within the Plan Area (including BRCP protected lands and lands that are not impacted by the covered activities) with full implementation of the covered activities.

4.4.15.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects within the Chico, Oroville, Foothill Area, Neal Road Drop-Off and Recycling Facility, and Bangor and UPAs will result in permanent direct effects on up to 325 acres of modeled foothill yellow-legged frog perennial stream habitat and 853 acres of modeled foothill yellow-legged frog intermittent stream and adjacent habitat (Table 4–9). Loss of this habitat area will reduce the area of any actual foothill yellow-legged frog habitat that is located within affected modeled habitat and thus will reduce the area of

habitat available to foothill yellow-legged frog. Construction activities could also result in injury and mortality of individuals within work areas. Removal of large patches of habitat could result in localized fragmentation of habitat and/or disruption of movement patterns of individual frogs in occupied habitat adjacent to removed habitat areas.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise, visual, and other disturbances (e.g., ground vibrations) associated with operating equipment and other activities necessary to construct new developments (Table 4–1). These impact mechanisms could cause foothill yellow-legged frog to reduce their use of affected habitat areas during the period these activities are implemented. Temporary displacement from habitat and increased movement away from disturbance may elevate energetic costs to foothill yellow-legged frog and increase the risk of predation. The potential for temporary direct effects on foothill yellow-legged frog will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 500-foot distance from new permanent developments within which temporary direct effects will occur (see Table 4–5), up to 1,846 acres of modeled foothill yellow-legged frog habitat Plan Area-wide[107] will be temporarily and directly affected by permanent development covered activities, 1,535 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other equipment), pet-related, and other disturbances associated with human occupancy following construction of permanent developments (see Table 4–1). These disturbances could cause foothill yellow-legged frog to reduce their foraging use of habitat adjacent to permanent development areas. Noise and visual disturbances are likely to preclude foothill yellow-legged frog from breeding in streams and adjacent habitat next to permanent developments that otherwise would be suitable for breeding. Permanent indirect effects also could include changes in water temperature associated with changes in vegetation structure that may affect individual activity patterns and egg survival, changes in movement behavior associated with lighting, visual, and noise disturbance, and increased predation of foothill yellow-legged frog from pets and nonnative species that benefit from human occupancy of developments, such as bullfrogs.

Based on an average 500-foot distance from new permanent developments within which permanent indirect effects will occur (see Table 4–5), up to 1,846 acres of modeled foothill yellow-legged frog habitat Plan Area-wide[108] will be permanently and indirectly affected by

[107] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.
[108] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

permanent development covered activities, 1,535 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). These permanent indirect effects will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Road improvement projects may cause increasing traffic volumes and vehicle speeds, especially where roads are widened, straightened or otherwise enhanced (e.g., the SR 99 capacity enhancement project). Vehicle strikes are a potential source of injury or mortality of individual frogs that are crossing improved roadways.

4.4.15.2.2 Outside Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects will result in permanent direct effects on up to approximately 1 acre of modeled foothill yellow-legged frog perennial stream habitat and 10 acres of intermittent stream and adjacent habitat outside the UPAs in the Sierra Foothills CAZ (see Table 4–9). Loss of this habitat area will reduce the area of any actual foothill yellow-legged frog habitat that is located within affected modeled habitat and thus will reduce the area of habitat available to foothill yellow-legged frog. The effects of such loss of modeled habitat on foothill yellow-legged frog are the same as described for the permanent direct effects of implementing permanent development projects in the UPAs (see Section 4.4.15.2.1, *Within Urban Permit Areas*).

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise, visual, and other disturbances (e.g., ground vibrations) associated with operating equipment and other activities necessary to construct new developments (Table 4–1). The effects of these impact mechanisms on foothill yellow-legged frog are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.15.2.1). The potential for temporary direct effects on foothill yellow-legged frog will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 500-foot distance from new permanent developments within which temporary direct effects will occur (see Table 4–5), up to 1,846 acres of modeled foothill yellow-legged frog habitat Plan Area-wide[109] will be temporarily and directly affected by permanent development covered activities, 1,535 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

[109] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

The potential for adverse effects on individual foothill yellow-legged frog of construction-related noise and visual disturbances is considered to be low because of the following factors.

1. Less than 2 percent of the available modeled habitat would be affected if all permanent development activities were implemented simultaneously, but permanent development projects would not be implemented simultaneously and thus a much smaller area of habitat would be affected by construction-related disturbances at any point in time.
2. The majority of covered activities implemented outside of the UPAs are linear transportation infrastructure projects (e.g., bridge and road replacements). As such, the period over which a given area of habitat adjacent to project footprints will be subjected to temporary direct construction-related disturbances will be limited as the area under construction moves along the project ROW.
3. Affected modeled habitat areas are within or near larger patches of modeled habitat that would not be disturbed and would be available for use by displaced individuals.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity) and noise (e.g., operation of vehicles and other equipment), and other disturbances associated with human activity following construction of permanent developments (see Table 4–1). The effects of these impact mechanisms on foothill yellow-legged frog are the same as described for the permanent indirect effects of implementing permanent development projects within UPAs (see Section 4.4.15.2.1). The level of these effects are expected to be less than that associated with permanent development projects within UPAs because they do not include residential developments, which are expected to support higher levels of human activity than nonresidential developments. Permanent indirect effects of new permanent developments will be minimized with implementation of the applicable AMMs indicated in Table 4–7. Permanent indirect effects of improved roads that result in higher traffic volume and traffic on new roads include increased risk for injury or mortality associated with vehicles striking individual frogs that are crossing these roads.

Based on an average 500-foot distance from new permanent developments within which permanent indirect effects will occur (see Table 4–5), up to 1,846 acres of modeled foothill yellow-legged frog habitat Plan Area-wide[110] will be permanently and indirectly affected by permanent development covered activities, 1,535 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K).

[110] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

4.4.15.3 Recurring Maintenance Activities

4.4.15.3.1 Within Urban Permit Areas

Permanent Direct Effects

With the exception of the potential impact mechanisms and associated effects on foothill yellow-legged frog described in Section 4.4.15.1, *Effects common among Covered Activities*, there are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on foothill yellow-legged frog.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (e.g., ground vibrations; Table 4–1). The effects of these impact mechanisms on foothill yellow-legged frog are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.15.2.1) except that the duration of maintenance-related activities is generally expected to be less than that of construction-related activities. The potential for temporary direct effects on foothill yellow-legged frog will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

The potential for adverse effects of temporary recurring maintenance-related disturbances on foothill yellow-legged frog behavior is considered low within UPAs because perennial streams supporting modeled habitat are likely unoccupied because they support nonnative predators and individual frogs would likely avoid habitat areas that are disturbed by recurring maintenance activities (e.g., operation of equipment).

Permanent Indirect Effects

As described in Table 4–2, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on foothill yellow-legged frog.

4.4.15.3.2 Outside Urban Permit Areas

Permanent Direct Effects

With the exception of the potential impact mechanisms and associated effects on foothill yellow-legged frog described in Section 4.4.15.1, there are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on foothill yellow-legged frog.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (e.g., ground vibrations; Table 4–1). The effects of

these impact mechanisms on foothill yellow-legged frog are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.15.2.1) except that the duration of maintenance-related activities is generally expected to be less than that of construction-related activities.

The potential for adverse effects of temporary maintenance-related disturbances on foothill yellow-legged frog behavior is considered low for the same reasons as those described for temporary direct effects of recurring maintenance activities inside UPAs.

Permanent Indirect Effects

As described in Table 4–2, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on foothill yellow-legged frog

4.4.15.4 Effects of Covered Activities within Conservation Lands

4.4.15.4.1 Permanent Direct Effects

Restoration of riparian and emergent wetland land cover types and activities implemented under CM9, Replenish Spawning Gravels for Salmonids and CM10, Remove Impediments to Upstream and Downstream Fish Passage , to improve stream channel habitat conditions for covered fish species in the Cascade Foothills and Sierra Foothills CAZs could result in injury or mortality of individual foothill yellow-legged frog as a result of operating restoration-related equipment if they are present in restoration sites. Permanent direct effects of habitat restoration projects will be minimized with implementation of the applicable AMMs indicated in Table 4–7. Though unlikely, the composition and structure up to 189 acres of modeled foothill yellow-legged frog habitat could be permanently altered (restored riparian and emergent wetland land cover types will support modeled foothill yellow-legged frog habitat) if these land cover types are restored in modeled habitat (e.g., grassland adjacent to stream channels; Table 5-7). Depending on the level of habitat function for foothill yellow-legged frog that is associated with the existing impacted habitat and the restored replacement habitat in any particularly location, there may be an overall permanent loss or increase in foothill yellow-legged frog habitat function.

4.4.15.4.2 Temporary Direct Effects

The primary temporary direct effect on foothill yellow-legged frog will be associated with restoration of up to 219 acres of riparian and emergent wetland land cover types in the Cascade Foothills and Sierra Foothills CAZs (see Table 5-7) within its modeled habitat. Restoration-related activities will temporarily reduce the function of the restored habitat (e.g., areas cleared of vegetation) until the foothill yellow-legged frog functions associated with the restored habitat have matured. In addition, the operation of equipment and other activities related to implementing habitat restoration, enhancement, and management actions in or adjacent to BRCP conservation lands that cause temporary noise, visual, and other disturbances to foothill yellow-

legged frog (Table 4–1). The effects of these impact mechanisms on foothill yellow-legged frog are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.15.2.1). The potential for temporary direct effects on occupied foothill yellow-legged frog habitat will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.15.4.3 Permanent Indirect Effects

Implementation of conservation measures will not result in permanent indirect effects on foothill yellow-legged frog because restored and protected habitats will not be associated with increasing human or pet presence, noise, traffic risks, or other impact mechanisms that could result in permanent indirect effects (Table 4–2).

4.4.15.5 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of foothill yellow-legged frog within the Plan Area.

4.4.15.5.1 Permanent Direct Effects

Loss of up to 326 acres of modeled foothill yellow-legged frog perennial stream habitat and 863 acres of intermittent stream habitat could result from the implementation of the covered activities. Assuming that all riparian and emergent wetland land cover type restoration in the Cascades Foothills and Sierra Foothills CAZs is located in modeled habitat, there could be a permanent reduction in habitat function on up to 219 acres of modeled habitat if the entire restored habitat supports lower habitat functions for foothill yellow-legged frog. The acreage of take (i.e., harm) will be the amount of actual habitat that is located within the area of affected modeled habitat.

A small, but indeterminable, amount of direct take of individual eggs, juvenile and adult foothill yellow-legged frog could be associated with contamination of streams or adverse changes in aquatic habitat structure and conditions and collisions with vehicles and other equipment used to construct permanent development projects and conduct recurring maintenance activities. Permanent direct effects of these impacts will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.15.5.2 Temporary Direct Effects

A temporary reduction in the functions of up to 1,846 acres of modeled foothill yellow-legged frog habitat would result from harassment associated with covered activities, 1,535 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). The habitat functions for foothill yellow-legged frog on up to an additional 189 acres of either modeled habitat type could be temporarily reduced as a result of habitat restoration activities. Management-related activities on 2,025 acres of conservation lands

supporting modeled foothill yellow-legged frog habitat (Table 5-10) will result in temporary direct effects on a relatively small acreage of additional habitat that cannot be estimated. The acreage of take (i.e., harassment) will be the amount of actual habitat that is located within the area of affected modeled habitat. Temporary direct effects on foothill yellow-legged frog will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.15.5.3 Permanent Indirect Effects

A permanent reduction in the functions of up to 1,846 acres of modeled foothill yellow-legged frog habitat would result from harassment associated with covered activities, 1,535 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). The acreage of take (i.e., harassment) will be the amount of actual habitat that is located within the area of affected modeled habitat. Permanent indirect effects on occupied foothill yellow-legged frog habitat will be minimized with implementation the applicable AMMs indicated in Table 4–7.

A small, but indeterminable, amount of direct take of individual egg, juvenile, and adult foothill yellow-legged frog could be associated with collisions with vehicles and other human uses adjacent to permanent development projects (e.g., illegal harvest), adverse changes in aquatic habitat structure and environmental conditions, and predation caused by increased numbers of nonnative species associated with development.

4.4.15.6 Overall Impact Likely to Result from Take

The primary threat to foothill yellow-legged frog has been the historical loss and degradation of its stream and adjacent habitat, as well as the introduction of nonnative predators and degradation of aquatic habitat conditions through water management (see Appendix A). It no longer occurs in the extreme southern portions of its historical range and populations on the west slope of the Sierra Nevada are limited. The species has been reported as threatened in the west slope drainages of the Sierra Nevada and southern Cascade Mountains east of the Sacramento-San Joaquin River axis. At least five extant populations in eastern Butte County are known based on verified museum records. Within the Plan Area, populations have been observed in Big Chico Creek along the upper reaches of Upper Bidwell Park, in Mud Creek and Rock Creek, along Butte Creek (at least one occurrence), and in the Feather River (see Appendix A).

The covered activities will result in the loss of up to 1,189 acres of modeled foothill yellow-legged frog habitat, representing approximately 11 percent (Table 4–7). Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less.

Based on the available information regarding the status and distribution of foothill yellow-legged frog (see Appendix A), it is likely that the most of the modeled habitat that is removed by the covered activities is unoccupied by foothill yellow-legged frog. Implementation of the applicable AMMs in Table 4–7 will also minimize the likelihood for take. In particular, AMM6 (see Chapter 6, *Conditions on Covered Activities*), which requires establishment of minimum impact avoidance buffers along stream channels, will substantially minimize the permanent indirect impacts associated with new developments. Permanent direct impacts on modeled habitat include the removal of habitat adjacent to streams, but do not include loss of stream channel corridor. Consequently, the ability of foothill yellow-legged frog to disperse and move among habitat areas may be reduced, but not eliminated. Following implementation of the covered activities, approximately 89 percent its modeled habitat in the Plan Area will remain. Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on foothill yellow-legged frog or adversely affect its Plan Area distribution or abundance.

4.4.16 Western Spadefoot Toad

The maximum acreage of modeled western spadefoot toad habitat that will be permanently affected, directly and indirectly, with implementation of the covered activities is 18,356 acres, representing approximately 17 percent of the current extent of modeled habitat (see Table 4–8, Appendix K, and Figure 4–34, *Western Spadefoot Toad: Direct Impacts of Covered Activities* [separate files]). Within these impact areas, up to 32 linear miles of stream channel and 22 ponds supporting modeled breeding habitat could be removed, representing approximately 8 and 11 percent, respectively of these habitat types in the Plan Area.

4.4.16.1 Effects Common among Covered Activities

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction of new developments, restoration of habitat, and maintenance of existing facilities) could result in injury or mortality of western spadefoot toad. For example, individual western spadefoot toads could be crushed by moving construction-related equipment, eggs and tadpoles could suffer mortality from contamination or changes to the structure of aquatic habitat, and invasive species may find conditions in some modeled habitat areas after covered activities are implemented more suitable, increasing the predation risk on western spadefoot toad. These potential impacts will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

The probability that the accidental introduction of contaminants associated with construction and maintenance activities (e.g., fuel spills) will adversely affect individual western spadefoot toad is considered low because toads are expected to avoid work sites with ongoing noise and visual construction-related disturbances. In addition, implementation of the applicable AMMs indicated in Table 4–7 provide for containment and rapid cleanup of releases that may occur, thus reducing exposure risk and the period that individuals could be exposed to contaminants.

4.4.16.2 Permanent Development Projects

Direct effects of permanent development projects will result in the permanent removal of up to 46 acres of modeled breeding habitat: nonpond, 1,963 acres of breeding and upland habitat, and 8,133 acres of modeled upland habitat, representing approximately 2 percent, 6 percent, and 11 percent of modeled habitat in the Plan Area. Within these impact areas, up to 32 miles of stream channels and 22 ponds supporting modeled breeding habitat could be removed, representing approximately 8 percent and 11 percent, respectively, of these modeled habitat types in the Plan Area (Table 4–8, Figure 4–34). Indirect effects of permanent development projects will result in reduced functions of up to 8,214 acres of modeled western spadefoot toad habitat, 4,970 acres of which overlap with areas subject to ongoing effects of existing permanent developments. Up to 33 ponds supporting modeled pond breeding habitat could be indirectly affected, of which 21 ponds occur within areas subject to ongoing effects of existing permanent developments (Appendix K).

Figure O–19, *Western Spadefoot Toad Habitat in the Plan Area with full BRCP Implementation* in Appendix O and Table 4–8 provide the acreage of modeled western spadefoot toad habitat remaining within the Plan Area (including BRCP protected lands and lands that are not impacted by the covered activities) with full implementation of the covered activities.

4.4.16.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects within the Chico, State Route 99, Foothill Area, Oroville, Foothill Area, Neal Road Drop-Off and Recycling Facility, Bangor, and Honcut UPAs will result in permanent direct effects on up to 46 acres of modeled western spadefoot toad breeding habitat: nonpond, 1,854 acres of modeled breeding and upland habitat, 7,853 acres of modeled upland habitat, 30 miles of stream channel, and 22 ponds (Table 4–9). Loss of this habitat area will reduce the area of any actual western spadefoot toad habitat that is located within affected modeled habitat and thus will reduce the area of habitat available to western spadefoot toad. Construction activities could also result in injury and mortality of individuals within work areas. Removal of large patches of habitat could result in localized fragmentation habitat and/or disruption of movement patterns of individual toads in occupied habitat adjacent to removed habitat areas. Implementation of AMM3 (see Chapter 6, *Conditions on Covered Activities*) will minimize impacts on breeding pools that support breeding occurrences of western spadefoot toad.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise, visual, and other disturbances (e.g., ground vibrations) associated with operating equipment and other activities necessary to construct new developments (Table 4–1). These impact mechanisms could cause western spadefoot toad to reduce their use of affected habitat areas during the period these activities are implemented. In particular, low frequency

noise and vibration in or near western spadefoot toad habitat may be harmful, even fatal, to the species. Western spadefoot toad is extremely sensitive to such disturbance, which causes them to break dormancy and emerge from their burrows (Dimmitt and Ruibal 1980), which could result in mortality or reduced productivity if it causes western spadefoot toads to emerge at inappropriate times (USFWS 2005). Temporary displacement from habitat and increased movement away from disturbance may elevate energetic costs to western spadefoot toad and increase the risk of predation. The potential for temporary direct effects on western spadefoot toad will be minimized with implementation of the applicable AMMs indicated in Table 4–7. Based on an average 500-foot distance from permanent new developments within which temporary indirect effects will occur (see Table 4–5), up to 8,214 acres of modeled western spadefoot toad habitat and 33 breeding ponds will be temporarily and directly affected by permanent development covered activities Plan Area-wide[111], of which 4,970 acres and 21 ponds occur within areas subject to ongoing effects of existing permanent developments (Appendix K*)*.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other equipment), pet-related, building maintenance, and other disturbances associated with human occupancy following construction of permanent developments (see Table 4–1). These disturbances could cause western spadefoot toad to reduce their use of habitat adjacent to permanent development areas. Noise and visual disturbances are likely to preclude western spadefoot toad from breeding in vernal pools, ponds, and streams adjacent to permanent developments that otherwise would be suitable for breeding. Other effects could include changes in movement behavior associated with lighting, visual, and noise disturbance, and increased predation of western spadefoot toad from pets and nonnative species that benefit from human occupancy, such as bullfrogs.

Based on an average 500-foot distance from permanent new developments within which temporary indirect effects will occur (see Table 4–5), up to 8,214 acres of modeled western spadefoot toad habitat and 33 breeding ponds will be permanently and indirectly affected by permanent development covered activities Plan Area-wide[112], of which 4,970 acres and 21 ponds occur within areas subject to ongoing effects of existing permanent developments (Appendix K*)*. Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K).

Permanent indirect effects associated with alteration in local hydrology may alter the vegetation composition, structure, and water chemistry of aquatic habitat and may lead to dewatering of some habitat. Based on the acreage of permanent indirect effects calculated above for modeled

[111] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.
[112] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

breeding habitat; nonpond and breeding and upland habitat, permanent development projects could alter the hydrology in up to 992 acres of breeding habitat. Any resulting adverse changes in water chemistry, hydroperiod, and water temperature could reduce production of western spadefoot toad. Because the distance from the footprint of permanent development projects within which temporary direct effects (see above) will occur is the same as the distance from the footprint within which permanent direct effects will occur following occupancy of new permanent developments, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects. These permanent indirect effects will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Road improvement projects may cause increasing traffic volumes and vehicle speeds, especially where roads are widened, straightened or otherwise enhanced (e.g., the SR 99 capacity enhancement project). Vehicle strikes are a potential source of injury or mortality of individual toads that are crossing improved roadways.

4.4.16.2.2 Outside Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects will result in permanent direct effects on less than 1 acre of modeled western spadefoot toad breeding habitat: nonpond, up to 109 acres of modeled breeding and upland habitat, up to 279 acres of modeled upland habitat and up to 2 miles of modeled stream channel habitat outside of UPAs distributed among all the CAZs (Table 4–9). No ponds supporting modeled breeding habitat will be removed. Implementation of AMM3 (see Chapter 6, *Conditions on Covered Activities*) will avoid impacts on breeding pools that support breeding occurrences of western spadefoot toad. The effects of such loss of modeled habitat on western spadefoot toad are the same as described for the permanent direct effects of implementing permanent development projects in the UPAs (see Section 4.4.16.2.1, *Within Urban Permit Areas*).

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include noise, visual, and other disturbances (e.g., ground vibrations) associated with operating equipment and other activities necessary to construct new developments (Table 4–1). The effects of these impact mechanisms on western spadefoot toad are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.16.2.1). The potential for temporary direct effects on western spadefoot toad will be minimized with implementation of the applicable AMMs indicated in Table 4–7

Based on an average 500-foot distance from permanent new developments within which temporary indirect effects will occur (see Table 4–5), up to 8,214 acres of modeled western spadefoot toad habitat and 33 breeding ponds will be temporarily and directly affected by

permanent development covered activities Plan Area-wide[113], 4,970 acres and up to 33 ponds supporting modeled pond breeding habitat could be indirectly affected, of which 21 ponds occur within areas subject to ongoing effects of existing permanent developments (Appendix K).

The potential for adverse effects on individual western spadefoot toad of construction-related noise and visual disturbances is considered to be low because of the following factors.

1. Less than 0.5 percent of the available modeled habitat would be affected if all permanent development activities outside UPAs were implemented simultaneously, but permanent development projects would not be implemented simultaneously and thus a much smaller area of habitat would be affected by construction-related disturbances at any point in time.
2. The majority of covered activities implemented outside of the UPAs are linear transportation infrastructure projects (e.g., bridge and road replacements). As such, the period over which a given area of habitat adjacent to project footprints will be subjected to temporary direct construction-related disturbances will be limited as the area under construction moves along the project ROW.
3. Affected modeled habitat areas are within or near larger patches of modeled habitat that would not be disturbed and would be available for use by displaced individuals.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity) and noise (e.g., operation of vehicles and other equipment) disturbances associated with human activity following construction of permanent developments (see Table 4–1). The level of these effects are expected to be less than that associated with permanent development projects within UPAs because they do not include residential developments, which are expected to support higher levels of human activity than nonresidential developments. These permanent indirect effects will be minimized with implementation of the applicable AMMs indicated in Table 4–7. Permanent indirect effects of improved roads that result in higher traffic volume and traffic on new roads include increased risk for injury or mortality associated with vehicles striking individual toads that are crossing these roads.

Noise and visual disturbances are likely to preclude western spadefoot toad from breeding in habitat immediately adjacent to new roads and bridges that otherwise would be suitable for breeding. Although unlikely, if western spadefoot toad were to nest adjacent to these new facilities, the effects on western spadefoot toad are the same as described for the permanent indirect effects of implementing permanent development projects in the UPAs (see Section 4.4.16.2.1).

[113] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

Based on an average 500-foot distance from permanent new developments within which temporary indirect effects will occur (see Table 4–5), up to 8,214 acres of modeled western spadefoot toad habitat and 33 breeding ponds will be permanently and indirectly affected by permanent development covered activities Plan Area-wide[114], 4,970 acres and up to 33 ponds supporting modeled pond breeding habitat could be indirectly affected, of which 21 ponds occur within areas subject to ongoing effects of existing permanent developments (Appendix K*)*. Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). Adverse effects of these disturbances, however, will be low for the reasons described above for temporary direct effects of construction-related noise and visual disturbances. Permanent indirect effects associated with alteration in local hydrology are the same as those described above for permanent indirect effects within UPAs, except that a smaller acreage of habitat could be affected.

4.4.16.3 Recurring Maintenance Activities

4.4.16.3.1 Within Urban Permit Areas

Permanent Direct Effects

With the exception of the potential impact mechanisms and associated effects on western spadefoot toad described in Section 4.4.16.1, *Effects Common among Covered Activities*, there are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on western spadefoot toad.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (e.g., ground vibrations; Table 4–1). The effects of these impact mechanisms on western spadefoot toad are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.16.2.1) except that the duration of maintenance-related activities is generally expected to be less than that of construction-related activities. The potential for temporary direct effects on western spadefoot toad will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

The potential for adverse effects of temporary recurring maintenance-related disturbances on western spadefoot toad behavior is considered low because maintenance areas are generally subject to ongoing high levels of disturbance that would be unlikely to be occupied by the toad (e.g., within residential and commercial developments).

[114] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

Permanent Indirect Effects

As described in Table 4–2, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on western spadefoot toad.

4.4.16.3.2 Outside Urban Permit Areas

Permanent Direct Effects

With the exception of the potential impact mechanisms and associated effects on western spadefoot toad described in Section 4.4.16.1, there are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on western spadefoot toad.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include noise, visual, and other disturbances (e.g., ground vibrations; Table 4–1). The effects of these impact mechanisms on western spadefoot toad are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.16.2.1) except that the duration of maintenance-related activities is generally expected to be less than that of construction-related activities.

The potential for adverse effects of temporary maintenance-related disturbances on western spadefoot toad behavior is considered low for the same reasons as those described for temporary direct effects of recurring maintenance activities inside UPAs.

Permanent Indirect Effects

As described in Table 4–2, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on western spadefoot toad.

4.4.16.4 Effects of Covered Activities within Conservation Lands

4.4.16.4.1 Permanent Direct Effects

Implementation of conservation measures to restore up to 496 acres vernal pool and other seasonal wetlands and riparian land cover types could result in injury or mortality of individual western spadefoot toad as a result of operating restoration-related equipment if they are present in restoration sites (giant garter snake habitat is expected to be restored on rice lands and managed wetlands that do not support western spadefoot toad habitat). Permanent direct effects of habitat restoration projects will be minimized with implementation of the applicable AMMs indicated in Table 4–7. Up to 189 acres of modeled toad habitat could be permanently removed if riparian land cover is restored in modeled habitat (e.g., grassland adjacent to stream channels;

Table 5-7). Up to an additional 121 acres of modeled toad habitat could be permanently removed if emergent wetland is restored in modeled habitat (e.g., grassland adjacent to stream channels; Table 5-7) and they do not develop as habitat for the toad.

4.4.16.4.2 Temporary Direct Effects

The primary temporary direct effect on western spadefoot toad will be associated with restoration of up to 306 acres of vernal pool and other seasonal wetlands and 121 acres of emergent wetland (see Table 5-7) within its modeled grassland habitat. Conversion of existing lower functioning grassland habitat to higher functioning breeding habitat will temporarily reduce the function of the restored habitat until the western spadefoot toad functions associated with the restored habitat have matured. Up to 121 acres of modeled toad habitat would be permanently removed if restoration of emergent wetland land cover is implemented in grassland and the emergent wetland does not develop as habitat for the toad. In addition, the operation of equipment and other activities related to implementing habitat restoration, enhancement, and management actions in or adjacent to BRCP conservation lands that cause temporary noise, visual, and other disturbances to western spadefoot toad (Table 4–1). The effects of these impact mechanisms on western spadefoot toad are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.16.2.1). The potential for temporary direct effects on occupied western spadefoot toad habitat will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.16.4.3 Permanent Indirect Effects

Implementation of conservation measures will not result in permanent indirect effects on western spadefoot toad because restored and protected habitats will not be associated with increasing human or pet presence, noise, traffic risks, or other impact mechanisms that could result in permanent indirect effects (Table 4–1).

4.4.16.5 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of western spadefoot toad within the Plan Area.

4.4.16.5.1 Permanent Direct Effects

Loss of up to 46 acres of modeled western spadefoot toad breeding habitat; nonpond, 1,963 acres of breeding and upland habitat, 8,133[115] acres of upland habitat, 32 miles of modeled stream channel habitat, and 22 breeding ponds (Table 4–8) could result from implementing the covered activities. The acreage of take (i.e., harm) will be the amount of actual habitat that is located within the area of affected modeled habitat.

[115] Does not include 189 acres of grassland that could be restored to riparian land cover types and 121 acres restored to emergent wetland. If restored emergent wetland develops as western spadefoot toad habitat, this impact will not be permanent.

A small, but indeterminable, amount of direct take of individual eggs, juvenile and adult western spadefoot toad could be associated with contamination or adverse changes in aquatic habitat structure and conditions and collisions with vehicles and other equipment used to construct permanent development projects and conduct recurring maintenance activities. Permanent direct effects of these impacts will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.16.5.2 Temporary Direct Effects

A temporary reduction in the functions of up to 8,214 acres of modeled western spadefoot toad habitat[116] and 33 ponds would result from harassment associated with covered activities, 4,970 acres and up to 33 ponds supporting modeled pond breeding habitat could be indirectly affected, of which 21 ponds occur within areas subject to ongoing effects of existing permanent developments (Appendix K*)*. Habitat enhancement- and management-related activities on up to 30,721 acres of conservation lands supporting modeled western spadefoot toad habitat (Table 5-10) will result in temporary direct effects on a relatively small acreage of additional habitat that cannot be estimated. The acreage of take (i.e., harassment) will be the amount of actual habitat that is located within the area of affected modeled habitat. Temporary direct effects on western spadefoot toad will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.16.5.3 Permanent Indirect Effects

A permanent reduction in the functions of up to 8,214 acres of modeled western spadefoot toad habitat and 33 ponds would result from harassment associated with covered activities, 4,970 acres and up to 33 ponds supporting modeled pond breeding habitat could be indirectly affected, of which 21 ponds occur within areas subject to ongoing effects of existing permanent developments (Appendix K*)*. Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). The acreage of take (i.e., harassment) will be the amount of actual habitat that is located within the area of affected modeled habitat. Permanent indirect effects on western spadefoot toad habitat will be minimized with implementation of the applicable AMMs indicated in Table 4–7. A small, but indeterminable, amount of direct take of individual western spadefoot toad (eggs, larvae, and adults) could be associated with collisions with vehicles and other human uses adjacent to permanent development projects (e.g., illegal harvest), adverse changes in aquatic habitat structure and environmental conditions, and predation caused by increased numbers of nonnative species associated with development.

[116] Includes temporary impacts on habitat function associated with restoration of 306 acres of vernal pools and other seasonal wetlands and 121 acres of emergent wetland.

4.4.16.6 Overall Impact Likely to Result from Take

The primary threat to western spadefoot toad has been the historical loss of its aquatic breeding and associated upland habitat due to urban development and agriculture (USFWS 2006b). It has been extirpated throughout most of Southern California and from many historical locations in the Central Valley (Stebbins 1985, Jennings and Hayes 1994, Fisher and Shaffer 1996). The CNDDB (2006) has five records of occurrences of western spadefoot toad within the Plan Area. Two are within the city limits of Chico (one is along Intermittent Creek), another is reported from the vicinity of Wyandotte Creek south of Oroville (J. Shedd pers. comm.; see Appendix A, Figure A.16-1, *Western Spadefoot Toad Modeled Habitat and Recorded Occurrences*), another is from the The Nature Conservancy Vina Plains Preserve, and another is from the DFW Stone Ridge Ecological Reserve.

The covered activities will result in the loss of up to 10,142 acres of modeled habitat, representing approximately 11 percent of the current extent of modeled habitat (see Table 4–8). Within these impact areas, up to 22 ponds supporting modeled breeding habitat could be removed, representing approximately 11 percent of the current number of modeled pond habitat. Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less.

Based on the available information regarding the status and distribution of western spadefoot toad (see Appendix A), it is likely that the most of the modeled habitat that is removed by the covered activities is unoccupied by western spadefoot toad. Implementation of AMM3 (see Chapter 6, *Conditions on Covered Activities*) requires that all impacts on breeding habitat supporting breeding by western spadefoot toad will be avoided until at least 5 newly discovered or established breeding occurrences are protected. Consequently, any potential impacts on the reproductive potential of western spadefoot toad will be minimized. Implementation of the remaining applicable AMMs (see Table 4–7) will serve to further minimize impacts on western spadefoot toad.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on western spadefoot toad or adversely affect its Plan Area distribution or abundance.

4.4.17 Central Valley Steelhead

The maximum acreage of modeled Central Valley steelhead habitat that will be permanently affected, directly and indirectly, with implementation of the covered activities is 8.84 acres. The permanent direct impacts result in the permanent alteration of channel habitat structure, but do not result in the removal of stream channel habitat (Figure 4–35, *Central Valley Steelhead: Direct Impacts of Covered Activities* [separate files]).

4.4.17.1 Effects Common among Covered Activities

Actions undertaken to implement covered activities that affect stream channels used by Central Valley steelhead (e.g., replacement of bridges) could result in injury or mortality of Central Valley steelhead associated with the operation of equipment in channels during periods steelhead are present. Operation of construction and maintenance-related equipment in and adjacent to stream habitats could result in temporary increases in turbidity that could increase predation risk for juvenile steelhead. The area of channel that could be affected by these activities is small relative to the overall length of channel habitat and, therefore, the number of individual fish that could be affected would be small. These potential impacts will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

Operation of equipment in and near stream channels supporting modeled habitat could result in the accidental introduction of contaminants associated with construction and recurring maintenance activities (e.g., fuel spills) into steelhead habitat could adversely affect individuals if present. Implementation of the applicable AMMs indicated in Table 4–7 provide for containment and rapid cleanup of releases that may occur, thus reducing exposure risk and the period that individuals could be exposed to contaminants.

4.4.17.2 Permanent Development Projects

Direct effects of permanent development projects result from construction of new and replacement bridge projects will permanently affect up to 2.34 acres of modeled Central Valley steelhead adult migration; juvenile rearing and migration habitat, 3.38 acres of adult spawning and migration; juvenile rearing and migration habitat, and 0.52 acres of nonnatal juvenile rearing habitat located outside UPAs. Up to an additional 2.6 acres of any combination of these modeled habitat types will be permanently and directly impacted within the UPAs.[117] Permanent direct effects include the alteration of habitat structure but will not result in the permanent removal of any modeled habitat in the Plan Area (Figure 4–35). Permanent indirect effects of permanent development projects will result in reduced functions of the up to 8.84 acres of modeled habitat that is directly affected by new and replacement bridge projects to the extent that permanent alterations in habitat structure increase habitat for predators, thus increasing the risk for predation mortality of juvenile steelhead. Nonquantifiable permanent indirect effects include the potential for increased exposure to any increase in contaminant-related stormwater runoff and human activity that is associated with new permanent development projects. Up to 0.20 linear mile of modeled adult migration; juvenile rearing and migration habitat, 0.30 linear mile of adult spawning and migration; juvenile rearing and migration habitat, and 0.05 linear mile of nonnatal juvenile rearing habitat located outside UPAs could be temporarily affected. Up to an additional 0.23 linear mile of any combination of these modeled habitat types will be temporarily impacted

[117] As indicated in Table 4–2, up to 10 new and replacement bridge projects may be implemented in the UPAs, the location of these bridge projects and, consequently, the modeled habitat types that will be affected cannot be determined at this time.

within the UPAs.[118] Figure O–20, *Central Valley Steelhead Habitat in the Plan Area with full BRCP Implementation* in Appendix O and Table 4–8 provide the acreage of modeled Central Valley steelhead habitat remaining within the Plan Area (including BRCP protected lands and lands that are not impacted by the covered activities) with full implementation of the covered activities. Implementation of the covered activities will not isolate or fragment Central Valley steelhead use of the Plan Area because no habitat will be permanently removed by the covered activities.

4.4.17.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of new and replacement bridge projects within UPAs will result in permanent direct effects on up to 2.6 acres of modeled Central Valley steelhead habitat types.[119] Construction of new and replacement bridges will alter the existing habitat structure of channel beds and banks (e.g., channel and bank substrate material), but will not result in the removal of Central Valley steelhead habitat.

Temporary Direct Effects

Temporary direct effects are associated with construction of new bridge and bridge replacement projects include noise and visual disturbances, and temporary increases in turbidity in stream channels associated with operating equipment and other activities necessary to construct new developments in locations in or near streams supporting habitat (Table 4–1). These impact mechanisms could cause Central Valley steelhead to reduce their use of affected habitat areas during the period these activities are implemented, and potentially may reduce their ability to forage and/or could increase their susceptibility to predation. The potential for temporary direct effects on Central Valley steelhead will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 100-foot downstream and 20-foot upstream distance from new and replacement bridge projects within which temporary direct effects will occur (see Table 4–5), up to 0.23 mile of modeled Central Valley steelhead habitat types within UPAs will temporarily affected by new bridge and bridge replacement construction activities.

Permanent Indirect Effects

Permanent indirect effects of new and replacement bridge projects include the potential for increased runoff of petroleum based chemicals from operation of vehicles on new bridges. The potential for adverse effects of these contaminants on Central Valley steelhead, however, is

[118] As indicated in Table 4–2, up to 10 new and replacement bridge projects may be implemented in the UPAs, the location of these bridge projects and, consequently, the modeled habitat types that will be affected cannot be determined at this time.

[119] As indicated in Table 4–2, up to 10 new and replacement bridge projects may be implemented in the UPAs, the UPAs in which the projects will be located and their locations with UPAs and, consequently, the modeled habitat types that will be affected, cannot be determined at this time.

considered low because most or all of the contaminant load is expected to result from displacing traffic and its associated contaminant load from existing bridges to new bridges. Alteration of up to 2.6 acres of in-channel habitat structure at new and replacement bridge project sites may create habitat for fish predators that could increase predation of juvenile steelhead.

Occupancy of new permanent developments could increase the discharge of contaminants and sediments in urban and stormwater runoff associated with permanent development activities could result in increased levels of toxic contaminants entering streams (e.g., pesticides, copper). Such contaminants could have sublethal effects on individual Central Valley steelhead associated with bioaccumulation of toxic compounds and potentially lethal effects depending on the toxicity and concentration of discharged contaminants. Occupancy of permanent development projects could also result in increased access to streams supporting modeled Central Valley steelhead habitat. Such access could increase the potential for the placement of litter and other material in stream channels that could affect the function of streams as habitat. The potential for these permanent indirect effects on steelhead will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.17.2.2 Outside Urban Permit Areas

Permanent Direct Effects

Implementation of new and replacement bridge projects outside UPAs will result in permanent direct effects on up to 2.34 acres of modeled Central Valley steelhead adult migration; juvenile rearing and migration habitat, 3.38 acres of adult spawning and migration; juvenile rearing and migration habitat, and 0.52 acres of nonnatal juvenile rearing habitat. Construction of new and replacement bridges will alter the existing habitat structure of channel beds and banks (e.g., channel and bank substrate material), but will not result in the removal of Central Valley steelhead habitat

Temporary Direct Effects

Temporary direct effects are associated with construction of new bridge and bridge replacement projects include noise and visual disturbances, and temporary increases in turbidity in stream channels associated with operating equipment and other activities necessary to construct new developments in locations in or near streams supporting habitat (Table 4–1). Effects of temporary disturbances are the same as described for permanent development activities in UPAs. The potential for temporary direct effects on Central Valley steelhead will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 100-foot downstream and 200-foot upstream distance from new and replacement bridge projects within which temporary direct effects will occur (see Table 4–5), up to 0.20 linear mile of modeled Central Valley steelhead adult migration; juvenile rearing and migration habitat, 0.30 linear mile of adult spawning and migration; juvenile rearing and migration habitat, and 0.05 linear mile of nonnatal juvenile rearing habitat 0.20 mile of modeled

habitat outside UPAs will temporarily affected by new bridge and bridge replacement construction activities.

Permanent Indirect Effects

Permanent indirect effects of new and replacement bridge projects include the potential for increased runoff of petroleum based chemicals from operation of vehicles on new bridges, the potential for increased discharge of contaminants associated with urban and stormwater runoff from new developments into streams supporting steelhead habitat, and potential for degradation of habitat functions associated with increased human access into stream habitats. The effects of these impacts on Central Valley steelhead are the same as described for permanent development activities in UPAs. Permanent indirect effects of include a reduction in the function of the up to 6.24 acres of modeled Central Valley steelhead habitat that is directly affected by new and replacement bridge projects to the extent that permanent alterations in habitat structure increase habitat for predators, thus increasing the risk for predation mortality of juvenile steelhead.

4.4.17.3 Recurring Maintenance Activities

4.4.17.3.1 Within Urban Permit Areas

Permanent Direct Effects

Recurring maintenance activities will not result in the permanent removal of Central Valley steelhead habitat. In-channel operation of equipment to remove debris (e.g., large woody debris) to maintain conveyance capacity in stream channels supporting modeled habitat could result in localized changes in habitat structure and flow conditions. As described in Section 4.4.17.1, *Effects Common among Covered Activities*, in-channel operation of maintenance equipment can result in injury or mortality of Central Valley steelhead if present during maintenance periods. The likelihood for this effect, however, is considered low because juvenile and adult steelhead are mobile and likely to avoid collisions with operating equipment. Because it is unlikely that in-channel equipment operation will occur in spawning beds, the potential for injury or mortality of eggs and alevins is also considered low. The potential for these effects on Central Valley steelhead will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Maintenance of Sycamore Pool in Big Chico Creek includes weekly dewatering from late May through early September. Dewatering of the pool could strand and result in injury or mortality of individuals if they are not able to escape the pool during dewatering operations.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment in stream channels used by Central Valley steelhead and include noise and visual disturbances, and temporary increases in turbidity in stream channels associated with operating equipment and other activities necessary to maintain in-stream infrastructure. The effects of these impact mechanisms on Central Valley steelhead are the same as described for the temporary direct

effects of implementing permanent development projects in the UPAs except that the duration of maintenance-related activities is expected to be generally less than that of construction-related activities. The potential for temporary direct effects on Central Valley steelhead will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

In-channel operation of equipment to remove debris (e.g., large woody debris) to maintain conveyance capacity in stream channels supporting modeled habitat could result in reducing the availability of cover for juvenile steelhead to hide from predators and could increase predatory fish habitat. Such changes in habitat conditions could increase the risk for predation of juvenile Central Valley steelhead.

4.4.17.3.2 Outside Urban Permit Areas

Permanent Direct Effects

With the exception of Sycamore Pool maintenance activities on Big Chico Creek, permanent direct effects of recurring maintenance activities on Central Valley steelhead outside of UPAs is the same as described above for the UPAs. The potential for these effects on Central Valley steelhead will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Temporary Direct Effects

With the exception of Sycamore Pool maintenance activities on Big Chico Creek, temporary direct effects of recurring maintenance activities on Central Valley steelhead outside of UPAs is the same as described above for the UPAs. The potential for these effects on Central Valley steelhead will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

Permanent indirect effects of recurring maintenance activities on Central Valley steelhead outside of UPAs is the same as described above for the UPAs. The potential for these effects on Central Valley steelhead will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.17.4 Effects of Covered Activities within Conservation Lands

4.4.17.4.1 Permanent Direct Effects

Implementation of conservation measures will not result in permanent indirect effects on Central Valley steelhead beyond those described in Section 4.4.17.1 that would be associated with the operation of equipment in stream channels necessary to install fish screens on diversions, and place spawning gravels in stream channels.

4.4.17.4.2 Temporary Direct Effects

Temporary direct effects result from noise and visual disturbances, and temporary increases in turbidity in stream channels associated with the operation of equipment in stream channels necessary to install fish screens on diversions, and place spawning gravels in stream channels. The effects of these impact mechanisms on Central Valley steelhead are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs. The potential for temporary direct effects on Central Valley steelhead will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.17.4.3 Permanent Indirect Effects

Implementation of conservation measures will not result in adverse permanent indirect effects on Central Valley steelhead because restored and protected habitats will not be associated with increasing human presence, contaminants, or other impact mechanisms that could result in indirect effects (Table 4–1).

4.4.17.5 Impacts on Critical Habitat

Critical habitat for the Central Valley steelhead was designated throughout the Central Valley in 2005.[120] Critical habitat was further characterized in the *Federal Register* Final Rule for steelhead in 2006.[121] Critical habitat for the species is divided into 22 hydrologic units by watersheds. Of these, two occur in Butte County and include the Marshville and Butte Creek Hydrologic Units. These units include the Feather River through Oroville and Little Chico, Butte, Little Butte, and Little Dry creeks near Paradise.

The PCEs that are essential for Central Valley steelhead conservation as stated in the designation of critical habitat and present in this portion of its designated critical habitat are the following:

1. Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development.
2. Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.
3. Freshwater migration corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.

[120] 70 FR 52488, September 2, 2005.
[121] 71 FR 834, January 5, 2006.

The covered activities and conservation measures do not include any actions that could substantively affect the PCEs. BRCP actions would not affect water quantity, floodplain connectivity, the current maintenance of Sycamore Pool on Big Chico Creek, or substantively affect natural cover or water quality conditions. Vegetation and instream structures may be disturbed beneath and immediately adjacent to the up to 34 new and replacement bridge project sites that could be located in designated critical habitat. The extent of permanently disturbed channel is not expected to exceed 20 feet upstream and 100 feet downstream of bridge project sites, which will alter habitat conditions (e.g., reduction in complexity) along up to 0.77 mile (approximately 8.84 acres of habitat area) of designated critical habitat, representing approximately 0.4 percent of the designated critical habitat within the Plan Area. The actual area within which habitat functions could be reduced from existing conditions is expected to be substantially less because almost all of the projects will be to replace existing bridges[122] and, consequently, the habitat conditions at these sites will have already been altered from natural conditions as result of construction of the original bridge. Implementation of the conservation measures to replenish spawning gravels, remove impediments to passage, screen diversions, and restore riparian vegetation are expected to substantially improve habitat conditions for Central Valley steelhead.

Construction-related activities near critical habitats and within their watersheds could indirectly have temporary effects on water quality as a result of increasing loads of contaminants and sediments entering critical habitats. These effects would be temporary during construction periods and would be minimized with implementation of the applicable AMMs indicated in Table 4–7. Based on this assessment, the covered activities and conservation measures are not expected to adversely affect PCEs of designated critical habitat and will not preclude the ability to recover Central Valley steelhead.

4.4.17.6 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of Central Valley steelhead within the Plan Area.

4.4.17.6.1 Permanent Direct Effects

Permanent reduction in the habitat function of up to 8.84 acres (or 0.77 linear miles) of modeled Central Valley steelhead habitat could result from construction of new and replacement bridges that will alter in-channel habitat conditions from existing conditions. The acreage of take (i.e., harm) will be the amount of actual habitat that is located within the area of affected modeled habitat.

[122] Only one of the 34 bridge projects that could be located in designated Central Valley steelhead critical habitat is specifically identified as a new bridge project at this time.

A small, but indeterminable, amount of direct take of individual eggs, alevins juvenile and adult Central Valley steelhead could be associated with contamination or adverse changes in aquatic habitat structure and conditions and collisions with in-channel operation of equipment used to construct permanent development projects and conduct recurring maintenance activities. Permanent direct effects on Central Valley steelhead will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.17.6.2 Temporary Direct Effects

Temporary reduction in Central Valley steelhead habitat use of up to 05.77 linear miles of modeled stream channel habitat upstream and downstream from new and replacement bridge projects and riprap removal sites during project implementation periods. An additional small but indeterminable temporary reduction of use habitat by Central Valley steelhead near storm outfall, flood control and other in-stream infrastructure construction and maintenance sites during periods that equipment is operated in stream channels as a result of noise and visual disturbances and increased turbidity. Increased turbidity and the potential for accidental discharge of contaminants during construction and maintenance activities could also temporarily reduce water quality. Temporary direct effects on modeled Central Valley steelhead habitat will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.17.6.3 Permanent Indirect Effects

Potential for increase in petroleum-based contaminants associated with vehicle traffic and subsequent runoff from new bridges and from human occupancy of new permanent developments that could reduce water quality. These permanent indirect effects on Central Valley steelhead will be minimized with implementation of the applicable AMMs indicated in Table 4–7. An indeterminable amount of predation mortality of juvenile Central Valley steelhead could be associated with construction of new bridge abutments and other in-channel structures that create predatory fish habitat.

4.4.17.7 Overall Impact Likely to Result from Take

The primary threat to Central Valley steelhead is the historical fragmentation of access to headwaters of the main stem Sacramento and San Joaquin Rivers and all the major tributaries (McEwan and Jackson 1996). The construction of barrier dams along the migratory streams has blocked steelhead passage to many natal tributaries, resulting in the loss of spawning and holding habitat. Steelhead populations in the Sacramento drainage were substantially reduced following construction of barrier dams (e.g., Oroville Dam, Shasta Dam). In addition to ongoing loss of spawning habitat and degradation of habitat conditions, and loss of genetic diversity resulting from hatchery practices has reduced the integrity of Central Valley steelhead populations (Good et al. 2005, NMFS 2009). Within the Plan Area, Central Valley steelhead has been recorded in Butte Creek, Big Chico Creek, and Feather River (Appendix A).

The covered activities will result in altering, and thus reducing the functions of, aquatic habitat structure in up to 0.77 linear miles (or 8.84 acres) of modeled Central Valley steelhead habitat, representing approximately 0.4 percent of the existing modeled habitat. The preponderance of the affected habitat area will be associated with the replacement of existing bridges that have previously altered channel habitat structure from historical conditions. Furthermore, because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the length of actual habitat that is altered will be less.

Consequently, given low proportion of affected habitat to remaining habitat, it is unlikely that the Central Valley steelhead population in the Plan Area will be adversely affected by the covered activities. Furthermore, implementation of the applicable AMMs in Table 4–7 will minimize the potential for take (injury, mortality, and harassment of individuals).

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on Central Valley steelhead or adversely affect its distribution or abundance in the Plan Area.

4.4.18 Central Valley Spring-Run Chinook Salmon

The maximum acreage of modeled Central Valley spring-run Chinook salmon habitat that will be permanently affected, directly and indirectly, with implementation of the covered activities is 7.02 acres. The permanent direct impacts result in the permanent alteration of channel habitat structure, but do not result in the removal of stream channel habitat (Figure 4–36, *Central Valley Spring-Run Chinook Salmon: Direct Impacts of Covered Activities* [see separate file]).

4.4.18.1 Effects Common among Covered Activities

Actions undertaken to implement covered activities that affect stream channels used by Central Valley spring-run Chinook salmon (e.g., replacement of bridges) could result in injury or mortality of Central Valley spring-run Chinook salmon associated with the operation of equipment in channels during periods when salmon are present. Operation of construction and maintenance-related equipment in and adjacent to stream habitats could result in temporary increases in turbidity that could increase predation risk for juvenile Chinook salmon. The area of channel that could be affected by these activities is small relative to the overall length of channel habitat and, therefore, the number of individual fish that could be affected is expected to be small. These potential impacts will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

Operation of equipment in and near stream channels supporting modeled habitat could result in the accidental introduction of contaminants associated with construction and recurring maintenance activities (e.g., fuel spills) into Central Valley spring-run Chinook salmon habitat could adversely affect individuals if present. Implementation of the applicable AMMs indicated in Table 4–7 provide for containment and rapid cleanup of releases that may occur, thus reducing exposure risk and the period that individuals could be exposed to contaminants.

4.4.18.2 Permanent Development Projects

Direct effects of permanent development projects result from construction of new and replacement bridge projects will permanently affect up to 2.34 acres of modeled Central Valley spring-run Chinook salmon adult migration; juvenile rearing and migration habitat and 2.08 acres of nonnatal juvenile rearing habitat located outside UPAs. Modeled adult spawning and migration; juvenile rearing and migration habitat will not be permanently affected outside UPAs. Up to an additional 2.6 acres of any combination of these modeled habitat types will be permanently and directly impacted within the UPAs.[123] Permanent direct effects include the alteration of habitat structure but will not result in the permanent removal of any modeled habitat in the Plan Area (Figure 4–36). Permanent indirect effects of permanent development projects will result in reduced functions of the up to 7.02 acres of modeled habitat that is directly affected by new and replacement bridge projects to the extent that permanent alterations in habitat structure increase habitat for predators, thus increasing the risk for predation mortality of juvenile salmon. Nonquantifiable permanent indirect effects include the potential for increased exposure to any increase in contaminant-related stormwater runoff and human activity that is associated with new permanent development projects. Up to 0.20 linear mile of modeled adult migration; juvenile rearing and migration habitat and 0.18 linear mile of nonnatal juvenile rearing habitat located outside UPAs could be temporarily affected. Modeled adult spawning and migration; juvenile rearing and migration habitat will not be temporarily affected outside UPAs. Up to an additional 0.23 linear mile of any combination of these modeled habitat types will be temporarily impacted within the UPAs.[124]

Figure O–21, *Central Valley Spring-Run Chinook Salmon Habitat in the Plan Area with full BRCP Implementation* in Appendix O and Table 4–8 provide the acreage of modeled Central Valley spring-run Chinook salmon habitat remaining within the Plan Area (including BRCP protected lands and lands that are not impacted by the covered activities) with full implementation of the covered activities. Implementation of the covered activities will not isolate or fragment Central Valley spring-run Chinook salmon use of the Plan Area because no habitat will be permanently removed by the covered activities.

4.4.18.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of new and replacement bridge projects within UPAs will result in permanent direct effects on up to 2.6 acres of modeled Central Valley spring-run Chinook salmon habitat

[123] As indicated in Table 4–2, up to 10 new and replacement bridge projects may be implemented in the UPAs, the location of these bridge projects and, consequently, the modeled habitat types that will be affected cannot be determined at this time.

[124] As indicated in Table 4–2, up to 10 new and replacement bridge projects may be implemented in the UPAs, the location of these bridge projects and, consequently, the modeled habitat types that will be affected cannot be determined at this time.

types.[125] Construction of new and replacement bridges will alter the existing habitat structure of channel beds and banks (e.g., channel and bank substrate material), but will not result in the removal of Central Valley spring-run Chinook salmon habitat.

Temporary Direct Effects

Temporary direct effects are associated with construction of new bridge and bridge replacement projects include noise and visual disturbances, and temporary increases in turbidity in stream channels associated with operating equipment and other activities necessary to construct new developments in locations in or near streams supporting habitat (Table 4–1). These impact mechanisms could cause Central Valley spring-run Chinook salmon to reduce their use of affected habitat areas during the period these activities are implemented, and potentially may reduce their ability to forage and/or could increase their susceptibility to predation. The potential for temporary direct effects on Central Valley spring-run Chinook salmon will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 100-foot downstream and 200-foot upstream distance from new and replacement bridge projects within which temporary direct effects will occur (see Table 4–5), up to 0.23 mile of modeled Central Valley spring-run Chinook salmon habitat types within UPAs will temporarily affected by new bridge and bridge replacement construction activities.

Permanent Indirect Effects

Permanent indirect effects of new and replacement bridge projects include the potential for increased runoff of petroleum based chemicals from operation of vehicles on new bridges. The potential for adverse effects of these contaminants on Central Valley spring-run Chinook salmon, however, is considered low because most or all of the contaminant load is expected to result from displacing traffic and its associated contaminant load from existing bridges to new bridges. Alteration of up to 2.6 acres of in-channel habitat structure at new and replacement bridge project sites may create habitat for fish predators that could increase predation of juvenile Chinook salmon.

Occupancy of new permanent developments could increase the discharge of contaminants and sediments in urban and stormwater runoff associated with permanent development activities could result in increased levels of toxic contaminants entering streams (e.g., pesticides, copper). Such contaminants could have sublethal effects on individual Central Valley spring-run Chinook salmon associated with bioaccumulation of toxic compounds and potentially lethal effects depending on the toxicity and concentration of discharged contaminants. Occupancy of permanent development projects could also result in increased access to streams supporting modeled Central Valley spring-run Chinook salmon habitat. Such access could increase the

[125] As indicated in Table 4–2, up to 10 new and replacement bridge projects may be implemented in the UPAs, the UPAs in which the projects will be located and their locations with UPAs and, consequently, the modeled habitat types that will be affected, cannot be determined at this time.

potential for the placement of litter and other material in stream channels that could affect the function of streams as habitat. The potential for these permanent indirect effects on Central Valley spring-run Chinook salmon will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.18.2.2 Outside Urban Permit Areas

Permanent Direct Effects

Implementation of new and replacement bridge projects outside UPAs will result in permanent direct effects on up to 2.34 acres of modeled Central Valley spring-run Chinook salmon adult migration; juvenile rearing and migration habitat and 2.08 acres of nonnatal juvenile rearing habitat. Construction of new and replacement bridges will alter the existing habitat structure of channel beds and banks (e.g., channel and bank substrate material), but will not result in the removal of Central Valley spring-run Chinook salmon habitat.

Temporary Direct Effects

Temporary direct effects are associated with construction of new bridge and bridge replacement projects include noise and visual disturbances, and temporary increases in turbidity in stream channels associated with operating equipment and other activities necessary to construct new developments in locations in or near streams supporting habitat (Table 4–1). Effects of temporary disturbances are the same as described for permanent development activities in UPAs. The potential for temporary direct effects on Central Valley spring-run Chinook salmon will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 100-foot downstream and 200-foot upstream distance from new and replacement bridge projects within which temporary direct effects will occur (see Table 4–5), up to 0.20 linear mile of modeled Central Valley spring-run Chinook salmon adult migration; juvenile rearing and migration habitat and 0.18 linear mile of nonnatal juvenile rearing habitat outside UPAs will be temporarily affected by new bridge and bridge replacement construction activities.

Permanent Indirect Effects

Permanent indirect effects of new and replacement bridge projects include the potential for increased runoff of petroleum based chemicals from operation of vehicles on new bridges, the potential for increased discharge of contaminants associated with urban and stormwater runoff from new developments into streams supporting spring-run Chinook salmon habitat, and potential for degradation of habitat functions associated with increased human access into stream habitats. The effects of these impacts on Central Valley spring-run Chinook salmon are the same as described for permanent development activities in UPAs. Permanent indirect effects of include a reduction in the function of the up to 4.42 acres of modeled Central Valley spring-run Chinook salmon habitat that is directly affected by new and replacement bridge projects to the

extent that permanent alterations in habitat structure increase habitat for predators, thus increasing the risk for predation mortality of juvenile Central Valley spring-run Chinook salmon.

4.4.18.3 Recurring Maintenance Activities

4.4.18.3.1 Within Urban Permit Areas

Permanent Direct Effects

Recurring maintenance activities will not result in the permanent removal of Central Valley spring-run Chinook salmon habitat. In-channel operation of equipment to remove debris (e.g., large woody debris) to maintain conveyance capacity in stream channels supporting modeled habitat could result in localized changes in habitat structure and flow conditions. As described in Section 4.4.17.1, in-channel operation of maintenance equipment can result in injury or mortality of Central Valley spring-run Chinook salmon if present during maintenance periods. The likelihood for this effect, however, is considered low because juvenile and adult Central Valley spring-run Chinook salmon are mobile and likely to avoid collisions with operating equipment. Because it is unlikely that in-channel equipment operation will occur in spawning beds, the potential for injury or mortality of eggs and alevins is also considered low. The potential for these effects on Central Valley spring-run Chinook salmon will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Maintenance of Sycamore Pool in Big Chico Creek includes weekly dewatering from late May through early September. Dewatering of the pool could strand and result in injury or mortality of individuals if they are not able to escape the pool during dewatering operations.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment in stream channels used by Central Valley spring-run Chinook salmon and include noise and visual disturbances, and temporary increases in turbidity in stream channels associated with operating equipment and other activities necessary to maintain in-stream infrastructure. The effects of these impact mechanisms on Central Valley spring-run Chinook salmon are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs except that the duration of maintenance-related activities is expected to be generally less than that of construction-related activities. The potential for temporary direct effects on Central Valley spring-run Chinook salmon will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

In-channel operation of equipment to remove debris (e.g., large woody debris) to maintain conveyance capacity in stream channels supporting modeled habitat could result in reducing the availability of cover for juvenile Central Valley spring-run Chinook salmon to hide from

predators and could increase predatory fish habitat. Such changes in habitat conditions could increase the risk for predation of juvenile Central Valley spring-run Chinook salmon.

4.4.18.3.2 Outside Urban Permit Areas

Permanent Direct Effects

With the exception of Sycamore Pool maintenance activities on Big Chico Creek, permanent direct effects of recurring maintenance activities on Central Valley spring-run Chinook salmon outside of UPAs is the same as described above for the UPAs. The potential for these effects on Central Valley spring-run Chinook salmon will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Temporary Direct Effects

With the exception of Sycamore Pool maintenance activities on Big Chico Creek, temporary direct effects of recurring maintenance activities on Central Valley spring-run Chinook salmon outside of UPAs is the same as described above for the UPAs. The potential for these effects on Central Valley spring-run Chinook salmon will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

Permanent indirect effects of recurring maintenance activities on Central Valley spring-run Chinook salmon outside of UPAs is the same as described above for the UPAs. The potential for these effects on Central Valley spring-run Chinook salmon will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.18.4 Effects of Covered Activities within Conservation Lands

4.4.18.4.1 Permanent Direct Effects

Implementation of conservation measures will not result in permanent indirect effects on Central Valley spring-run Chinook salmon beyond those described in Section 4.4.18.1, *Effects Common among Covered Activities* that would be associated with the operation of equipment in stream channels necessary to install fish screens on diversions, and place spawning gravels in stream channels.

4.4.18.4.2 Temporary Direct Effects

Temporary direct effects result from noise and visual disturbances, and temporary increases in turbidity in stream channels associated with the operation of equipment in stream channels necessary to install fish screens on diversions, and place spawning gravels in stream channels. The effects of these impact mechanisms on Central Valley spring-run Chinook salmon are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs. The potential for temporary direct effects on Central Valley spring-run

Chinook salmon will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.18.4.3 Permanent Indirect Effects

Implementation of conservation measures will not result in adverse permanent indirect effects on Central Valley spring-run Chinook salmon because restored and protected habitats will not be associated with increasing human presence, contaminants, or other impact mechanisms that could result in indirect effects (Table 4–2).

4.4.18.5 Impacts on Critical Habitat

Designated critical habitat for Central Valley spring-run Chinook salmon in the Plan Area encompasses the length of the Pine Creek, Lindo Channel, Big Chico Creek, and Butte Creek, and portions of Mud Creek, Rock Creek, and the Feather River. The PCEs, which are essential for the conservation of Central Valley spring-run Chinook salmon as stated in the designation of critical habitat and present in this portion of its designated critical habitat, are as follows:

1. Freshwater spawning sites with water quantity and quality conditions and substrate supporting spawning, incubation and larval development.
2. Freshwater rearing sites with water quantity and floodplain connectivity to form and maintain physical habitat conditions and support juvenile growth and mobility; water quality and forage supporting juvenile development; and natural cover such as shade, submerged and overhanging large wood, log jams and beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.
3. Freshwater migration corridors free of obstruction with water quantity and quality conditions and natural cover such as submerged and overhanging large wood, aquatic vegetation, large rocks and boulders, side channels, and undercut banks supporting juvenile and adult mobility and survival.

The covered activities and conservation measures do not include any actions that could substantively affect the PCEs. BRCP actions would not affect water quantity, floodplain connectivity, the current maintenance of Sycamore Pool on Big Chico Creek, or substantively affect natural cover or water quality conditions. Vegetation and instream structures may be disturbed beneath and immediately adjacent to the up to 27 new and replacement bridge project sites that could be located in designated critical habitat. The extent of permanently disturbed channel is not expected to exceed 20 feet upstream and 100 feet downstream of bridge project sites, which will alter habitat conditions (e.g., reduction in complexity) along up to 0.61 mile (approximately 7.02 acres of habitat area) of designated critical habitat, representing 0.4 percent of the designated critical habitat within the Plan Area. The actual area within which habitat functions could be reduced from existing conditions is expected to be substantially less because

almost all of the projects will be to replace existing bridges[126] and, consequently, the habitat conditions at these sites will have already been altered from natural conditions as result of construction of the original bridge. Implementation of the conservation measures to replenish spawning gravels, remove impediments to passage, screen diversions, and restore riparian vegetation are expected to substantially improve habitat conditions for Central Valley spring-run Chinook salmon.

Construction-related activities near critical habitats and within their watersheds could indirectly have temporary effects on water quality as a result of increasing loads of contaminants and sediments entering critical habitats. These effects would be temporary during construction periods and would be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7. Based on this assessment, the covered activities and conservation measures would not adversely affect PCEs of designated critical habitat and will not preclude the ability to recover Central Valley spring-run Chinook salmon.

4.4.18.6 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of Central Valley spring-run Chinook salmon within the Plan Area.

4.4.18.6.1 Permanent Direct Effects

Permanent reduction in the habitat function of up to 7.02 acres (or 0.61 linear miles) of modeled Central Valley spring-run Chinook salmon habitat could result from construction of new and replacement bridges that will alter in-channel habitat conditions from existing conditions. The acreage of take (i.e., harm) will be the amount of actual habitat that is located within the area of affected modeled habitat.

A small, but indeterminable, amount of direct take of individual eggs, alevins juvenile and adult Central Valley spring-run Chinook salmon could be associated with contamination or adverse changes in aquatic habitat structure and conditions and collisions with in-channel operation of equipment used to construct permanent development projects and conduct recurring maintenance activities. Permanent direct effects on Central Valley spring-run Chinook salmon will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.18.6.2 Temporary Direct Effects

Temporary reduction in Central Valley spring-run Chinook salmon habitat use of up to 5.61 linear miles of modeled stream channel habitat upstream and downstream from new and replacement bridge projects and riprap removal sites during project implementation periods. An additional small but indeterminable temporary reduction of use habitat by Central Valley spring-

[126] Only one of the 27 bridge projects that could be located in designated Central Valley spring-run Chinook salmon critical habitat is specifically identified as a new bridge project at this time.

run Chinook salmon near storm outfall, flood control and other in-stream infrastructure construction and maintenance sites during periods that equipment is operated in stream channels as a result of noise and visual disturbances and increased turbidity. Increased turbidity and the potential for accidental discharge of contaminants during construction and maintenance activities could also temporarily reduce water quality. Temporary direct effects on modeled Central Valley spring-run Chinook salmon habitat will be minimized with the applicable AMMs indicated in Table 4–7.

4.4.18.6.3 Permanent Indirect Effects

Potential for increase in petroleum-based contaminants associated with vehicle traffic and subsequent runoff from new bridges and from human occupancy of new permanent developments that could reduce water quality. These permanent indirect effects on Central Valley spring-run Chinook salmon will be minimized with the applicable AMMs indicated in Table 4–7. An indeterminable amount of predation mortality of juvenile Central Valley spring-run Chinook salmon could be associated with construction of new bridge abutments and other in-channel structures that create predatory fish habitat.

4.4.18.7 Overall Impact Likely to Result from Take

The primary threat to Central Valley spring-run Chinook salmon is the historical and ongoing loss of spawning habitat, degradation of habitat conditions, and loss of genetic diversity resulting from Chinook salmon hatchery practices (Good et al. 2005, NMFS 2009). Spring-run Chinook salmon populations in the Sacramento drainage were substantially reduced following construction of barrier dams (e.g., Oroville Dam, Shasta Dam). Within the Plan Area, Central Valley spring-run Chinook salmon has been recorded in Butte Creek, Big Chico Creek, and Feather River (Appendix A).

The covered activities will result in altering, and thus reducing the functions of, aquatic habitat structure in up to 0.61 linear miles (or 7.02 acres) of modeled Central Valley spring-run Chinook salmon habitat, representing approximately 0.4 percent the existing modeled habitat. The preponderance of the affected habitat area will be associated with the replacement of existing bridges that have previously altered channel habitat structure from historical conditions. Furthermore, because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the length of actual habitat that is altered will be less.

Consequently, given low proportion of affected habitat to remaining habitat, it is unlikely that the Central Valley spring-run Chinook salmon population in the Plan Area will be adversely affected by the covered activities. Furthermore, implementation of the applicable AMMs in Table 4–7 will minimize the potential for take (injury, mortality, and harassment of individuals).

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on Central Valley spring-run Chinook salmon or adversely affect its distribution or abundance in the Plan Area.

4.4.19 Central Valley Fall-/Late Fall-Run Chinook Salmon

The maximum acreage of modeled Central Valley fall-/late fall-run Chinook salmon habitat that will be permanently affected, directly and indirectly, with implementation of the covered activities is 6.24 acres. The permanent direct impacts result in the permanent alteration of channel habitat structure, but do not result in the removal of stream channel habitat (Figure 4–37, *Central Valley Fall/Late Fall-Run Chinook Salmon: Direct Impacts of Covered Activities* [see separate file).

4.4.19.1 Effects Common among Covered Activities

Actions undertaken to implement covered activities that affect stream channels used by Central Valley fall-run Chinook salmon (e.g., replacement of bridges) could result in injury or mortality of Central Valley fall-run Chinook salmon associated with the operation of equipment in channels during periods salmon are present. Operation of construction and maintenance-related equipment in and adjacent to stream habitats could result in temporary increases in turbidity that could increase predation risk for juvenile salmon. The area of channel that could be affected by these activities is small relative to the overall length of channel habitat and, therefore, the number of individual fish that could be affected would be small. These potential impacts will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

Operation of equipment in and near stream channels supporting modeled habitat could result in the accidental introduction of contaminants associated with construction and recurring maintenance activities (e.g., fuel spills) into Central Valley fall-run Chinook salmon habitat could adversely affect individuals if present. Implementation of the applicable AMMs indicated in Table 4–7 provide for containment and rapid cleanup of releases that may occur, thus reducing exposure risk and the period that individuals could be exposed to contaminants.

4.4.19.1.1 Permanent Development Projects

Direct effects of permanent development projects result from construction of new and replacement bridge projects will permanently affect up to 1.04 acres of modeled Central Valley fall-/late fall-run Chinook salmon adult migration; juvenile rearing and migration habitat and 2.6 acres of adult spawning and migration; juvenile rearing and migration habitat located outside UPAs. Modeled nonnatal juvenile rearing habitat will not be permanently affected outside UPAs. Up to an additional 2.6 acres of any combination of these modeled habitat types will be permanently and directly impacted within the UPAs.[127] Permanent direct effects include the alteration of habitat structure but will not result in the permanent removal of any modeled habitat in the Plan Area (Figure 4–37). Permanent indirect effects of permanent development projects will result in reduced functions of the up to 6.24 acres of modeled habitat that is directly affected

[127] As indicated in Table 4–2, up to 10 new and replacement bridge projects may be implemented in the UPAs, the location of these bridge projects and, consequently, the modeled habitat types that will be affected cannot be determined at this time.

by new and replacement bridge projects to the extent that permanent alterations in habitat structure increase habitat for predators, thus increasing the risk for predation mortality of juvenile salmon. Nonquantifiable permanent indirect effects include the potential for increased exposure to any increase in contaminant-related stormwater runoff and human activity that is associated with new permanent development projects. Up to 0.09 linear mile of modeled adult migration; juvenile rearing and migration habitat and 0.23 linear mile of adult spawning and migration; juvenile rearing and migration habitat located outside UPAs could be temporarily affected. Modeled nonnatal juvenile rearing habitat will not be temporarily affected outside UPAs. Up to an additional 0.23 linear mile of any combination of these modeled habitat types will be temporarily impacted within the UPAs.[128]

Figure O–22, *Central Valley Fall/Late Fall-RunChinook Salmon Habitat in the Plan Area with full BRCP Implementation* in Appendix O and Table 4–8 provide the acreage of modeled Central Valley fall-/late fall-run Chinook salmon habitat remaining within the Plan Area (including BRCP protected lands and lands that are not impacted by the covered activities) with full implementation of the covered activities. Implementation of the covered activities will not isolate or fragment Central Valley fall-/late fall-run Chinook salmon use of the Plan Area because no habitat will be permanently removed by the covered activities.

Direct effects of permanent development projects result from construction of new and replacement bridge projects will permanently affect up to 6.24 acres and 0.04 linear miles and temporarily affect up to 0.23 linear miles of modeled Central Valley fall-/late fall-run Chinook salmon habitat. Permanent direct effects include the alteration of habitat structure but will not result in the permanent removal of any modeled habitat in the Plan Area (Figure 4–37). Indirect effects of permanent development projects will reduce the function of up to 6.24 acres of modeled habitat to the extent that permanent alterations in habitat structure increase habitat for predators, thus increasing the risk for predation mortality of juvenile Central Valley fall-/late fall-run Chinook salmon. Nonquantifiable permanent indirect effects include the potential for increased exposure to any increase in contaminant-related stormwater runoff and human activity that is associated with new permanent development projects.

Following implementation of the covered activities, all existing modeled Central Valley fall/late fall-run Chinook salmon habitat will remain in the Plan Area. Implementation of the covered activities will not isolate or fragment Central Valley fall/late fall-run Chinook salmon use of the Plan Area.

[128] As indicated in Table 4–2, up to 10 new and replacement bridge projects may be implemented in the UPAs, the location of these bridge projects and, consequently, the modeled habitat types that will be affected cannot be determined at this time.

4.4.19.1.2 Within Urban Permit Areas

Permanent Direct Effects

Implementation of new and replacement bridge projects within UPAs will result in permanent direct effects on up to 2.6 acres of modeled Central Valley fall-/late fall-run Chinook salmon habitat types.[129] Construction of new and replacement bridges will alter the existing habitat structure of channel beds and banks (e.g., channel and bank substrate material), but will not result in the removal of Central Valley fall-/late fall-run Chinook salmon habitat.

Temporary Direct Effects

Temporary direct effects are associated with construction of new bridge and bridge replacement projects include noise and visual disturbances, and temporary increases in turbidity in stream channels associated with operating equipment and other activities necessary to construct new developments in locations in or near streams supporting habitat (Table 4–1). These impact mechanisms could cause Central Valley fall-/late fall-run Chinook salmon to reduce their use of affected habitat areas during the period these activities are implemented, and potentially may reduce their ability to forage and/or could increase their susceptibility to predation. The potential for temporary direct effects on Central Valley fall-/late fall-run Chinook salmon will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 100-foot downstream and 200-foot upstream distance from new and replacement bridge projects within which temporary direct effects will occur (see Table 4–5), up to 0.23 mile of modeled Central Valley fall-/late fall-run Chinook salmon habitat types within UPAs will temporarily affected by new bridge and bridge replacement construction activities.

Permanent Indirect Effects

Permanent indirect effects of new and replacement bridge projects include the potential for increased runoff of petroleum based chemicals from operation of vehicles on new bridges. The potential for adverse effects of these contaminants on Central Valley fall-/late fall-run Chinook salmon, however, is considered low because most or all of the contaminant load is expected to result from displacing traffic and its associated contaminant load from existing bridges to new bridges. Alteration of up to 2.6 acres of in-channel habitat structure at new and replacement bridge project sites may create habitat for fish predators that could increase predation of juvenile Chinook salmon.

Occupancy of new permanent developments could increase the discharge of contaminants and sediments in urban and stormwater runoff associated with permanent development activities could result in increased levels of toxic contaminants entering streams (e.g., pesticides, copper).

[129] As indicated in Table 4–2, up to 10 new and replacement bridge projects may be implemented in the UPAs, the UPAs in which the projects will be located and their locations with UPAs and, consequently, the modeled habitat types that will be affected, cannot be determined at this time.

Such contaminants could have sublethal effects on individual Central Valley fall-/late fall-run Chinook salmon associated with bioaccumulation of toxic compounds and potentially lethal effects depending on the toxicity and concentration of discharged contaminants. Occupancy of permanent development projects could also result in increased access to streams supporting modeled Central Valley fall-/late fall-run Chinook salmon habitat. Such access could increase the potential for the placement of litter and other material in stream channels that could affect the function of streams as habitat. The potential for these permanent indirect effects on Central Valley fall-/late fall-run Chinook salmon will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.19.1.3 Outside Urban Permit Areas

Permanent Direct Effects

Implementation of new and replacement bridge projects outside UPAs will result in permanent direct effects on up to 1.04 acres of modeled Central Valley fall-/late fall-run Chinook salmon adult migration; juvenile rearing and migration habitat and 2.6 acres of adult spawning and migration; juvenile rearing and migration habitat located outside UPAs. Modeled nonnatal juvenile rearing habitat will not be permanently affected outside UPAs. Construction of new and replacement bridges will alter the existing habitat structure of channel beds and banks (e.g., channel and bank substrate material), but will not result in the removal of Central Valley fall-/late fall-run Chinook salmon habitat.

Temporary Direct Effects

Temporary direct effects are associated with construction of new bridge and bridge replacement projects include noise and visual disturbances, and temporary increases in turbidity in stream channels associated with operating equipment and other activities necessary to construct new developments in locations in or near streams supporting habitat (Table 4–1). Effects of temporary disturbances are the same as described for permanent development activities in UPAs. The potential for temporary direct effects on Central Valley fall-/late fall-run Chinook salmon will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 100-foot downstream and 200-foot upstream distance from new and replacement bridge projects within which temporary direct effects will occur (see Table 4–5), up to 0.09 linear mile of modeled Central Valley fall-/late fall-run Chinook salmon adult migration; juvenile rearing and migration habitat and 0.23 linear mile of adult spawning and migration; juvenile rearing and migration habitat will be temporarily affected by new bridge and bridge replacement construction activities.

Permanent Indirect Effects

Permanent indirect effects of new and replacement bridge projects include the potential for increased runoff of petroleum based chemicals from operation of vehicles on new bridges, the potential for increased discharge of contaminants associated with urban and stormwater runoff

from new developments into streams supporting fall-/late fall-run Chinook salmon habitat, and potential for degradation of habitat functions associated with increased human access into stream habitats. The effects of these impacts on Central Valley fall-/late fall-run Chinook salmon are the same as described for permanent development activities in UPAs. Permanent indirect effects of include a reduction in the function of the up to 3.64 acres of modeled Central Valley fall-/late fall-run Chinook salmon habitat that is directly affected by new and replacement bridge projects to the extent that permanent alterations in habitat structure increase habitat for predators, thus increasing the risk for predation mortality of juvenile Central Valley fall-/late fall-run Chinook salmon.

4.4.19.2 Recurring Maintenance Activities

4.4.19.2.1 Within Urban Permit Areas

Permanent Direct Effects

Recurring maintenance activities will not result in the permanent removal of Central Valley fall-/late fall-run Chinook salmon habitat. In-channel operation of equipment to remove debris (e.g., large woody debris) to maintain conveyance capacity in stream channels supporting modeled habitat could result in localized changes in habitat structure and flow conditions. As described in Section 4.4.19.1, *Effects Common among Covered Activities*, in-channel operation of maintenance equipment can result in injury or mortality of Central Valley fall-/late fall-run Chinook salmon if present during maintenance periods. The likelihood for this effect, however, is considered low because juvenile and adult Central Valley fall-/late fall-run Chinook salmon are mobile and likely to avoid collisions with operating equipment. Because it is unlikely that in-channel equipment operation will occur in spawning beds, the potential for injury or mortality of eggs and alevins is also considered low. The potential for these effects on Central Valley fall-/late fall-run Chinook salmon will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Maintenance of Sycamore Pool in Big Chico Creek includes weekly dewatering from late May through early September. Dewatering of the pool could strand and result in injury or mortality of individuals if they are not able to escape the pool during dewatering operations.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment in stream channels used by Central Valley fall-/late fall-run Chinook salmon and include noise and visual disturbances, and temporary increases in turbidity in stream channels associated with operating equipment and other activities necessary to maintain in-stream infrastructure. The effects of these impact mechanisms on Central Valley fall-/late fall-run Chinook salmon are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs except that the duration of maintenance-related activities is expected to be generally less than that of construction-related activities. The potential for temporary direct

effects on Central Valley fall-/late fall-run Chinook salmon will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

In-channel operation of equipment to remove debris (e.g., large woody debris) to maintain conveyance capacity in stream channels supporting modeled habitat could result in reducing the availability of cover for juvenile Central Valley fall-/late fall-run Chinook salmon to hide from predators and could increase predatory fish habitat. Such changes in habitat conditions could increase the risk for predation of juvenile Central Valley fall-/late fall-run Chinook salmon.

4.4.19.2.2 Outside Urban Permit Areas

Permanent Direct Effects

With the exception of Sycamore Pool maintenance activities on Big Chico Creek, permanent direct effects of recurring maintenance activities on Central Valley fall-/late fall-run Chinook salmon outside of UPAs is the same as described above for the UPAs. The potential for these effects on Central Valley fall-/late fall-run Chinook salmon will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Temporary Direct Effects

With the exception of Sycamore Pool maintenance activities on Big Chico Creek, temporary direct effects of recurring maintenance activities on Central Valley fall-/late fall-run Chinook salmon outside of UPAs is the same as described above for the UPAs. The potential for these effects on Central Valley fall-/late fall-run Chinook salmon will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

Permanent indirect effects of recurring maintenance activities on Central Valley fall-/late fall-run Chinook salmon outside of UPAs is the same as described above for the UPAs. The potential for these effects on Central Valley fall-/late fall-run Chinook salmon will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.19.2.3 Outside Urban Permit Areas

Permanent Direct Effects

With the exception for the potential impact mechanisms and associated effects on Central Valley fall/late fall-run Chinook salmon described in Section 4.4.19.1, there are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on Chinook salmon. The potential impacts of these activities will be minimized with implementation of avoidance and minimization measures identified in Table 4–7.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment in stream channels used by Central Valley fall/late fall-run Chinook salmon and include noise and visual disturbances, and temporary increases in turbidity in stream channels associated with operating equipment and other activities necessary to maintain in-stream infrastructure. The effects of these impact mechanisms on Central Valley fall/late fall-run Chinook salmon are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.19.2.1, *Within Urban Permit Areas*) except that the duration of maintenance-related activities is generally expected to be less than that of construction-related activities. The potential for temporary direct effects on Central Valley fall/late fall-run Chinook salmon will be minimized with implementation of avoidance and minimization measures identified in Table 4–7.

Permanent Indirect Effects

As described in Table 4–2, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on Central Valley fall/late fall-run Chinook salmon.

4.4.19.3 Effects of Covered Activities within Conservation Lands

4.4.19.3.1 Permanent Direct Effects

Implementation of conservation measures will not result in permanent indirect effects on Central Valley fall/late fall-run Chinook salmon beyond those described in Section 4.4.19.1 that would be associated with the operation of equipment in stream channels necessary to install fish screens on diversions, place spawning gravels in stream channels, and remove riprap.

4.4.19.3.2 Temporary Direct Effects

Temporary direct effects result from noise and visual disturbances, and temporary increases in turbidity in stream channels associated with the operation of equipment in stream channels necessary to install fish screens on diversions, and place spawning gravels in stream channels. The effects of these impact mechanisms on Central Valley fall/late fall-run Chinook salmon are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs. The potential for temporary direct effects on Central Valley fall/late fall-run Chinook salmon will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.19.3.3 Permanent Indirect Effects

Implementation of conservation measures will not result in adverse permanent indirect effects on Central Valley fall/late fall-run Chinook salmon because restored and protected habitats will not

be associated with increasing human presence, contaminants, or other impact mechanisms that could result in indirect effects (Table 4–1).

4.4.19.4 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of Central Valley fall-/late fall-run Chinook salmon within the Plan Area.

4.4.19.4.1 Permanent Direct Effects

Permanent changes in habitat structure of up to 6.24 acres (or 0.55 linear miles) of modeled Central Valley fall-/late fall-run Chinook salmon habitat resulting from construction of new and replacement bridges that will alter in-channel habitat conditions from existing conditions. The acreage of take (i.e., harm) will be the amount of actual habitat that is located within the area of affected modeled habitat.

A small, but indeterminable, amount of direct take of individual eggs, alevins juvenile and adult Central Valley fall-/late fall-run Chinook salmon could be associated with contamination or adverse changes in aquatic habitat structure and conditions and collisions with in-channel operation of equipment used to construct permanent development projects and conduct recurring maintenance activities. Permanent direct effects on Central Valley fall-/late fall-run Chinook salmon will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.19.4.2 Temporary Direct Effects

Temporary reduction in Central Valley fall-/late fall-run Chinook salmon habitat use of up to 05.55 linear miles of modeled stream channel habitat upstream and downstream from new and replacement bridge projects and riprap removal sites during project implementation periods. An additional small but indeterminable temporary reduction of use habitat by Central Valley fall-/late fall-run Chinook salmon near upstream and downstream from storm outfall, flood control and other in-stream infrastructure construction and maintenance sites during periods that equipment is operated in stream channels as a result of noise and visual disturbances and increased turbidity. Increased turbidity and the potential for accidental discharge of contaminants during construction and maintenance activities could also temporarily reduce water quality. Temporary direct effects on modeled Central Valley fall-/late fall-run Chinook salmon habitat will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.19.4.3 Permanent Indirect Effects

Potential for increase in petroleum-based contaminants associated with vehicle traffic and subsequent runoff from new bridges and from human occupancy of new permanent developments that could reduce water quality. These permanent indirect effects on Central Valley fall-/late fall-run Chinook salmon will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

An indeterminable amount of predation mortality of juvenile Central Valley fall-/late fall-run Chinook salmon could be associated with construction of new bridge abutments and other in-channel structures that create predatory fish habitat.

4.4.19.5 Overall Impact Likely to Result from Take

The primary threat to Central Valley fall-/late fall-run Chinook salmon is the historical and ongoing loss of spawning habitat, degradation of habitat conditions, and loss of genetic diversity resulting from Chinook salmon hatchery practices (Good et al. 2005, NMFS 2009). Fall-/late fall-run Chinook salmon populations in the Sacramento drainage were substantially reduced following construction of barrier dams (e.g., Oroville Dam, Shasta Dam). Fall-run Chinook salmon are thought to use the Feather River to Oroville, Butte Creek, Big Chico Creek, Little Chico Creek, Rock Creek, Mud Creek, and the Sacramento River (Maslin et al. 1997, GIC 1999, NMFS 1999). However, no adults have returned to Big Chico Creek since 1985.

The covered activities will result in altering, and thus reducing the functions of, aquatic habitat structure in up to 0.55 linear miles (or 6.24 acres) of modeled Central Valley fall-/late fall-run Chinook salmon habitat, representing approximately 0.4 percent the existing modeled habitat. The preponderance of the affected habitat area will be associated with the replacement of existing bridges that have previously altered channel habitat structure from historical conditions. Furthermore, because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the length of actual habitat that is altered will be less.

Consequently, given low proportion of affected habitat to remaining habitat, it is unlikely that the Central Valley fall-/late fall-run Chinook salmon population in the Plan Area will be adversely affected by the covered activities. Furthermore, implementation of the applicable AMMs in Table 4–7 will minimize the potential for take (injury, mortality, and harassment of individuals).

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on Central Valley fall-/late fall-run Chinook salmon or adversely affect its distribution or abundance in the Plan Area.

4.4.20 Green Sturgeon

The maximum acreage of modeled green sturgeon habitat that will be permanently affected, directly and indirectly, with implementation of the covered activities is 2.6 acres. The permanent direct impacts result in the permanent alteration of channel habitat structure, but do not result in the removal of stream channel habitat (Figure 4–38, *Green Sturgeon: Direct Impacts of Covered Activities* [see separate file]).

4.4.20.1 Effects Common among Covered Activities

Actions undertaken to implement covered activities that affect stream channels used by green sturgeon (e.g., replacement of bridges) could result in injury or mortality of green sturgeon

associated with the operation of equipment in channels during periods sturgeon are present. Operation of construction and maintenance-related equipment in and adjacent to stream habitats could result in temporary increases in turbidity that could increase predation risk for juvenile green sturgeon. The area of channel that could be affected by these activities is small relative to the overall length of channel habitat and, therefore, the number of individual fish that could be affected is expected to be small. These potential impacts will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

Operation of equipment in and near stream channels supporting modeled habitat could result in the accidental introduction of contaminants associated with construction and recurring maintenance activities (e.g., fuel spills) into green sturgeon habitat could adversely affect individuals if present. Implementation of the applicable AMMs indicated in Table 4–7 provide for containment and rapid cleanup of releases that may occur, thus reducing exposure risk and the period that individuals could be exposed to contaminants.

4.4.20.2 Permanent Development Projects

Direct effects of permanent development projects result from construction of new and replacement bridge projects will permanently affect up to 2.6 acres of modeled green sturgeon adult migration and potential spawning habitat if all of the 10 new and replacement bridge projects assumed to be constructed in the UPAs (Table 4–2) are constructed on the Feather River in the Oroville UPA. Permanent direct effects include the alteration of habitat structure but will not result in the permanent removal of any modeled habitat in the Plan Area (Figure 4–38). Permanent indirect effects of permanent development projects result in reduced functions of the up to 2.6 acres of modeled habitat that is directly affected by new and replacement bridge projects to the extent that permanent alterations in habitat structure increase habitat for predators, thus increasing the risk for predation mortality of juvenile green sturgeon. Nonquantifiable permanent indirect effects include the potential for increased exposure to any increase in contaminant-related stormwater runoff and human activity that is associated with new permanent development projects. Up to 0.23 linear mile of modeled green sturgeon habitat in the Oroville UPA could be temporarily affected. [130]

Figure O–23, *Green Sturgeon Habitat in the Plan Area with full BRCP Implementation* in Appendix O and Table 4–8 provide the acreage of modeled green sturgeon habitat remaining within the Plan Area (including BRCP protected lands and lands that are not impacted by the covered activities) with full implementation of the covered activities. Implementation of the covered activities will not isolate or fragment green sturgeon use of the Plan Area because no habitat will be permanently removed by the covered activities.

[130] As indicated in Table 4–2, up to 10 new and replacement bridge projects may be implemented in the UPAs, the location of these bridge projects and, consequently, the modeled habitat types that will be affected cannot be determined at this time.

4.4.20.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of new and replacement bridge projects within UPAs will permanently affect up to 2.6 acres of modeled green sturgeon adult migration and potential spawning habitat if all of the 10 new and replacement bridge projects assumed to be constructed in the UPAs are constructed on the Feather River in the Oroville UPA. Construction of new and replacement bridges will alter the existing habitat structure of channel beds and banks (e.g., channel and bank substrate material), but will not result in the removal of green sturgeon habitat.

Temporary Direct Effects

Temporary direct effects are associated with construction of new bridge and bridge replacement projects include noise and visual disturbances, and temporary increases in turbidity in stream channels associated with operating equipment and other activities necessary to construct new developments in locations in or near streams supporting habitat (Table 4–1). These impact mechanisms could cause green sturgeon to reduce their use of affected habitat areas during the period these activities are implemented, and potentially may reduce their ability to forage and/or could increase their susceptibility to predation. The potential for temporary direct effects on green sturgeon will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 100-foot downstream and 20-foot upstream distance from new and replacement bridge projects within which temporary direct effects will occur and assuming up to 10 bridge projects are located in modeled green sturgeon adult migration and potential spawning habitat (see Table 4–2), up to 0.23 mile of modeled adult migration and potential spawning habitat within UPAs will temporarily affected by new bridge and bridge replacement construction activities.

Permanent Indirect Effects

Permanent indirect effects of new and replacement bridge projects include the potential for increased runoff of petroleum based chemicals from operation of vehicles on new bridges. The potential for adverse effects of these contaminants on green sturgeon, however, is considered low because most or all of the contaminant load is expected to result from displacing traffic and its associated contaminant load from existing bridges to new bridges. Alteration of up to 2.6 acres of in-channel habitat structure at new and replacement bridge project sites may create habitat for fish predators that could increase predation of juvenile sturgeon.

Occupancy of new permanent developments could increase the discharge of contaminants and sediments in urban and stormwater runoff associated with permanent development activities could result in increased levels of toxic contaminants entering streams (e.g., pesticides, copper). Such contaminants could have sublethal effects on individual green sturgeon associated with bioaccumulation of toxic compounds and potentially lethal effects depending on the toxicity and

concentration of discharged contaminants. Occupancy of permanent development projects could also result in increased access to its Feather River habitats. Such access could increase the potential for the placement of litter and other material in stream channels that could affect the function of affected areas as habitat. The potential for these permanent indirect effects on green sturgeon will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.20.2.2 Outside Urban Permit Areas

Permanent Direct Effects

Implementation of the covered activities outside UPAs will not result in permanent direct effects on green sturgeon.

Temporary Direct Effects

Implementation of the covered activities outside UPAs will not have temporary direct effects on green sturgeon.

Permanent Indirect Effects

Permanent direct effects on green sturgeon include the potential for increased discharge of contaminants associated with urban and stormwater runoff from new developments and the potential for a reduction of habitat functions associated with increased human access into its Feather River habitats. The effects of these impacts on green sturgeon are the same as described for permanent development activities in UPAs.

4.4.20.3 Recurring Maintenance Activities

4.4.20.3.1 Within Urban Permit Areas

Permanent Direct Effects

Recurring maintenance activities will not result in the permanent removal of green sturgeon habitat. Operation of equipment in the Feather River to remove debris (e.g., large woody debris) to maintain conveyance capacity could result in localized changes in habitat structure and flow conditions for green sturgeon. As described in Section 4.4.20.1, *Effects Common among Covered Activities*, in-channel operation of maintenance equipment can result in injury or mortality of green sturgeon if present during maintenance periods. The likelihood for this effect, however, is considered low because juvenile and adult green sturgeon are mobile and likely to avoid collisions with operating equipment. The potential for these effects on green sturgeon will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Temporary Direct Effects

Temporary direct effects on green sturgeon are associated with operation of maintenance-related equipment in the Feather River and include noise and visual disturbances, and temporary

increases in turbidity associated with operating equipment and other activities necessary to maintain in-channel infrastructure and conveyance capacity. These temporary effects could cause green sturgeon to reduce their use of affected habitat areas and could increase predation risk during the period the activities are being implemented. The potential for temporary direct effects on green sturgeon will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

Operation of equipment in the Feather River to remove debris (e.g., large woody debris) to maintain conveyance capacity could result in reducing the availability of cover for juvenile green sturgeon to hide from predators and could increase predatory fish habitat. Such changes in habitat conditions could increase the risk for predation of juvenile green sturgeon.

4.4.20.3.2 Outside Urban Permit Areas

Permanent Direct Effects

Permanent direct effects of recurring maintenance activities on green sturgeon outside of UPAs are the same as described above for the UPAs. The potential for these effects on green sturgeon will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Temporary Direct Effects

Temporary direct effects of recurring maintenance activities on green sturgeon outside of UPAs are the same as described above for the UPAs. The potential for these effects on green sturgeon will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

Permanent indirect effects of recurring maintenance activities on green sturgeon outside of UPAs are the same as described above for the UPAs. The potential for these effects on green sturgeon will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.20.4 Effects of Covered Activities within Conservation Lands

There are no conservation measures proposed for implementation in waterways used by green sturgeon as habitat in the Plan Area. Therefore, there are no expected effects of the conservation measures on green sturgeon.

4.4.20.5 Impacts on Critical Habitat

In 2009, NMFS designated critical habitat for the green sturgeon Southern Distinct Population Segment (DPS) throughout most of its occupied range.[131]

The specific PCEs essential for the conservation of the Southern DPS in freshwater riverine systems include (NMFS 2009, 74 FR 52300):

1. Food resources. Abundant prey items for larval, juvenile, subadult, and adult life stages are important for juvenile foraging, growth, and development during their downstream migration to the Delta and bays. In addition, subadult and adult green sturgeon may forage during their downstream post-spawning migration, while holding within deep pools.
2. Substrate type or size for egg deposition and development (e.g., bedrock sills and shelves, cobble and gravel, or hard clean sand, with interstices or irregular surfaces to ‘‘collect’’ eggs and provide protection from predators, and free of excessive silt and debris that could smother eggs during incubation), larval development (e.g., substrates with interstices or voids providing refuge from predators and from high flow conditions), and subadults and adults (e.g., substrates for holding and spawning).
3. Water flow. A flow regime necessary for normal behavior, growth, and survival of all life stages should include stable and sufficient water flow rates in spawning and rearing reaches to maintain water temperatures within the optimal range for egg, larval, and juvenile survival and development (11–19 °C). Sufficient flow is needed to reduce the incidence of suffocation and fungal infestations of the eggs and to flush silt and debris from substrate to maintain surfaces for and migration of adult green sturgeon to and from spawning grounds. Spawning success is associated with water flow and water temperature.
4. Water quality attributes, including temperature, salinity, oxygen content, and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages include: relatively stable water temperatures within spawning reaches; temperatures within 11–17 degrees Celsius (°C) in spawning reaches for egg incubation (March– August); temperatures below 20 °C for larval development; and temperatures below 24 °C for juveniles. Adequate levels of dissolved oxygen are needed to support oxygen consumption by fish in their early life stages (ranging from 61.78 to 76.06 mg O_2 hr/kg for juveniles). Suitable water quality would also include water containing acceptably low levels of contaminants (e.g., pesticides, polyaromatic hydrocarbons (PAHs), elevated levels of heavy metals) that may disrupt normal development of embryonic, larval, and juvenile stages of green sturgeon.
5. A migratory pathway necessary for the safe and timely passage of Southern DPS fish within riverine habitats and between riverine and estuarine habitats (e.g., an unobstructed river or dammed river that still allows for safe and timely passage). Unimpeded migratory

[131] 74 FR 52300, October 9, 2009.

corridors are necessary for adult green sturgeon to migrate to and from spawning habitats, and for larval and juvenile green sturgeon to migrate downstream from spawning/rearing habitats within freshwater rivers to rearing habitats within the estuaries.

6. Water depth. Deep (greater than or equal to 5-meter) holding pools for both upstream and downstream holding of adult or subadult fish, with adequate water quality and flow to maintain the physiological needs of the holding adult or subadult fish. Deep pools of greater than or equal to 5-meter depth with high associated turbulence and upwelling are critical for adult green sturgeon spawning and for summer holding within the Sacramento River.
7. Sediment quality (i.e., chemical characteristics) necessary for normal behavior, growth, and viability of all life stages includes sediments free of elevated levels of contaminants (e.g., selenium, PAHs, and pesticides) that may adversely affect green sturgeon.

The covered activities and conservation measures do not include any actions that could substantively and permanently affect the PCEs. BRCP actions would not affect water quantity, flows, floodplain connectivity, or substantively affect natural cover or water quality conditions. Vegetation and instream structures may be disturbed beneath and immediately adjacent to the up to 10 new and replacement bridge project sites that could be located in designated critical habitat, assuming that all bridge projects to be implemented in the UPAs (Table 4–2) are implemented in the Oroville UPA in locations that affect the Feather River, The extent of permanently disturbed channel is not expected to exceed 20 feet upstream and 100 feet downstream of bridge project sites, which will alter habitat conditions (e.g., reduction in complexity) along up to 0.23 mile (approximately 2.6 acres of habitat area) of designated critical habitat, representing approximately 0.4 percent of the designated critical habitat within the Plan Area. The actual area within which habitat functions could be reduced from existing conditions is expected to be substantially less because almost all of the projects will be to replace existing bridges and, consequently, the habitat conditions at these sites will have already been altered from natural conditions as result of construction of the original bridge.

Construction-related activities near critical habitats and within their watersheds could indirectly have temporary effects on water quality as a result of increasing loads of contaminants and sediments entering critical habitats. These effects would be temporary during construction periods and would be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7. Based on this assessment, the covered activities would not adversely affect PCEs of designated critical habitat and will not preclude the ability to recover green sturgeon.

4.4.20.6 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of green sturgeon within the Plan Area.

4.4.20.6.1 Permanent Direct Effects

Permanent reduction in the habitat function of up to 2.6 acres (or 0.23 linear miles) of modeled green sturgeon habitat resulting from construction of new and replacement bridges that will alter in-channel habitat conditions from existing conditions. The acreage of take (i.e., harm) will be the amount of actual habitat that is located within the area of affected modeled habitat.

A small, but indeterminable, amount of direct take of individual eggs, larvae, juvenile and adult green sturgeon could be associated with contamination or adverse changes in aquatic habitat structure and conditions and collisions with in-channel operation of equipment used to construct permanent development projects and conduct recurring maintenance activities. Permanent direct effects on green sturgeon will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.20.6.2 Temporary Direct Effects

Temporary reduction in green sturgeon habitat use of up to 0.23 linear miles of modeled stream channel habitat upstream and downstream from new and replacement bridge projects during project implementation periods. An additional small but indeterminable temporary reduction of use habitat by green sturgeon near storm outfall, flood control and other in-stream infrastructure construction and maintenance sites during periods that equipment is operated in stream channels as a result of noise and visual disturbances and increased turbidity. Increased turbidity and the potential for accidental discharge of contaminants during construction and maintenance activities could also temporarily reduce water quality. Temporary direct effects on modeled green sturgeon habitat will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.20.6.3 Permanent Indirect Effects

Potential for increase in petroleum-based contaminants associated with vehicle traffic and subsequent runoff from new bridges and from human occupancy of new permanent developments that could reduce water quality. This permanent indirect effect on green sturgeon will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

An indeterminable amount of predation mortality of juvenile green sturgeon could be associated with construction of new bridge abutments and other in-channel structures that create predatory fish habitat.

4.4.20.7 Overall Impact Likely to Result from Take

The primary threat to the southern DPS is the reduction of the spawning area to one population in the Sacramento River. This reduction in range makes green sturgeon vulnerable to catastrophic events. Loss of habitat due to dams (such as Keswick, Shasta, and Oroville) have already occurred, and continuing threats include migration barriers, insufficient flow, increased

water temperatures, juvenile entrainment in water export facilities, nonnative forage species, competitors, and predators, poaching, pesticides and heavy metals, and local harvest. Green sturgeon use the Sacramento River along the western boundary of Butte County and several have been recorded in the Feather River up to the Thermalito Afterbay (see Appendix A).

The covered activities will result in altering and thus reducing the functions of aquatic habitat structure in up to 0.23 linear miles (or 2.6 acres) of modeled green sturgeon habitat, representing approximately 0.4 percent of the existing modeled habitat. The preponderance of the affected habitat area will be associated with the replacement of existing bridges that have previously altered channel habitat structure from historical conditions. Furthermore, because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the length of actual habitat that is altered will be less.

Consequently, given low proportion of affected habitat to remaining habitat, it is unlikely that the green sturgeon population in the Plan Area will be adversely affected by the covered activities. Furthermore, implementation of the applicable AMMs in Table 4–7 will minimize the potential for take (injury, mortality, and harassment of individuals).

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on green sturgeon or adversely affect its distribution or abundance in the Plan Area.

4.4.21 Valley Elderberry Longhorn Beetle

The maximum acreage of modeled valley elderberry longhorn beetle habitat that will be permanently affected, directly and indirectly, with implementation of the covered activities is 3,308 acres, representing approximately 8 percent of the current extent of its modeled habitat (see Table 4–8, Appendix K, and Figure 4–39, *Valley Elderberry Longhorn Beetle: Direct Impacts of Covered Activities* [separate files]).

4.4.21.1 Effects Common among Covered Activities

Actions associated with implementation of the covered activities (e.g., operation of equipment for construction, habitat restoration, and maintenance) could result in mortality of valley elderberry longhorn beetle. For example, construction equipment could remove individual elderberry shrubs or crush individual beetles. The potential for these impacts will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

The probability that the accidental introduction of contaminants associated with construction and maintenance activities (e.g., fuel spills) will adversely affect individual valley elderberry longhorn beetle is considered low because beetles are closely associated with elderberry shrubs and are not expected to use cleared areas such as work sites where spills may occur. In addition, implementation of the applicable AMMs indicated in Table 4–7 provides for containment and

rapid cleanup of releases that may occur, thus reducing exposure risk and the period that individuals could be exposed to contaminants.

4.4.21.2 Permanent Development Projects

Direct effects of permanent development projects will result in the permanent removal of up to 2,280 acres of modeled valley elderberry longhorn beetle habitat (Table 4–8), representing approximately 5 percent of the existing acreage of modeled habitat in the Plan Area (Table 4–8, Figure 4–39). Indirect effects of permanent development projects will result in reduced functions of up to 1,028 acres of modeled valley elderberry longhorn beetle habitat, 659 acres of which overlap with areas subject to ongoing effects of existing permanent developments (Appendix K). Figure O–24, *Valley Elderberry Longhorn Beetle Habitat in the Plan Area with full BRCP Implementation* in Appendix O and Table 4–8 provide the acreage of modeled valley elderberry longhorn beetle habitat remaining within the Plan Area (including BRCP protected lands and lands that are not impacted by the covered activities) with full implementation of the covered activities.

4.4.21.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects within the Chico, State Route 99, Foothill Area, Oroville, Neal Road Drop-Off and Recycling Facility, Durham, and Bangor UPAs will result in permanent direct effects on up to 2,158 acres of modeled valley elderberry longhorn beetle habitat (Table 4–9). Loss of this habitat area will reduce the area of any actual valley elderberry longhorn beetle habitat that is located within affected modeled habitat and thus will reduce the area of habitat available to valley elderberry longhorn beetle. Habitat loss may also result in increased fragmentation of existing occurrences, which could result in increased risk of predation (e.g., less cover), increase energy use (e.g., individuals dispersing greater distances), and decreased reproductive success.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include visual and other disturbances (e.g., ground vibrations) associated with operating equipment and other activities necessary to construct new developments (Table 4–1). These impact mechanisms could cause valley elderberry longhorn beetle to reduce their use of affected habitat areas during the period these activities are implemented. The potential for temporary direct effects on valley elderberry longhorn beetle will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 100-foot distance from permanent new developments within which temporary indirect effects will occur (see Table 4–5), up to 1,028 acres of modeled valley elderberry longhorn beetle habitat will be temporarily and directly affected by permanent

development covered activities Plan Area-wide[132], 659 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity), noise (e.g., operation of vehicles and other equipment), building maintenance, and other disturbances associated with human occupancy following construction of permanent developments (see Table 4–1). These disturbances could cause valley elderberry longhorn beetle to reduce their use of habitat adjacent to permanent development areas. Other effects could include increased predation of valley elderberry longhorn beetle from nonnative species that benefit from human occupancy, such as Argentine ant.

Based on an average 100-foot distance from permanent new developments within which permanent indirect effects will occur (see Table 4–5), up to 1,028 acres of modeled valley elderberry longhorn beetle habitat will be permanently and indirectly affected by permanent development covered activities Plan Area-wide[133], 659 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). These permanent indirect effects will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.21.2.2 Outside Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects will result in permanent direct effects on 122 acre of modeled valley elderberry longhorn beetle habitat outside of UPAs distributed among all the CAZs (Table 4–9). The effects of such loss of modeled habitat on valley elderberry longhorn beetle are the same as described for the permanent direct effects of implementing permanent development projects in the UPAs (see Section 4.4.21.2.1, *Within Urban Permit Areas*).

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include visual and other disturbances (e.g., ground vibrations) associated with operating equipment and other activities necessary to construct new developments (Table 4–1). The effects of these impact mechanisms on valley elderberry longhorn beetle are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.21.2.1). The potential for temporary direct effects on valley

[132] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.
[133] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

elderberry longhorn beetle will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 100-foot distance from permanent new developments within which temporary direct effects will occur (see Table 4–5), up to 1,028 acres of modeled habitat will be temporarily and directly affected by permanent development covered activities Plan Area-wide[134], 659 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

The potential for adverse effects on individual valley elderberry longhorn beetle of construction-related noise and other disturbances is considered to be low because of the following factors.

1. Less than 0.3 percent of the available modeled habitat would be affected if all permanent development activities outside UPAs were implemented simultaneously, but permanent development projects would not be implemented simultaneously and thus a much smaller area of habitat would be affected by construction-related disturbances at any point in time.
2. The majority of covered activities implemented outside of the UPAs are linear transportation infrastructure projects (e.g., bridge and road replacements). As such, the period over which a given area of habitat adjacent to project footprints will be subjected to temporary direct construction-related disturbances will be limited as the area under construction moves along the project ROW.
3. Affected modeled habitat areas are within or near larger patches of modeled habitat that would not be disturbed and would be available for use by the species.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include ongoing visual (e.g., operation of vehicles, lighting, human activity) and noise (e.g., operation of vehicles and other equipment) disturbances associated with human activity following construction of permanent developments (see Table 4–1). The level of these effects are expected to be less than that associated with permanent development projects within UPAs because they do not include residential developments, which are expected to support higher levels of human activity than nonresidential developments. These permanent indirect effects will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 100-foot distance from permanent new developments within which temporary indirect effects will occur (see Table 4–5), 1,028 acres of modeled habitat will be permanently and indirectly affected by permanent development covered activities Plan Area-wide[135], 659 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have

[134] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.
[135] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts within UPAs.

been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). Adverse effects of these disturbances, however, will be low for the reasons described above for temporary direct effects of construction-related noise and visual disturbances.

4.4.21.3 Recurring Maintenance Activities

4.4.21.3.1 Within Urban Permit Areas

Permanent Direct Effects

With the exception of the potential impact mechanisms and associated effects on valley elderberry longhorn beetle described in Section 4.4.21.1, *Effects Common among Covered Activities*, there are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on valley elderberry longhorn beetle. Maintenance removal of riparian vegetation that potentially support valley elderberry longhorn beetle habitat may adversely affect valley elderberry longhorn beetle because for the reasons similar as for the permanent direct effects of implementing permanent development projects in the UPAs (see Section 4.4.21.2.1).

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include visual and other disturbances (e.g., ground vibrations; Table 4–1). The effects of these impact mechanisms on valley elderberry longhorn beetle are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.21.2.1) except that the duration of maintenance-related activities is generally expected to be less than that of construction-related activities. The potential for temporary direct effects on valley elderberry longhorn beetle will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

The potential for adverse effects of temporary recurring maintenance-related disturbances on valley elderberry longhorn beetle is considered low because maintenance areas are generally subject to ongoing high levels of disturbance that.

Permanent Indirect Effects

As described in Table 4–2, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on valley elderberry longhorn beetle.

4.4.21.3.2 Outside Urban Permit Areas

Permanent Direct Effects

With the exception of the potential impact mechanisms and associated effects on valley elderberry longhorn beetle described in Section 4.4.21.1 and those described above for the UPAs, there are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on valley elderberry longhorn beetle.

Potential effects of recurring maintenance activities on valley elderberry longhorn beetle habitat will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Temporary Direct Effects

Temporary direct effects are associated with operation of maintenance-related equipment and include visual and other disturbances (e.g., ground vibrations; Table 4–1). The effects of these impact mechanisms on valley elderberry longhorn beetle are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.21.2.1) except that the duration of maintenance-related activities is generally expected to be less than that of construction-related activities.

The potential for adverse effects of temporary maintenance-related disturbances on valley elderberry longhorn beetle behavior is considered low for the same reasons as those described for temporary direct effects of recurring maintenance activities inside UPAs.

Permanent Indirect Effects

As described in Table 4–2, there are no impact mechanisms associated with implementation of recurring maintenance activities that could result in permanent indirect effects on valley elderberry longhorn beetle.

4.4.21.4 Effects of Covered Activities within Conservation Lands

Permanent Direct Effects

Implementation of conservation measures to restore up to 178 acres of riparian forest types could result in injury or mortality of individual valley elderberry longhorn beetle as a result of operating restoration-related equipment if elderberry shrubs are present at restoration sites. Permanent direct effects of habitat restoration projects will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Temporary Direct Effects

The primary temporary direct effect on valley elderberry longhorn beetle will be associated with restoration of 178 acres of riparian forest habitat (see Table 5-7), most of which will be restored from habitat types that do not support valley elderberry longhorn beetle. Conversion of existing,

small riparian patches to higher functioning riparian forest habitat will temporarily reduce the function of the restored habitat until the valley elderberry longhorn beetle functions associated with the restored habitat have matured. In addition, the operation of equipment and other activities related to implementing habitat restoration, enhancement, and management actions in or adjacent to BRCP conservation lands that cause temporary visual and other disturbances to valley elderberry longhorn beetle (Table 4–1). The effects of these impact mechanisms on valley elderberry longhorn beetle are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs (see Section 4.4.21.2.1). The potential for temporary direct effects on occupied valley elderberry longhorn beetle habitat will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

Implementation of conservation measures will not result in permanent indirect effects on valley elderberry longhorn beetle because restored and protected habitats will not be associated with increasing human or pet presence, noise, traffic risks, or other impact mechanisms that could result in permanent indirect effects (Table 4–2). Restored habitat types, although they may not support valley elderberry longhorn beetle, are highly unlikely to impose additional risk factors or stressors on valley elderberry longhorn beetle.

4.4.21.5 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of valley elderberry longhorn beetle within the Plan Area.

4.4.21.5.1 Permanent Direct Effects

Loss of up to 2,280 acres of modeled valley elderberry longhorn beetle breeding habitat (Table 4–8). The acreage of take (i.e., harm) will be the amount of actual habitat (e.g., elderberry bushes) that is located within the area of affected modeled habitat.

A small, but indeterminable, amount of direct take of adult valley elderberry longhorn beetles could be associated with contamination or adverse changes in habitat structure and conditions, and with collisions with vehicles and other equipment used to construct permanent development projects and conduct recurring maintenance activities. Permanent direct effects of these impacts will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.21.5.2 Temporary Direct Effects

A temporary reduction in the functions of up to 1,028 acres of modeled valley elderberry longhorn beetle habitat would result from disturbance associated with covered activities, 659 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Habitat enhancement- and management-related activities on up to 10,915 acres of conservation lands supporting modeled valley elderberry longhorn beetle habitat (Table 5-10) will result in temporary direct effects on a relatively small acreage of additional habitat

that cannot be estimated. The acreage of take (i.e., harassment) will be the amount of actual habitat that is located within the area of affected modeled habitat.

Temporary direct effects on valley elderberry longhorn beetle will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.21.5.3 Permanent Indirect Effects

A permanent reduction in the functions of up to 1,028 acres of modeled valley elderberry longhorn beetle habitat would result from harassment associated with covered activities, 659 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). The acreage of take (i.e., harassment) will be the amount of actual habitat that is located within the area of affected modeled habitat. Permanent indirect effects on valley elderberry longhorn beetle habitat will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

A small, but indeterminable, amount of direct take of individual valley elderberry longhorn beetle (eggs, larvae, and adults) could be associated with collisions with vehicles and other human uses adjacent to permanent development projects (e.g., illegal removal of elderberry bushes), adverse changes in habitat structure and environmental conditions, and predation caused by increased numbers of nonnative species associated with development.

4.4.21.6 Overall Impact Likely to Result from Take

As described in Appendix A, the primary threats to survival of the beetle include loss and alteration of habitat by agricultural conversion; inappropriate grazing; levee construction; stream and river channelization; removal of riparian vegetation; rip-rapping of shorelines; nonnative species such as the Argentine ant (*Linepithema humile*), a predator of the early phases of the beetle; and recreational, industrial, and urban development.

The covered activities, including conservation measures, will result in the loss of up to 2,280 acres of modeled habitat, representing approximately 5 percent of the current extent of modeled habitat (see Table 4–8). Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less.

Based on the available information regarding the status and distribution of valley elderberry longhorn beetle (see Appendix A), it is likely that the most of the modeled habitat that is removed by the covered activities is unoccupied by valley elderberry longhorn beetle. Implementation of the applicable AMMs (see Table 4–7) will serve to further minimize impacts on valley elderberry longhorn beetle.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on valley elderberry longhorn beetle or adversely affect its Plan Area distribution or abundance.

4.4.22 Vernal Pool Tadpole Shrimp

The maximum acreage of vernal pool tadpole shrimp habitat that will be permanently affected, directly and indirectly, with implementation of the covered activities is 2,162 acres, representing approximately 6 percent of the current extent of modeled habitat (see Table 4–8, Appendix K, and Figure 4–40, *Vernal Pool Tadpole Shrimp: Direct Impacts of Covered Activities* [separate files]). Within the affected modeled habitat, up to 38 acres of wetted vernal pool surface could be removed (see Section 4.7.1, *Vernal Pools and Other Seasonal Wetlands*, Table 4–13, Subtable C, *Impacts on Vernal Pools and Other Seasonal Wetlands*). Four of the 17 known occurrences of vernal pool tadpole shrimp will be adversely affected by the covered activities (Table 4–9, Appendix K, and Figure 4–40).

4.4.22.1 Effects Common among Covered Activities

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction, habitat restoration, and recurring maintenance activities) could result in injury or mortality to vernal pool tadpole shrimp if present in affected habitat areas. For example, cysts could be removed from soil or crushed by construction- or maintenance-related equipment. Adults could suffer mortality from contamination or changes to the hydrology of vernal pool tadpole shrimp habitat, and invasive nonnative species could be introduced and negatively affect its habitat. These potential impacts will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.22.2 Permanent Development Projects

Direct effects of permanent development projects will result in the permanent removal of up to 1,422 acres of modeled vernal pool tadpole shrimp habitat representing approximately 4 percent of modeled habitat in the Plan Area. Within this area, up to 38 acres of wetted vernal pool surface could be removed (see Section 4.7.1, Table 4–13, Subtable C, *Impacts on Vernal Pools and Other Seasonal Wetlands*). Up to 3 of the 17 known occurrences of vernal pool tadpole shrimp will be removed by the covered activities (Table 4–8). Indirect effects of permanent development projects will result in reduced functions of up to 740 acres of modeled habitat in the Plan Area, 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Figure O–25, *Vernal Pool Tadpole Shrimp and Vernal Pool Fairy Shrimp Habitat in the Plan Area with full BRCP Implementation* in Appendix O and Table 4–8 provide the acreage of modeled vernal pool tadpole shrimp habitat remaining within the Plan Area (including BRCP protected lands and lands that are not impacted by the covered activities) with full implementation of the covered activities.

4.4.22.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects within the Chico, Foothill Area, Neal Road Drop-Off and Recycling Facility, Oroville, and State Route 99 UPAs will result in permanent direct effects on up to 1,313 acres of modeled vernal pool tadpole shrimp habitat (Table 4–9). Within this area, up to 35.6 acres of wetted vernal pool surface could be removed (see Section 4.7.1, Table 4–13, Subtable C). No known occurrences of vernal pool tadpole shrimp will be removed within the UPAs. Loss of this habitat area will reduce the area of any actual vernal pool tadpole shrimp habitat that is located within affected modeled habitat and thus will reduce the area of habitat available to vernal pool tadpole shrimp. Habitat loss could result in localized fragmentation and increased isolation of vernal pool tadpole shrimp occurrences leading to a reduction in genetic diversity or the increased likelihood of stochastic factors extirpating small populations.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include introduction of contaminants and erosion and sedimentation associated with construction related activities (Table 4–1). These impact mechanisms could cause toxicity induced morbidity or mortality due to contaminants or altered water chemistry, bury individuals, and reduce the algal and plant based food supply in its habitat. The potential for temporary direct effects on vernal pool tadpole shrimp will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7. Based on an average 250-foot distance from permanent new developments within which temporary direct effects will occur (see Table 4–5), up to 740 acres of modeled vernal pool tadpole shrimp habitat will be temporarily directly affected by permanent development covered activities Plan Area-wide[136], 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include increased human activity associated with new recreational developments in and adjacent to natural areas, altered hydrology, and introduction of nonnative species (see Table 4–1). These effects could cause the morbidity (disease) or mortality of vernal pool tadpole shrimp, alter the hydrology necessary for supporting its habitat, or introduce nonnative species that could negatively affect vernal pool tadpole shrimp habitat adjacent to permanent development areas.

Based on an average 250-foot distance from permanent new developments within which permanent indirect effects will occur (see Table 4–5), up to 740 acres of modeled vernal pool

[136] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

tadpole shrimp habitat will be permanently indirectly affected by permanent development covered activities Plan Area-wide[137], 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). These permanent indirect effects will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.22.2.2 Outside Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects will result in permanent direct effects on 109 acres of modeled vernal pool tadpole shrimp modeled habitat outside of UPAs and distributed among all the CAZs. Within this area, up to 2.4 acres of wetted vernal pool surface could be removed (see Table 13, Subtable C, *Impacts on Vernal Pools and Other Seasonal Wetlands*). Up to three known occurrences of vernal pool tadpole shrimp will be removed by the covered activities (Table 4–9). The effects of such loss of known occurrences and modeled habitat for vernal pool tadpole shrimp are the same as described for the permanent direct effects of implementing permanent development projects in the UPAs.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include introduction of contaminants and erosion and sedimentation associated with construction related activities (Table 4–1). The effects of these impact mechanisms on vernal pool tadpole shrimp are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs. The potential for temporary direct effects on vernal pool tadpole shrimp will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 250-foot distance from permanent new developments within which temporary direct effects will occur (see Table 4–5), up to 740 acres of modeled habitat will be temporarily directly affected by permanent development covered activities Plan Area-wide[138], 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include increased human activity associated with new recreational developments in and adjacent to natural areas, altered hydrology, and introduction of diseases, pests, and other nonnative species (see Table 4–1).

[137] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.
[138] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts inside UPAs.

These effects could cause the direct morbidity or mortality of vernal pool tadpole shrimp, alter the hydrology necessary for supporting its habitat, or introduce nonnative species that could negatively affect vernal pool tadpole shrimp habitat adjacent to permanent development areas.

Based on an average 250-foot distance from permanent new developments within which permanent indirect effects will occur (see Table 4–5), up to 740 acres of modeled vernal pool tadpole shrimp habitat will be permanently indirectly affected by permanent development covered activities Plan Area-wide[139], 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K).

4.4.22.3 Recurring Maintenance Activities

4.4.22.3.1 Within Urban Permit Areas

Permanent Direct Effects

With implementation of the applicable AMMs (Tables 4-7 and 5-25) there are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on vernal pool tadpole shrimp (see Table 4–1).

Temporary Direct Effects

With implementation of the applicable AMMs (Tables 4-7 and 5-25) there are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in temporary direct effects on vernal pool tadpole shrimp (see Table 4–1).

Permanent Indirect Effects

With implementation of the applicable AMMs (Tables 4-7 and 5-25) there are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent indirect effects on vernal pool tadpole shrimp (see Table 4–1).

4.4.22.3.2 Outside Urban Permit Areas

Permanent Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on vernal pool tadpole shrimp (see Table 4–1).

[139] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts inside UPAs.

Temporary Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in temporary direct effects on vernal pool tadpole shrimp (see Table 4–1).

Permanent Indirect Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent indirect effects on vernal pool tadpole shrimp (see Table 4–1).

4.4.22.4 Effects of Covered Activities within Conservation Lands

Permanent Direct Effects

Operation of equipment to implement conservation measures to enhance, restore, and manage BRCP conservation lands could result in the introduction of contaminants and erosion and sedimentation into vernal pool tadpole shrimp habitat if present where conservation actions are implemented (Table 4–1). These impact mechanisms could cause toxicity induced morbidity or mortality due to contaminants or altered water chemistry and bury individuals. The potential for permanent direct effects on vernal pool tadpole shrimp will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

Temporary Direct Effects

Operation of equipment to implement conservation measures to enhance, restore, and manage BRCP conservation lands could result in the introduction of contaminants and erosion and sedimentation into vernal pool tadpole shrimp habitat if present. These impact mechanisms could cause temporary reductions in the vernal pool tadpole shrimp algal and plant based food supply in its habitat that could affect individuals. The potential for temporary direct effects on vernal pool tadpole shrimp will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

Implementation of the conservation measures are not expected to result in permanent indirect effects on vernal pool tadpole shrimp.

4.4.22.5 Impacts on Critical Habitat

Designated critical habitat for vernal pool tadpole shrimp is described in Appendix A. Approximately 9,976 acres of modeled vernal pool tadpole shrimp habitat is present within designated critical habitat units 3D-F and 4A-F within the Plan Area. Covered activities will affect up to 106 acres of the modeled habitat located in designated critical habitat units 3F, 4A, 4B, 4D, and 4F. The PCEs essential for this species' conservation as stated in the designation of critical habitat are as follows:

1. Topographic features characterized by mounds and swales and depressions within a matrix of surrounding uplands that result in complexes of continuously, or intermittently, flowing surface water in the swales connecting the pools described in PCE 2, providing for dispersal and promoting hydroperiods of adequate length in the pools.
2. Depressional features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains, and that continuously hold water for a minimum of 41 days, in all but the driest years, thereby providing adequate water for incubation, maturation, and reproduction. As these features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands.
3. Sources of food, expected to be detritus occurring in the pools, contributed by overland flow from the pools' watershed or as a result of biological processes within the pools themselves, such as single-celled bacteria, algae, and dead organic matter, to provide for feeding.
4. Structure within the pools described in PCE 2, consisting of organic and inorganic materials, such as living and dead plants from plant species adapted to seasonally inundated environments, rocks, and other inorganic debris that may be washed, blown, or otherwise transported into the pools, that provide shelter.

Implementation of the permanent development activities on modeled vernal pool tadpole shrimp habitat present in designated critical habitat will eliminate all four PCEs completely. Indirect effects of these covered activities will negatively affect all four PCEs to varying degrees depending primarily on the proximity of the habitat to the direct impact areas. No permanent development or ongoing maintenance activities will be implemented in critical habitat Units 3D, 3E, 4C, and 4E, and habitat in these Units will not be affected by the covered activities. In critical habitat Units 3F, 4A, 4B, and 4D the directly impacted critical habitat consists of low-density vernal pools scattered within grassland that has been periodically dry-farmed to grain. In Unit 3F the vernal pools are located at the lowest local topographic position along a creek and adjacent to commercial development, so indirect effects on downslope and upslope hydrological conditions supporting other vernal pools are minimal to nonexistent. Similar conditions exist on Unit 4A where the directly impacted habitat is bordered by roads. The area upslope of the direct impact is much more extensive than the directly impacted critical habitat, which will be preserved under the Plan as the Chico Butte County Meadowfoam Preserve and thereby will preserve the ecological characteristics for maintaining vernal pool tadpole shrimp habitat. Conditions similar to those that exist on Unit 4A exist on Units 4B and 4D where the directly impacted habitat is bordered by roads. Direct impacts to habitat in Unit 4F are confined to an area bordering State Route 99 and one very small area near a proposed bridge. Both areas are in the lowest local topographic position in the area on the borders of much greater extents of preserved habitat that includes the Dove Ridge Preserve.

Implementation of habitat management and enhancement actions could affect critical habitat to the extent that lands within designated critical habitat are protected under the BRCP.

Implementation of conservation measures to restore vernal pool and other seasonal wetland will convert grassland that includes modeled vernal pool tadpole shrimp habitat. Restoration projects for vernal pools and emergent wetland would cause the take any unknown occurrences. Permanent direct effects of habitat management, enhancement, and restoration actions will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

The removal of 97 acres of modeled vernal pool tadpole shrimp habitat in designated critical habitat units and the associated 9 acres of indirect effects on modeled habitat will not affect the ability to recover vernal pool tadpole shrimp in the Plan Area. Implementation of the BRCP will result in protecting approximately 21,400 acres of modeled vernal pool tadpole shrimp habitat. Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on vernal pool tadpole shrimp or adversely affect its Plan Area distribution or abundance.

4.4.22.6 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of vernal pool tadpole shrimp within the Plan Area.

4.4.22.6.1 Permanent Direct Effects

The removal of up to 1,422 acres of modeled vernal pool tadpole shrimp habitat and three known occurrences (Tables 4-8 and 4-9), including up to 38 acres of wetted vernal pool surface (see Table 13, Subtable C, *Impacts on Vernal Pools and Other Seasonal Wetlands*). Up to 3 of the 17 known occurrences of vernal tadpole shrimp will be removed by the covered activities (Table 4–8). The acreage of removal of vernal pool tadpole shrimp will be the amount of actual habitat that is located within the area of affected modeled habitat. An additional small, but indeterminable, amount of direct impacts could be associated with habitat fragmentation. Permanent direct effects of these impacts will be avoided and minimized with implementation of the applicable AMMs in Table 4–7.

4.4.22.6.2 Temporary Direct Effects

A temporary reduction in the functions of up to 740 acres of modeled vernal pool tadpole shrimp habitat would result from the effects of covered activities, 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Temporary direct effects on vernal pool tadpole shrimp will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.22.6.3 Permanent Indirect Effects

A permanent reduction in the functions of up to 740 acres of modeled vernal pool tadpole shrimp habitat would result from covered activities Plan Area-wide, 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because

temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). Permanent indirect effects on vernal pool tadpole shrimp will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.22.7 Overall Impact Likely to Result from Take

The primary threats to vernal pool tadpole shrimp have been the historical loss of its habitat, incompatible livestock grazing practices, adverse effects of invasive species, altered hydrology, and contaminants (USFWS 2005). The covered activities will result in the loss of up to 1,422 acres of modeled habitat, representing approximately 4 percent of the current extent of modeled habitat (see Table 4–8and Figure 4–40). Within this area, up to 38 acres of wetted vernal pool surface could be removed (see Table 13, Subtable C, *Impacts on Vernal Pools and Other Seasonal Wetlands*). Based on the available information regarding the status and distribution of vernal pool tadpole shrimp (see Appendix A), it is likely that the most of the modeled habitat that is removed by the covered activities is unoccupied by vernal pool tadpole shrimp and, because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. Three of the 17 known occurrences of vernal pool tadpole shrimp will be adversely affected by the covered activities (Table 4–9, Appendix K, and Figure 4–40). Implementation of the applicable AMMs (Table 4–7) will serve to further avoid and minimize impacts on vernal pool tadpole shrimp. While PCEs in designated critical habitat will be affected, implementation of the BRCP will more than offset those impacts by protecting approximately 21,400 acres of modeled vernal pool tadpole shrimp habitat.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on vernal pool tadpole shrimp or adversely affect its Plan Area distribution or abundance.

4.4.23 Conservancy Fairy Shrimp

A habitat suitability model has not been developed for Conservancy fairy shrimp because its known occurrences are disjunct and it does not occur in many vernal pools that otherwise appear to support suitable habitat. The 3 known occurrences of Conservancy fairy shrimp will not be adversely affected by the covered activities and no take of this species is permitted within the Plan Area (Tables 4-6 and 5-23).

4.4.23.1 Effects Common among Covered Activities

There will be no take of Conservancy fairy shrimp due to the implementation of covered activities and any potential impacts will be avoided with implementation of the applicable AMMs indicated in Table 4–7.

4.4.23.2 Permanent Development Projects

Direct and indirect effects of permanent development projects on Conservancy fairy shrimp will be avoided with implementation the applicable AMMs indicated in Table 4–7.

4.4.23.3 Recurring Maintenance Activities

Recurring maintenance activities are not expected to be implemented in or near occupied Conservancy fairy shrimp habitat and, with implementation the applicable AMMs indicated in Table 4–7, all potential direct and indirect effects of recurring maintenance activities will be avoided.

4.4.23.4 Effects of Covered Activities within Conservation Lands

4.4.23.4.1 Permanent Direct Effects

Operation of equipment to implement conservation measures to enhance and manage BRCP protected Conservancy fairy shrimp habitat could result in the introduction of contaminants and erosion and sedimentation into occupied habitat (Table 4–1). These impact mechanisms could cause toxicity induced morbidity or mortality due to contaminants or altered water chemistry and bury individuals. The potential for permanent direct effects on Conservancy fairy shrimp will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.23.4.2 Temporary Direct Effects

Operation of equipment to implement conservation measures to enhance and manage BRCP protected Conservancy fairy shrimp habitat could result in the introduction of contaminants and erosion and sedimentation into occupied habitat. These impact mechanisms could cause temporary reductions in the Conservancy fairy shrimp algal and plant based food supply in its habitat that could affect individuals. The potential for temporary direct effects on Conservancy fairy shrimp will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.23.4.3 Permanent Indirect Effects

Implementation of the conservation measures are not expected to result in permanent indirect effects on Conservancy fairy shrimp.

4.4.23.5 Impacts on Critical Habitat

Designated critical habitat for Conservancy fairy shrimp is described in Appendix A. The PCEs essential for this species' conservation as stated in the designation of critical habitat are as follows:

1. Topographic features characterized by mounds and swales and depressions within a matrix of surrounding uplands that result in complexes of continuously or intermittently flowing surface water in the swales connecting the pools described in PCE 2, providing for dispersal and promoting hydroperiods of adequate length in the pools.
2. Depressional features, including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and continuously hold water for a minimum of 19 days in all but the driest years, thereby providing adequate water for incubation, maturation, and reproduction. As these features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands;
3. Sources of food, expected to be detritus occurring in the pools, contributed by overland flow from the pools' watershed or as the result of biological processes within the pools themselves, such as single-celled bacteria, algae, and dead organic matter, to provide for feeding.
4. Structure within the pools described in PCE 2, consisting of organic and inorganic materials such as living and dead plants from plant species adapted to seasonally inundated environments, rocks, and other inorganic debris that may be washed, blown, or otherwise transported into the pools, that provide shelter.

No permanent development or ongoing maintenance covered activities will be implemented in the designated critical habitat. Implementation of habitat management and enhancement actions could affect critical habitat to the extent that lands within designated critical habitat are protected and enhanced under the BRCP. Where Conservancy fairy shrimp is found to be present on BRCP conservation lands within areas of designated critical habitat, habitat management and enhancement actions will maintain or enhance each of the PCEs as described in conservation measure CM5, Enhance Protected Natural Communities for Covered Species and comply with the requirements of Table 6-3, *Take Limits for Covered Species and Avoidance and Minimization Criteria for Covered Species*.

4.4.23.6 Estimated Level of Take

There will be no take of Conservancy fairy shrimp associated with implementation of permanent development and recurring maintenance activities with implementation of the applicable AMMs indicated in Table 4–7. Implementation of BRCP conservation actions to enhance and manage occupied Conservancy fairy shrimp could result in take of Conservancy fairy shrimp. It is a small, but indeterminable amount of take. Covered activities will result in the following level of estimated take of Conservancy fairy shrimp within the Plan Area.

4.4.23.6.1 Permanent Direct Effects

Take of an indeterminable, but minimal number of individual Conservancy fairy shrimp associated with the operation of equipment in occupied habitat to enhance and manage BRCP

protected habitat areas to benefit Conservancy fairy shrimp. Permanent direct effects of these impacts will be avoided and minimized with implementation of the applicable AMMs described in Table 4–7.

4.4.23.6.2 Temporary Direct Effects

A temporary reduction in the function of occupied habitat resulting from the operation of equipment in occupied habitat to enhance and manage BRCP protected habitat areas to benefit Conservancy fairy shrimp.

4.4.23.6.3 Permanent Indirect Effects

Implementation of the conservation measures are not expected to result in permanent indirect effects on Conservancy fairy shrimp.

4.4.23.7 Overall Impact Likely to Result from Take

The primary threats to Conservancy fairy shrimp have been the historical loss of its habitat, incompatible livestock grazing practices, adverse effects of invasive species, altered hydrology, and contaminants (USFWS 2005). The covered activities, including conservation measures, will avoid all take of Conservancy fairy shrimp and manage protected lands to preserve or enhance their habitat function for Conservancy fairy shrimp. PCEs in designated critical habitat will not be affected.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on Conservancy fairy shrimp or adversely affect its Plan Area distribution or abundance.

4.4.24 Vernal Pool Fairy Shrimp

The maximum acreage of vernal pool fairy shrimp habitat that will be permanently affected, directly and indirectly, with implementation of the covered activities is 2,162 acres, representing approximately 7 percent of the current extent of modeled habitat (see Table 4–8, Appendix K, and Figure 4–41, *Vernal Pool Fairy Shrimp: Direct Impacts of Covered Activities* [separate files]). Within the affected modeled habitat, up to 38 acres of wetted vernal pool surface could be removed (see Table 13, subtable C, *Impacts on Vernal Pools and Other Seasonal Wetlands*). Seventeen of the 29 known occurrences of vernal pool fairy shrimp will be adversely affected by the covered activities (Table 4–9, Appendix K, and Figure 4–41).

4.4.24.1 Effects Common among Covered Activities

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction, habitat restoration, and recurring maintenance activities) could result in injury or mortality to vernal pool fairy shrimp in unknown occurrences if present in affected habitat areas.

For example, eggs and cysts could be removed from soil with construction of new structures and adults could be crushed by construction- or maintenance-related equipment. Adults could suffer mortality from contamination or changes to the in the hydrology of vernal pool fairy shrimp habitat, and invasive nonnative species could be introduced and negatively affect its habitat. These potential impacts will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.24.2 Permanent Development Projects

Direct effects of permanent development projects will result in the permanent removal of up to 1,422 acres of modeled primary habitat representing approximately 4 percent of modeled habitat in the Plan Area. Within this area, up to 38 acres of wetted vernal pool surface could be removed (see Table 13, Subtable C, *Impacts on Vernal Pools and Other Seasonal Wetlands*). Up to 17 of the 29 known occurrences of vernal pool fairy shrimp will be removed by the covered activities (Table 4–8). Indirect effects of permanent development projects will result in reduced functions of up to 740 acres of modeled habitat in the Plan Area, 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Figure O–25 in Appendix O and Table 4–8 provide the acreage of modeled vernal pool fairy shrimp habitat remaining within the Plan Area (including BRCP protected lands and lands that are not impacted by the covered activities) with full implementation of the covered activities.

4.4.24.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects within the Chico, Foothill Area, Neal Road Drop-Off and Recycling Facility, Oroville, and State Route 99 UPAs will result in permanent direct effects on up to 1,313 acres of modeled vernal pool fairy shrimp habitat. Within this area, up to 38 acres of wetted vernal pool surface could be removed (see Section 4.7.1, Table 4–13, Subtable C). Up to 15 known occurrences of vernal pool fairy shrimp will be removed by the covered activities (Table 4–9). Loss of this habitat area will reduce the area of any actual vernal pool fairy shrimp habitat that is located within affected modeled habitat and thus will reduce the area of habitat available to vernal pool fairy shrimp. Removal of large patches of habitat could result in localized fragmentation habitat and/or disruption of egg or cyst dispersal patterns in occupied habitat adjacent to removed habitat areas potentially leading to reduction in genetic diversity or the increased likelihood of stochastic factors extirpating small populations.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include introduction of contaminants and erosion and sedimentation associated with construction related activities (Table 4–1). These impact mechanisms could cause toxicity induced morbidity or mortality due to contaminants or altered water chemistry, bury individuals, and reduce the algal and plant based food supply in its habitat. The potential for temporary

direct effects on vernal pool fairy shrimp will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7. Based on an average 250-foot distance from permanent new developments within which temporary direct effects will occur (see Table 4–5), up to 740 acres of modeled vernal pool fairy shrimp habitat will be temporarily directly affected by permanent development covered activities Plan Area-wide[140], 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include increased human activity associated with new recreational developments in and adjacent to natural areas, altered hydrology, and introduction of nonnative species (see Table 4–1). These effects could cause the direct morbidity or mortality of vernal pool fairy shrimp, alter the hydrology necessary for supporting its habitat, or introduce nonnative species that could negatively affect vernal pool fairy shrimp habitat adjacent to permanent development areas.

Based on an average 250-foot distance from permanent new developments within which permanent indirect effects will occur (see Table 4–5), up to 740 acres of modeled vernal pool fairy shrimp habitat will be permanently indirectly affected by permanent development covered activities Plan Area-wide[141], 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). These permanent indirect effects will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.24.2.2 Outside Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects will result in permanent direct effects on 109 acres of modeled vernal pool fairy shrimp modeled habitat outside of UPAs and distributed among all the CAZs. Within this area, up to 2.4 acres of wetted vernal pool surface could be removed (see Section 4.7.1, Table 4–13, Subtable C). Up to 2 known occurrences of vernal pool fairy shrimp will be removed by the covered activities (Table 4–9). The effects of such loss of modeled habitat on vernal pool fairy shrimp are the same as described for the permanent direct effects of implementing permanent development projects in the UPAs.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include introduction of contaminants and erosion and sedimentation associated with

[140] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.
[141] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

construction related activities (Table 4–1). The effects of these impact mechanisms on vernal pool fairy shrimp are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs. The potential for temporary direct effects on vernal pool fairy shrimp will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 250-foot distance from permanent new developments within which temporary direct effects will occur (see Table 4–5), up to 740 acres of modeled habitat will be temporarily directly affected by permanent development covered activities Plan Area-wide[142] , 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include increased human activity associated with new recreational developments in and adjacent to natural areas, altered hydrology, and introduction of nonnative species (see Table 4–1). These effects could cause the direct morbidity or mortality of vernal pool fairy shrimp, alter the hydrology necessary for supporting its habitat, or introduce nonnative species that could negatively affect vernal pool fairy shrimp habitat adjacent to permanent development areas.

Based on an average 250-foot distance from permanent new developments within which permanent indirect effects will occur (see Table 4–5), up to 740 acres of modeled vernal pool fairy shrimp habitat will be permanently indirectly affected by permanent development covered activities Plan Area-wide[143] , 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K).

4.4.24.3 Recurring Maintenance Activities

4.4.24.3.1 Within Urban Permit Areas

Permanent Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on vernal pool fairy shrimp (see Table 4–1).

[142] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts inside UPAs.
[143] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts inside UPAs.

Temporary Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in temporary direct effects on vernal pool fairy shrimp (see Table 4–1).

Permanent Indirect Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent indirect effects on vernal pool fairy shrimp (see Table 4–1).

4.4.24.3.2 Outside Urban Permit Areas

Permanent Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on vernal pool fairy shrimp (see Table 4–1).

Temporary Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in temporary direct effects on vernal pool fairy shrimp (see Table 4–1).

Permanent Indirect Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent indirect effects on vernal pool fairy shrimp (see Table 4–1).

4.4.24.4 Effects of Covered Activities within Conservation Lands

4.4.24.4.1 Permanent Direct Effects

Operation of equipment to implement conservation measures to enhance, restore, and manage BRCP conservation lands could result in the introduction of contaminants and erosion and sedimentation into vernal pool fairy shrimp habitat if present where conservation actions are implemented (Table 4–1). These impact mechanisms could cause toxicity induced morbidity or mortality due to contaminants or altered water chemistry and bury individuals. The potential for permanent direct effects on vernal pool fairy shrimp will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.24.4.2 Temporary Direct Effects

Operation of equipment to implement conservation measures to enhance, restore, and manage BRCP conservation lands could result in the introduction of contaminants and erosion and sedimentation into vernal pool fairy shrimp habitat if present. These impact mechanisms could cause temporary reductions in the vernal pool fairy shrimp algal and plant based food supply in its habitat that could affect individuals. The potential for temporary direct effects on vernal pool fairy shrimp will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.24.4.3 Permanent Indirect Effects

Implementation of the conservation measures are not expected to result in permanent indirect effects on vernal pool fairy shrimp.

4.4.24.5 Impacts on Critical Habitat

Designated critical habitat for vernal pool fairy shrimp is described in Appendix A. Approximately 9,976 acres of modeled vernal pool fairy shrimp habitat is present within designated critical habitat units 3D-F and 4A-F within the Plan Area. Covered activities will affect up to 106 acres of the modeled habitat located in designated critical habitat units 3F, 4A, 4B, 4D, and 4F. The PCEs essential for this species' conservation as stated in the designation of critical habitat are as follows:

1. Topographic features characterized by mounds and swales and depressions within a matrix of surrounding uplands that result in complexes of continuously, or intermittently, flowing surface water in the swales connecting the pools described in PCE 2, providing for dispersal and promoting hydroperiods of adequate length in the pools.
2. Depressional features including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains, and that continuously hold water for a minimum of 41 days, in all but the driest years, thereby providing adequate water for incubation, maturation, and reproduction. As these features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands.
3. Sources of food, expected to be detritus occurring in the pools, contributed by overland flow from the pools' watershed or as a result of biological processes within the pools themselves, such as single-celled bacteria, algae, and dead organic matter, to provide for feeding.
4. Structure within the pools described in PCE 2, consisting of organic and inorganic materials, such as living and dead plants from plant species adapted to seasonally inundated environments, rocks, and other inorganic debris that may be washed, blown, or otherwise transported into the pools, that provide shelter.

Implementation of the permanent development activities on modeled vernal pool fairy shrimp habitat present in designated critical habitat will eliminate all four PCEs completely. Indirect effects of these covered activities will negatively affect all four PCEs to varying degrees depending primarily on the proximity of the habitat to the direct impact areas. No permanent development or ongoing maintenance activities will be implemented in critical habitat Units 3D, 3E, 4C, and 4E, and habitat in these Units will not be affected by the covered activities. In critical habitat Units 3F, 4A, 4B, and 4D the directly impacted critical habitat consists of low-density vernal pools scattered within grassland that has been periodically dry-farmed to grain. In Unit 3F the vernal pools are located at the lowest local topographic position along a creek and adjacent to commercial development, so indirect effects on downslope and upslope hydrological conditions supporting other vernal pools are minimal to nonexistent. Similar conditions exist on Unit 4A where the directly impacted habitat is bordered by roads. The area upslope of the direct impact is much more extensive than the directly impacted critical habitat, which will be preserved under the Plan as the Chico Butte County Meadowfoam Preserve and thereby will preserve the ecological characteristics for maintaining vernal pool fairy shrimp habitat. Conditions similar to those that exist on Unit 4A exist on Units 4B and 4D where the directly impacted habitat is bordered by roads. Direct impacts to habitat in Unit 4F are confined to an area bordering State Route 99 and one very small area near a proposed bridge. Both areas are in the lowest local topographic position in the area on the borders of much greater extents of preserved habitat that includes the Dove Ridge Preserve.

Implementation of habitat management and enhancement actions could affect critical habitat to the extent that lands within designated critical habitat are protected under the BRCP. Implementation of conservation measures to restore vernal pool and other seasonal wetland will convert grassland that includes modeled vernal pool fairy shrimp habitat. Restoration projects for vernal pools and emergent wetland would cause the take any unknown occurrences. Permanent direct effects of habitat management, enhancement, and restoration actions will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

The removal of 97 acres of modeled vernal pool fairy shrimp habitat in designated critical habitat units and associated indirect effects on modeled habitat will not affect the ability to recover vernal pool fairy shrimp in the Plan Area. Implementation of the BRCP will result in protecting approximately 21,400 acres of modeled vernal pool fairy shrimp habitat. Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on vernal pool fairy shrimp or adversely affect its Plan Area distribution or abundance.

4.4.24.6 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of vernal pool fairy shrimp within the Plan Area.

4.4.24.6.1 Permanent Direct Effects

The removal of up to 1,422 acres of modeled vernal pool fairy shrimp habitat (Tables 4-8 and 4-9), including up to 38 acres of wetted vernal pool surface (see Section 4.7.1, Table 4–13, Subtable C), could result from implementing the covered activities. The acreage of removal of vernal pool fairy shrimp will be the amount of actual habitat that is located within the area of affected modeled habitat. Up to 17 of the 29 known occurrences of vernal pool fairy shrimp will be removed by the covered activities (Table 4–8). An additional small, but indeterminable, amount of direct impacts could be associated with habitat fragmentation. Permanent direct effects of these impacts will be avoided and minimized with implementation of the applicable AMMs in Table 4–7.

4.4.24.6.2 Temporary Direct Effects

A temporary reduction in the functions of up to 740 acres of modeled vernal pool fairy shrimp habitat would result from the effects of covered activities, 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Temporary direct effects on vernal pool fairy shrimp will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.24.6.3 Permanent Indirect Effects

A permanent reduction in the functions of up to 740 acres of modeled vernal pool fairy shrimp habitat would result from covered activities Plan Area-wide, 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K) Permanent indirect effects on vernal pool fairy shrimp will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.24.7 Overall Impact Likely to Result from Take

The primary threats to vernal pool fairy shrimp have been the historical loss of its habitat, incompatible livestock grazing practices, adverse effects of invasive species, altered hydrology, and contaminants (USFWS 2005). The covered activities will result in the loss of up to 1,422 acres of modeled habitat, representing approximately 4 percent of the current extent of modeled habitat (see Table 4–8 and Figure 4–41). Within this area, up to 38 acres of wetted vernal pool surface could be removed (see Section 4.7.1, Table 4–13, Subtable C). Based on the available information regarding the status and distribution of vernal pool fairy shrimp (see Appendix A), it is likely that the most of the modeled habitat that is removed by the covered activities is unoccupied by vernal pool fairy shrimp and, because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. Seventeen of the 29 known occurrences of vernal pool fairy shrimp will be adversely affected by the

covered activities (Table 4–9, Appendix K, and Figure 4–41). Implementation of the applicable AMMs (Table 4–7) will serve to further avoid and minimize impacts on vernal pool fairy shrimp. While PCEs in designated critical habitat will be affected, implementation of the BRCP will more than offset those impacts by protecting approximately 21,400 acres of modeled vernal pool fairy shrimp habitat.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on vernal pool fairy shrimp or adversely affect its Plan Area distribution or abundance.

4.4.25 Ferris' Milkvetch

The maximum acreage of Ferris' milkvetch habitat that will be permanently affected, directly and indirectly, with implementation of the covered activities is 214 acres, representing approximately 10 percent of the current extent of modeled habitat (see Table 4–8, Appendix K, and Figure 4–42, *Ferris' Milkvetch: Direct Impacts of Covered Activities* [separate files]). Based on the available data, all eight historical occurrences are likely extirpated so no known occurrences of Ferris' milkvetch will be adversely affected by the covered activities (Figure 4–42; Appendix A.25, *Ferris' Milkvetch*).

4.4.25.1 Effects Common among Covered Activities

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction, habitat restoration, and recurring maintenance activities) could result in damage or destruction of Ferris' milkvetch in unknown occurrences if present in affected habitat areas. For example, plants and seeds could be removed from soil with construction of new structures and plants could be crushed by construction- or maintenance-related equipment. Plants and seeds could suffer mortality from contamination or changes to the in the hydrology of Ferris' milkvetch habitat, and invasive nonnative species could be introduced and negatively affect its habitat. These potential impacts will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.25.2 Permanent Development Projects

Direct effects of permanent development projects will result in the permanent removal of up to 176 acres of modeled Ferris' milkvetch habitat representing approximately 8 percent of modeled habitat in the Plan Area (Table 4–8). No known occurrences of Ferris' milkvetch will be impacted. As indicated in Tables 4-6 and 5-23, removal of plants in up to eight (8) currently unknown occurrences that are discovered over the term of the BRCP is permitted unless, in consultation with USFWS and CDFW, it is determined that the proposed project would remove a significant occurrence that is necessary to maintain the genetic diversity or maintain the regional distribution of the species. Indirect effects of permanent development projects will result in reduced functions of up to 39 acres of modeled habitat in the Plan Area, 21 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see

Appendix K). Figure O–26, *Ferris' Milkvetch Habitat in the Plan Area with full BRCP Implementation* in Appendix O and Table 4–8 provide the acreage of modeled Ferris' milkvetch habitat remaining within the Plan Area (including BRCP protected lands and lands that are not impacted by the covered activities) with full implementation of the covered activities.

4.4.25.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects within the Chico and State Route 99 UPAs will result in permanent direct effects on up to 159 acres of modeled Ferris' milkvetch habitat (Table 4–9). Loss of this habitat area will reduce the area of any actual Ferris' milkvetch habitat that is located within affected modeled habitat and thus will reduce the area of habitat available to Ferris' milkvetch. Removal of large patches of habitat could result in localized fragmentation habitat and/or disruption of seed or pollen dispersal patterns in occupied habitat adjacent to removed habitat areas potentially leading to reduction in genetic diversity or the increased likelihood of stochastic factors extirpating small populations.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include introduction of contaminants and erosion and sedimentation associated with construction related activities (Table 4–1). These impact mechanisms could cover leaves and flowers on individual Ferris' milkvetch plants and impede their ability to photosynthesize or produce seed. The potential for temporary direct effects on Ferris' milkvetch will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7. Based on an average 250-foot distance from permanent new developments within which temporary direct effects will occur for plant species (see Table 4–5), up to 39 acres of modeled Ferris' milkvetch habitat will be temporarily directly affected by permanent development covered activities Plan Area-wide[144], 21 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include increased human activity associated with new recreational developments in and adjacent to natural areas, altered hydrology, and introduction of nonnative species (see Table 4–1). These effects could cause the direct removal of Ferris' milkvetch plants, alter the hydrology necessary for supporting its habitat, or introduce nonnative species that could negatively affect Ferris' milkvetch habitat adjacent to permanent development areas.

Based on an average 250-foot distance from permanent new developments within which permanent indirect effects will occur for plant species (see Table 4–5), up to 39 acres of modeled

[144] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

Ferris' milkvetch habitat will be permanently indirectly affected by permanent development covered activities Plan Area-wide[145], 21 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K) These permanent indirect effects will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.25.2.2 Outside Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects will result in permanent direct effects on 17 acres of modeled Ferris' milkvetch modeled habitat outside of UPAs and distributed among all the CAZs (Table 4–9). The effects of such loss of modeled habitat on Ferris' milkvetch are the same as described for the permanent direct effects of implementing permanent development projects in the UPAs.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include introduction of contaminants and erosion and sedimentation associated with construction related activities (Table 4–1). The effects of these impact mechanisms on Ferris' milkvetch are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs. The potential for temporary direct effects on Ferris' milkvetch will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 250-foot distance from permanent new developments within which temporary direct effects will occur for plant species (see Table 4–5), up to 39 acres of modeled Ferris' milkvetch habitat will be temporarily directly affected by permanent development covered activities Plan Area-wide[146], 21 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include increased human activity associated with new recreational developments in and adjacent to natural areas, altered hydrology, and introduction of nonnative species (see Table 4–1). These effects could cause the direct removal of Ferris' milkvetch plants, alter the hydrology necessary for supporting its habitat, or introduce nonnative species that could negatively affect Ferris' milkvetch habitat adjacent to permanent development areas.

[145] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.
[146] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts inside UPAs.

Based on an average 250-foot distance from permanent new developments within which permanent indirect effects will occur for plant species (see Table 4–5), up to 39 acres of modeled Ferris' milkvetch habitat will be permanently indirectly affected by permanent development covered activities Plan Area-wide[147], 21 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K).

4.4.25.3 Recurring Maintenance Activities

4.4.25.3.1 Within Urban Permit Areas

Permanent Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on Ferris' milkvetch (see Table 4–1).

Temporary Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in temporary direct effects on Ferris' milkvetch (see Table 4–1).

Permanent Indirect Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent indirect effects on Ferris' milkvetch (see Table 4–1).

4.4.25.3.2 Outside Urban Permit Areas

Permanent Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on Ferris' milkvetch (see Table 4–1).

Temporary Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in temporary direct effects on Ferris' milkvetch (see Table 4–1).

[147] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts inside UPAs.

Permanent Indirect Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent indirect effects on Ferris' milkvetch (see Table 4–1).

4.4.25.4 Effects of Covered Activities within Conservation Lands

4.4.25.4.1 Permanent Direct Effects

Operation of equipment to implement conservation measures to enhance, restore, and manage conservation lands could result in burying or killing Ferris' milkvetch if present as a result of operating equipment and the potential for introduction of contaminants and erosion and sedimentation (Table 4–1). Habitat restoration actions could remove unknown occurrences of Ferris' milkvetch if present, however, BCAG will avoid removal of any occurrences discovered within potential habitat restoration sites during BRCP biological surveys. The potential for permanent direct effects on Ferris' milkvetch will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.25.4.2 Temporary Direct Effects

Operation of equipment to implement conservation measures to enhance, restore, and manage conservation lands could cause localized erosion and sedimentation that could temporarily cover leaves and flowers on individual Ferris' milkvetch plants if present and impede their ability to photosynthesize or produce seed. The potential for temporary direct effects on Ferris' milkvetch will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.25.4.3 Permanent Indirect Effects

Implementation of the conservation measures are not expected to result in permanent indirect effects on Ferris' milkvetch.

4.4.25.5 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of Ferris' milkvetch within the Plan Area.

4.4.25.5.1 Permanent Direct Effects

Loss of up to 176 acres of modeled Ferris' milkvetch habitat (Tables 4-8 and 4-9) could result in localized fragmentation and/or disruption of seed or pollen dispersal patterns in occupied habitat adjacent to removed habitat areas potentially leading to reduction in genetic diversity or the increased likelihood of stochastic factors extirpating small occurrences. No known occurrences of Ferris' milkvetch will be removed (Table 4–8). As indicated in Table 6-3, however, removal

of up to eight (8) currently unknown occurrences that are discovered over the term of the BRCP is permitted unless, in consultation with USFWS and CDFW, it is determined that the proposed project would remove a significant occurrence that is necessary to maintain the genetic diversity or maintain the regional distribution of the species. Permanent direct effects of these impacts will be avoided and minimized with implementation of the applicable AMMs in Table 4–7.

4.4.25.5.2 Temporary Direct Effects

A temporary reduction in the functions of up to 39 acres of modeled Ferris' milkvetch habitat would result from the effects of covered activities, 21 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Temporary direct effects on Ferris' milkvetch will be avoided and minimized with implementation of the applicable AMMs indicated in
Table 4–7.

4.4.25.5.3 Permanent Indirect Effects

A permanent reduction in the functions of up to 39 acres of modeled Ferris' milkvetch habitat would result from covered activities Plan Area-wide, 21 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K) Permanent indirect effects on Ferris' milkvetch will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.25.6 Overall Impact Likely to Result from Take

The primary threat to Ferris' milkvetch has been the historical loss of its habitat due to urban development and the intensification of agriculture (USFWS 2005). There are records 8 historical but now extirpated occurrences of Ferris' milkvetch from the Plan Area. The location of one occurrence from 1922 is unknown and another is now in intensive rice production. Three occurrences were on the Llano Seco division of the Sacramento National Wildlife Refuge, one of them was on the Upper Butte Basin Wildlife Area, one is at the Gray Lodge Wildlife Area, and one is from an active rice field. CNDDB records indicate that in 1996 an estimated 200 Ferris' milkvetch plants were present at each of the Sacramento National Wildlife Refuge occurrences and that there were two plants at the Gray Lodge Wildlife Area occurrence in 2002. No plants were found at the sites of the three Sacramento National Wildlife Refuge occurrences in 2002 surveys and Joe Silveira of USFWS reported that no plants have been detected during surveys of the Sacramento National Wildlife Refuge or the Llano Seco unit of the Upper Butte Basin Wildlife Area during surveys since 1996 (Silveira pers. comm. April 4, 2012).

The covered activities will result in the loss of up to 176 acres of modeled habitat, representing approximately 8 percent of the current extent of modeled habitat (see Table 4–8, Appendix K,

and Figure 4–42). Within these impact areas, because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less.

Based on the available information regarding the status and distribution of Ferris' milkvetch (see Appendix A), it is likely that the most of the modeled habitat that is removed by the covered activities is unoccupied by Ferris' milkvetch. Implementation of AMM3 (see Table 6-3) permits the removal of newly discovered occurrences unless BCAG in coordination with USFWS and CDFW determines that those occurrences are not necessary for the survival and recovery of Ferris' milkvetch. Implementation of the remaining applicable AMMs (see Table 4–7) will serve to further minimize impacts on Ferris' milkvetch.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on Ferris' milkvetch or adversely affect its Plan Area distribution or abundance.

4.4.26 Lesser Saltscale

A habitat model has not been developed for lesser saltscale because there is insufficient information regarding its habitat requirements and the distribution of the physical attributes that support its habitat in the Plan Area. Lesser saltscale has only been documented on the CDFW Gray Lodge Wildlife Area and is considered to be a waif there due to seed dispersal by waterfowl migrating northward from the San Joaquin Valley. Neither of the two known occurrences of lesser saltscale will be adversely affected by the covered activities (Table 4–8).

4.4.26.1 Effects Common among Covered Activities

Except for the 2 known occurrences, plants may be removed unless in consultation with USFWS and CDFW, it is determined that the proposed project would remove a significant occurrence that is necessary to maintain the genetic diversity or maintain the regional distribution of the species and any potential impacts will be avoided or minimized with implementation of the applicable AMMs indicated in Tables 4-7 and 5-23.

4.4.26.2 Permanent Development Projects

Permanent development projects will not affect currently known occurrences in the Plan Area. As indicated in Tables 4-6 and 5-23, up to 8 currently unknown occurrences of lesser saltscale may be removed by the covered activities. Direct and indirect effects of permanent development projects on lesser saltscale will be minimized with implementation the applicable AMMs indicated in Table 4–7.

4.4.26.2.1 Within Urban Permit Areas

Permanent Direct Effects

Direct effects of permanent development projects could result in the removal of newly discovered lesser saltscale plants and habitat if present in project sites. Implementation of the applicable AMMs in Table 4–7, however, will avoid impacts on any occurrences that are necessary to maintain the distribution, abundance, and genetic diversity of lesser saltscale in the Plan Area.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include introduction of contaminants and erosion and sedimentation associated with construction related activities (Table 4–1). These impact mechanisms could cover leaves and flowers on individual lesser saltscale plants if present in project sites and impede their ability to photosynthesize or produce seed. The potential for temporary direct effects on lesser saltscale will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include increased human activity associated with new permanent developments in and adjacent to natural areas, altered hydrology, and introduction of nonnative species (see Table 4–1). These effects could cause the loss of lesser saltscale plants, alter the hydrology necessary for supporting its habitat, or introduce nonnative species that could negatively affect lesser saltscale habitat, if present, adjacent to permanent development areas. These affects will be minimized with the implementation of the applicable AMMs described in Table 4–7.

4.4.26.2.2 Outside Urban Permit Areas

Permanent Direct Effects

Direct effects of permanent development projects could result in the removal of newly discovered lesser saltscale plants and habitat if present in project sites. Implementation of the applicable AMMs in Table 4–7, however, will avoid impacts on any occurrences that are necessary to maintain the distribution, abundance, and genetic diversity of lesser saltscale in the Plan Area.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include introduction of contaminants and erosion and sedimentation associated with construction related activities (Table 4–1). The effects of these impact mechanisms on lesser saltscale are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs. The potential for temporary direct effects on lesser saltscale

will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include increased human activity associated with new recreational developments in and adjacent to natural areas, altered hydrology, and introduction of nonnative species (see Table 4–1). These effects could cause the loss of lesser saltscale plants, alter the hydrology necessary for supporting its habitat, or introduce nonnative species that could negatively affect lesser saltscale habitat adjacent to permanent development areas.

4.4.26.3 Recurring Maintenance Activities

4.4.26.3.1 Within Urban Permit Areas

Permanent Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on lesser saltscale (see Table 4–1).

Temporary Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in temporary direct effects on lesser saltscale (see Table 4–1).

Permanent Indirect Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent indirect effects on lesser saltscale (see Table 4–1).

4.4.26.3.2 Outside Urban Permit Areas

Permanent Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on lesser saltscale (see Table 4–1).

Temporary Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in temporary direct effects on lesser saltscale (see Table 4–1).

Permanent Indirect Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent indirect effects on lesser saltscale (see Table 4–1).

4.4.26.4 Effects of Covered Activities within Conservation Lands

4.4.26.4.1 Permanent Direct Effects

Operation of equipment to implement conservation measures to enhance, restore, and manage conservation lands could result in burying or killing lesser saltscale if present as a result of operating equipment and the potential for introduction of contaminants and erosion and sedimentation (Table 4–1). Habitat restoration actions could remove unknown occurrences of lesser saltscale if present; however, BCAG will avoid removal of any occurrences discovered within potential habitat restoration sites during BRCP biological surveys. The potential for permanent direct effects on lesser saltscale will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.26.4.2 Temporary Direct Effects

Operation of equipment to implement conservation measures to enhance, restore, and manage conservation lands could cause localized erosion and sedimentation that could temporarily cover leaves and flowers on individual lesser saltscale plants if present and impede their ability to photosynthesize or produce seed. The potential for temporary direct effects on lesser saltscale will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.26.4.3 Permanent Indirect Effects

Implementation of the conservation measures are not expected to result in permanent indirect effects on lesser saltscale.

4.4.26.5 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of lesser saltscale within the Plan Area.

4.4.26.5.1 Permanent Direct Effects

No known occurrences of lesser saltscale will be directly impacted by the covered activities. As indicated in Table 6-3, however, removal of up to eight (8) currently unknown occurrences that are discovered over the term of the BRCP is permitted unless, in consultation with USFWS and CDFW, it is determined that the proposed project would remove a significant occurrence that is necessary to maintain the genetic diversity or maintain the regional distribution of the species. If

lesser saltscale plants are found within project sites, coordination with USFWS and CDFW will prevent the removal of significant occurrences necessary to maintain the genetic diversity or regional distribution of the species.

4.4.26.5.2 Temporary Direct Effects

Implementation of covered activities adjacent to occupied habitat could result in a temporary reduction in the functions of lesser saltscale habitat. Temporary direct effects on lesser saltscale will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.26.5.3 Permanent Indirect Effects

Construction of permanent development projects adjacent to occupied habitat could result in a permanent reduction in the functions of lesser saltscale habitat if present. Permanent direct effects on lesser saltscale will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.26.6 Overall Impact Likely to Result from Take

Both known occurrences are located on the CDFW Gray Lodge Wildlife Area and in 1993 management for waterfowl was considered to be a threat (CNDDB 2012). Neither of the two known occurrences of lesser saltscale will be adversely affected by the covered activities (Table 4–8).

Implementation of AMM3 (see Chapter 6, *Conditions on Covered Activities*, Table 6-3) requires that neither of the 2 known occurrences may be removed. With concurrence of USFWS and CDFW, newly discovered occurrences within proposed project footprints may be removed unless it is determined that the proposed project would remove a significant occurrence that is necessary to maintain the genetic diversity or maintain the regional distribution of the species. Implementation of the remaining applicable AMMs (see Tables 4-7 and 5-23) will serve to further avoid and minimize impacts on lesser saltscale.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on lesser saltscale or adversely affect its Plan Area distribution or abundance.

4.4.27 Hoover's Spurge

The maximum acreage of Hoover's spurge habitat that will be permanently affected, directly and indirectly, with implementation of the covered activities is 2,162 acres, representing approximately 6 percent of the current extent of modeled habitat (see Table 4–8, Appendix K, and Figure 4–43, *Hoover's Spurge: Direct Impacts of Covered Activities* [separate files]). None of the four known occurrences of Hoover's spurge will be adversely affected by the covered

activities and no take of this species is permitted until at least 4 new occurrences are discovered or established in the Plan Area (Table 6-3 and Figure 4–43). After the 4 additional occurrences are protected or established and with concurrence of USFWS and CDFW, up to two occurrences discovered within proposed project footprints may be removed as long as those occurrences do not include more than 20 percent of the mean annual number of plants in protected occurrences.

4.4.27.1 Effects Common among Covered Activities

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction, habitat restoration, and recurring maintenance activities) could result in damage or destruction of Hoover's spurge in unknown occurrences if present in affected habitat areas. For example, plants and seeds could be removed from soil with construction of new structures and plants could be crushed by construction- or maintenance-related equipment. Plants and seeds could suffer mortality from contamination or changes to the in the hydrology of Hoover's spurge habitat, and invasive nonnative species could be introduced and negatively affect its habitat. These potential impacts will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.27.2 Permanent Development Projects

Direct effects of permanent development projects will result in the permanent removal of up to 1,422 acres of modeled Hoover's spurge habitat representing approximately 4 percent of modeled habitat in the Plan Area (Table 4–8). Indirect effects of permanent development projects will result in reduced functions of up to 740 acres of modeled habitat in the Plan Area, 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Figure O–27, *Vernal Pool Plant Species Habitat in the Plan Area with full BRCP Implementation* in Appendix O and Table 4–8 provide the acreage of modeled Hoover's spurge habitat remaining within the Plan Area (including BRCP protected lands and lands that are not impacted by the covered activities) with full implementation of the covered activities.

4.4.27.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects within the Chico, Foothill Area, Neal Road Drop-Off and Recycling Facility, Oroville, and State Route 99 UPAs will result in permanent direct effects on up to 1,313 acres of modeled Hoover's spurge habitat (Table 4–9). Loss of this habitat area could result in localized fragmentation habitat and/or disruption of seed or pollen dispersal patterns in occupied habitat adjacent to removed habitat areas potentially leading to reduction in genetic diversity or the increased likelihood of stochastic factors extirpating small populations.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include introduction of contaminants and erosion and sedimentation associated with construction related activities (Table 4–1). These impacts could cover leaves and flowers on individual Hoover's spurge plants and impede their ability to photosynthesize or produce seed. The potential for temporary direct effects on Hoover's spurge will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7. Based on an average 250-foot distance from permanent new developments within which temporary direct effects will occur for plant species (see Table 4–5), up to 740 acres of modeled Hoover's spurge habitat will be temporarily directly affected by permanent development covered activities Plan Area-wide[148], 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include increased human activity associated with new recreational developments in and adjacent to natural areas, altered hydrology, and introduction of nonnative species (see Table 4–1). These effects could cause the direct removal of Hoover's spurge plants, alter the hydrology necessary for supporting its habitat, or introduce nonnative species that could negatively affect Hoover's spurge habitat adjacent to permanent development areas.

Based on an average 250-foot distance from permanent new developments within which permanent indirect effects will occur for plant species (see Table 4–5), up to 740 acres of modeled Hoover's spurge habitat will be permanently indirectly affected by permanent development covered activities Plan Area-wide[149], 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K) These permanent indirect effects will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.27.2.2 Outside Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects will result in permanent direct effects on 109 acres of modeled Hoover's spurge modeled habitat outside of UPAs and distributed among all the CAZs (Table 4–9). The effects of such loss of modeled habitat on Hoover's spurge are the

[148] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.
[149] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

same as described for the permanent direct effects of implementing permanent development projects in the UPAs.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include introduction of contaminants and erosion and sedimentation associated with construction related activities (Table 4–1). The effects of these impacts on Hoover's spurge are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs. The potential for temporary direct effects on Hoover's spurge will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 250-foot distance from permanent new developments within which temporary direct effects will occur for plant species (see Table 4–5), up to 740 acres of modeled habitat will be temporarily directly affected by permanent development covered activities Plan Area-wide[150], 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include increased human activity associated with new recreational developments in and adjacent to natural areas, altered hydrology, and introduction of nonnative species (see Table 4–1). These effects could cause the direct removal of Hoover's spurge plants, alter the hydrology necessary for supporting its habitat, or introduce nonnative species that could negatively affect Hoover's spurge habitat adjacent to permanent development areas.

Based on an average 250-foot distance from permanent new developments within which permanent indirect effects will occur for plant species (see Table 4–5), up to 740 acres of modeled Hoover's spurge habitat will be permanently indirectly affected by permanent development covered activities Plan Area-wide[151], 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K).

[150] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts inside UPAs.
[151] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts inside UPAs.

4.4.27.3 Recurring Maintenance Activities

4.4.27.3.1 Within Urban Permit Areas

Permanent Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on Hoover's spurge (see Table 4–1).

Temporary Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in temporary direct effects on Hoover's spurge (see Table 4–1).

Permanent Indirect Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent indirect effects on Hoover's spurge (see Table 4–1).

4.4.27.3.2 Outside Urban Permit Areas

Permanent Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on Hoover's spurge (see Table 4–1).

Temporary Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in temporary direct effects on Hoover's spurge (see Table 4–1).

Permanent Indirect Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent indirect effects on Hoover's spurge (see Table 4–1).

4.4.27.4 Effects of Covered Activities within Conservation Lands

4.4.27.4.1 Permanent Direct Effects

Operation of equipment to implement conservation measures to enhance, restore, and manage conservation lands could result in burying or killing Hoover's spurge if present as a result of

operating equipment and the potential for introduction of contaminants and erosion and sedimentation (Table 4–1). Habitat restoration actions could remove unknown occurrences of Hoover's spurge if present; however, BCAG will avoid removal of any occurrences discovered within potential habitat restoration sites during BRCP biological surveys. The potential for permanent direct effects on Hoover's spurge will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.27.4.2 Temporary Direct Effects

Operation of equipment to implement conservation measures to enhance, restore, and manage conservation lands could cause localized erosion and sedimentation that could temporarily cover leaves and flowers on individual Hoover's spurge plants if present and impede their ability to photosynthesize or produce seed. The potential for temporary direct effects on Hoover's spurge will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

Implementation of the conservation measures are not expected to result in permanent indirect effects on Hoover's spurge.

4.4.27.5 Impacts on Critical Habitat

Approximately 8 acres of Hoover's spurge designated critical habitat (Unit 2) are present in the Plan Area, all of which are located near (but not encompassing) the known occurrence of Hoover's spurge along Highway 99 north of the Highway 149 interchange. The PCEs essential for this species' conservation as stated in the designation of critical habitat are as follows:

Topographic features characterized by isolated mound and intermound complex within a matrix of surrounding uplands that result in continuously or intermittently flowing surface water in the depressional features, including swales connecting the pools described in PCE (ii), providing for dispersal and promoting hydroperiods of adequate length in the pools.

Depressional features, including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and continuously hold water, or whose soils are saturated for a period long enough to promote germination, flowering, and seed production of predominantly annual native wetland species and typically exclude both native and nonnative upland plant species in all but the driest years. As these features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands.

The implementation of proposed Highway 99 expansion and improvement projects and associated maintenance activities could remove up to 8 acres of designated critical habitat. Current land uses that completely occupy all of the designated critical habitat located in the Plan Area consist of a portion of State Route 99, a metals scrap yard, and an abandoned section of a

contour rice field. These land uses predate the designation of critical habitat. The leveling and/or paving over of the critical habitat has eliminated the characteristic vernal pool topographic features defined in PCE 1 and has also either completely eliminated or severely altered the characteristic seasonal hydrology defined in PCE 2. Therefore, because the PCEs no longer exist within the designated critical habitat, no critical habitat will be degraded by the proposed Highway 99 expansion and improvement projects and associated maintenance activities.

Based on this assessment, the covered activities and conservation measures are not expected to impact PCEs of designated critical habitat and will not preclude the ability to recover Hoover's spurge.

4.4.27.6 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of Hoover's spurge within the Plan Area.

4.4.27.6.1 Permanent Direct Effects

Loss of up to 1,422 acres of modeled Hoover's spurge habitat (Tables 4-8 and 4-9) could result in localized fragmentation and/or disruption of seed or pollen dispersal patterns in occupied habitat adjacent to removed habitat areas potentially leading to reduction in genetic diversity or the increased likelihood of stochastic factors extirpating small populations. As indicated in Table 6-3, however, up two (2) occurrences discovered within proposed project footprints may be removed as long as those occurrences do not include more than 20 percent of the mean annual number of plants in protected occurrences and, in consultation with USFWS and CDFW, it is determined that the proposed project would not remove a significant occurrence that is necessary to maintain the genetic diversity or maintain the regional distribution of the species. Permanent direct effects of these impacts will be avoided and minimized with implementation of the applicable AMMs in Table 4–7.

4.4.27.6.2 Temporary Direct Effects

A temporary reduction in the functions of up to 740 acres of modeled Hoover's spurge habitat would result from the effects of covered activities, 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Temporary direct effects on Hoover's spurge will be avoided and minimized with implementation of the applicable AMMs indicated in
Table 4–7.

4.4.27.6.3 Permanent Indirect Effects

A permanent reduction in the functions of up to 740 acres of modeled Hoover's spurge habitat would result from covered activities Plan Area-wide, 222 acres of which overlap with areas

subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K) Permanent indirect effects on Hoover's spurge will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.27.7 Overall Impact Likely to Result from Take

The primary threat to Hoover's spurge has been the historical loss of its habitat (USFWS 2005). The covered activities will result in the loss of up to 1,422 acres of modeled habitat, representing approximately 4 percent of the current extent of modeled habitat (see Table 4–8 and Figure 4–43). Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. None of the 4 known occurrences of Hoover's spurge in the Plan Area will be impacted (Figure 4–43). As noted above, because the PCEs no longer exist within the designated critical habitat, no critical habitat will be degraded within the Plan Area.

Based on the available information regarding the status and distribution of Hoover's spurge (see Appendix A), it is likely that the most of the modeled habitat that is removed by the covered activities is unoccupied by Hoover's spurge. Implementation of AMM3 (see Chapter 6, *Conditions on Covered Activities*, Table 6-3) requires that no take of this species is permitted until at least 4 new occurrences are discovered or established in the Plan Area. After the 4 additional occurrences are protected or established and with concurrence of USFWS and CDFW, up to two occurrences discovered within proposed project footprints may be removed as long as those occurrences do not include more than 20 percent of the mean annual number of plants in protected occurrences. However, plants may not be removed if, in consultation with USFWS and CDFW, it is determined that the proposed project would remove a significant occurrence that is necessary to maintain the genetic diversity or maintain the regional distribution of the species. Implementation of the remaining applicable AMMs (see Tables 4-7 and 5-23) will serve to further avoid and minimize impacts on Hoover's spurge.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on Hoover's spurge or adversely affect its Plan Area distribution or abundance.

4.4.28 Ahart's Dwarf Rush

The maximum acreage of Ahart's dwarf rush habitat that will be permanently affected, directly and indirectly, with implementation of the covered activities is 2,162 acres, representing approximately 6 percent of the current extent of modeled habitat (see Table 4–8, Appendix K, and Figure 4–44, *Ahart's Dwarf Rush: Direct Impacts of Covered Activities* [separate files]). No

known occurrences of Ahart's dwarf rush will be adversely affected by the covered activities (Figure 4–44).

4.4.28.1 Effects Common among Covered Activities

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction, habitat restoration, and recurring maintenance activities) could result in damage or destruction of Ahart's dwarf rush in unknown occurrences if present in affected habitat areas. For example, plants and seeds could be removed from soil with construction of new structures and plants could be crushed by construction- or maintenance-related equipment. Plants and seeds could suffer mortality from contamination or changes to the in the hydrology of Ahart's dwarf rush habitat, and invasive nonnative species could be introduced and negatively affect its habitat. These potential impacts will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.28.2 Permanent Development Projects

Direct effects of permanent development projects will result in the permanent removal of up to 1,422 acres of modeled Ahart's dwarf rush habitat representing approximately 4 percent of modeled habitat in the Plan Area (Table 4–8). No currently known occurrences of the species will be removed. Indirect effects of permanent development projects will result in reduced functions of up to 740 acres of modeled habitat in the Plan Area, 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Figure O–27 in Appendix A and Table 4–8 provide the acreage of modeled Ahart's dwarf rush habitat remaining within the Plan Area (including BRCP protected lands and lands that are not impacted by the covered activities) with full implementation of the covered activities.

4.4.28.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects within the Chico, Foothill Area, Neal Road Drop-Off and Recycling Facility, Oroville, and State Route 99 UPAs will result in permanent direct effects on up to 1,313 acres of modeled Ahart's dwarf rush habitat (Table 4–9). Loss of this habitat area could result in localized fragmentation habitat and/or disruption of seed or pollen dispersal patterns in occupied habitat adjacent to removed habitat areas potentially leading to reduction in genetic diversity or the increased likelihood of stochastic factors extirpating small populations.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include introduction of contaminants and erosion and sedimentation associated with construction related activities (Table 4–1). These impacts could cover leaves and flowers on

individual Ahart's dwarf rush plants and impede their ability to photosynthesize or produce seed. The potential for temporary direct effects on Ahart's dwarf rush will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7. Based on an average 250-foot distance from permanent new developments within which temporary direct effects will occur for plant species (see Table 4–5), up to 740 acres of modeled Ahart's dwarf rush habitat will be temporarily directly affected by permanent development covered activities Plan Area-wide[152], 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include increased human activity associated with new recreational developments in and adjacent to natural areas, altered hydrology, and introduction of nonnative species (see Table 4–1). These effects could cause the direct removal of Ahart's dwarf rush plants, alter the hydrology necessary for supporting its habitat, or introduce nonnative species that could negatively affect Ahart's dwarf rush habitat adjacent to permanent development areas.

Based on an average 250-foot distance from permanent new developments within which permanent indirect effects will occur for plant species (see Table 4–5), up to 740 acres of modeled Ahart's dwarf rush habitat will be permanently indirectly affected by permanent development covered activities Plan Area-wide[153], 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). These permanent indirect effects will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.28.2.2 Outside Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects will result in permanent direct effects on 109 acres of modeled Ahart's dwarf rush modeled habitat outside of UPAs and distributed among all the CAZs (Table 4–9). The effects of such loss of modeled habitat on Ahart's dwarf rush are the same as described for the permanent direct effects of implementing permanent development projects in the UPAs.

[152] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.
[153] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include introduction of contaminants and erosion and sedimentation associated with construction related activities (Table 4–1). The effects of these impacts on Ahart's dwarf rush are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs. The potential for temporary direct effects on Ahart's dwarf rush will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 250-foot distance from permanent new developments within which temporary direct effects will occur for plant species (see Table 4–5), up to 740 acres of modeled habitat will be temporarily directly affected by permanent development covered activities Plan Area-wide[154], 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include increased human activity associated with new recreational developments in and adjacent to natural areas, altered hydrology, and introduction of nonnative species (see Table 4–1). These effects could cause the direct removal of Ahart's dwarf rush plants, alter the hydrology necessary for supporting its habitat, or introduce nonnative species that could negatively affect Ahart's dwarf rush habitat adjacent to permanent development areas.

Based on an average 250-foot distance from permanent new developments within which permanent indirect effects will occur for plant species (see Table 4–5), up to 740 acres of modeled Ahart's dwarf rush habitat will be permanently indirectly affected by permanent development covered activities Plan Area-wide[155], 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K).

[154] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts inside UPAs.
[155] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts inside UPAs.

4.4.28.3 Recurring Maintenance Activities

4.4.28.3.1 Within Urban Permit Areas

Permanent Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on Ahart's dwarf rush (see Table 4–1).

Temporary Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in temporary direct effects on Ahart's dwarf rush (see Table 4–1).

Permanent Indirect Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent indirect effects on Ahart's dwarf rush (see Table 4–1).

4.4.28.3.2 Outside Urban Permit Areas

Permanent Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on Ahart's dwarf rush (see Table 4–1).

Temporary Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in temporary direct effects on Ahart's dwarf rush (see Table 4–1).

Permanent Indirect Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent indirect effects on Ahart's dwarf rush (see Table 4–1).

4.4.28.4 Effects of Covered Activities within Conservation Lands

4.4.28.4.1 Permanent Direct Effects

Operation of equipment to implement conservation measures to enhance, restore, and manage conservation lands could result in burying or killing Ahart's dwarf rush if present as a result of

operating equipment and the potential for introduction of contaminants and erosion and sedimentation (Table 4–1). Habitat restoration actions could remove unknown occurrences of Ahart's dwarf rush if present; however, BCAG will avoid removal of any occurrences discovered within potential habitat restoration sites during BRCP biological surveys. The potential for permanent direct effects on Ahart's dwarf rush will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.28.4.2 Temporary Direct Effects

Operation of equipment to implement conservation measures to enhance, restore, and manage conservation lands could cause localized erosion and sedimentation that could temporarily cover leaves and flowers on individual Ahart's dwarf rush plants if present and impede their ability to photosynthesize or produce seed. The potential for temporary direct effects on Ahart's dwarf rush will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.28.4.3 Permanent Indirect Effects

Implementation of the conservation measures are not expected to result in permanent indirect effects on Ahart's dwarf rush.

4.4.28.5 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of Ahart's dwarf rush within the Plan Area.

4.4.28.5.1 Permanent Direct Effects

Loss of up to 1,422 acres of modeled Ahart's dwarf rush habitat (Tables 4-8 and 4-9) could result in localized fragmentation and/or disruption of seed or pollen dispersal patterns in occupied habitat adjacent to removed habitat areas potentially leading to reduction in genetic diversity or the increased likelihood of stochastic factors extirpating small populations. No known occurrences of Ahart's dwarf rush will be removed. As indicated in Table 6-3, however, removal of up to eight (8) currently unknown occurrences that are discovered over the term of the BRCP is permitted unless, in consultation with USFWS and CDFW, it is determined that the proposed project would remove a significant occurrence that is necessary to maintain the genetic diversity or maintain the regional distribution of the species. Permanent direct effects of these impacts will be avoided and minimized with implementation of the applicable AMMs in Table 4–7.

4.4.28.5.2 Temporary Direct Effects

A temporary reduction in the functions of up to 740 acres of modeled Ahart's dwarf rush habitat would result from the effects of covered activities, 222 acres of which overlap with areas subject

to ongoing effects of existing permanent developments (see Appendix K). Temporary direct effects on Ahart's dwarf rush will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.28.5.3 Permanent Indirect Effects

A permanent reduction in the functions of up to 740 acres of modeled Ahart's dwarf rush habitat would result from covered activities Plan Area-wide, 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). Permanent indirect effects on Ahart's dwarf rush will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.28.6 Overall Impact Likely to Result from Take

The primary threat to Ahart's dwarf rush has been the historical loss of its habitat due to urban development and the intensification of agriculture (USFWS 2005). The covered activities will result in the loss of up to 1,422 acres of modeled habitat, representing approximately 4 percent of the current extent of modeled habitat (see Table 4–8 and Figure 4–44). Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. None of the 17 known occurrences of Ahart's dwarf rush in the Plan Area will be impacted (Figure 4–44).

Based on the available information regarding the status and distribution of Ahart's dwarf rush (see Appendix A), it is likely that the most of the modeled habitat that is removed by the covered activities is unoccupied by Ahart's dwarf rush. Implementation of AMM3 (see Chapter 6, *Conditions on Covered Activities*) permits the removal of newly discovered occurrences unless BCAG in coordination with USFWS and CDFW determines that those occurrences are not necessary for the survival and recovery of Ahart's dwarf rush. Implementation of the remaining applicable AMMs (see Tables 4-7 and 5-23) will serve to further minimize impacts on Ahart's dwarf rush.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on Ahart's dwarf rush or adversely affect its Plan Area distribution or abundance.

4.4.29 Red Bluff Dwarf Rush

The maximum acreage of Red Bluff dwarf rush habitat that will be permanently affected, directly and indirectly, with implementation of the covered activities is 2,162 acres, representing approximately 6 percent of the current extent of modeled habitat (see Table 4–8, Appendix K, and Figure 4–45, *Red Bluff Dwarf Rush: Direct Impacts of Covered Activities* [see separate

files]). One known occurrence of Red Bluff dwarf rush will be adversely affected by the covered activities
(Figure 4–45).

4.4.29.1 Effects Common among Covered Activities

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction, habitat restoration, and recurring maintenance activities) could result in damage or destruction of Red Bluff dwarf rush in unknown occurrences if present in affected habitat areas. For example, plants and seeds could be removed from soil with construction of new structures and plants could be crushed by construction- or maintenance-related equipment. Plants and seeds could suffer mortality from contamination or changes to the in the hydrology of Red Bluff dwarf rush habitat, and invasive nonnative species could be introduced and negatively affect its habitat. These potential impacts will be avoided and avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.29.2 Permanent Development Projects

Direct effects of permanent development projects will result in the permanent removal of up to 1,422 acres of modeled Red Bluff dwarf rush habitat representing approximately 4 percent of modeled habitat in the Plan Area (Table 4–8). Up to 1 of the 32 known occurrences of Red Bluff dwarf rush will be removed by the covered activities (Table 4–8). Indirect effects of permanent development projects will result in reduced functions of up to 740 acres of modeled habitat in the Plan Area, 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Figure O–27 in Appendix O and Table 4–8 provide the acreage of modeled Red Bluff dwarf rush habitat remaining within the Plan Area (including BRCP protected lands and lands that are not impacted by the covered activities) with full implementation of the covered activities.

4.4.29.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects within the Chico, Foothill Area, Neal Road Drop-Off and Recycling Facility, Oroville, and State Route 99 UPAs will result in permanent direct effects on up to 1,313 acres of modeled Red Bluff dwarf rush habitat and up to one known occurrence (Table 4–9). Loss of this habitat area could result in localized fragmentation habitat and/or disruption of seed or pollen dispersal patterns in occupied habitat adjacent to removed habitat areas potentially leading to reduction in genetic diversity or the increased likelihood of stochastic factors extirpating small populations. Up to 1 of the 32 known occurrences of Red Bluff dwarf rush will be removed by the covered activities (Table 4–9).

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include introduction of contaminants and erosion and sedimentation associated with construction related activities (Table 4–1). These impacts could cover leaves and flowers on individual Red Bluff dwarf rush plants and impede their ability to photosynthesize or produce seed. The potential for temporary direct effects on Red Bluff dwarf rush will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7. Based on an average 250-foot distance from permanent new developments within which temporary direct effects will occur for plant species (see Table 4–5), up to 740 acres of modeled Red Bluff dwarf rush habitat will be temporarily directly affected by permanent development covered activities Plan Area-wide[156], 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include increased human activity associated with new recreational developments in and adjacent to natural areas, altered hydrology, and introduction of nonnative species (see Table 4–1). These effects could cause the direct removal of Red Bluff dwarf rush plants, alter the hydrology necessary for supporting its habitat, or introduce nonnative species that could negatively affect Red Bluff dwarf rush habitat adjacent to permanent development areas.

Based on an average 250-foot distance from permanent new developments within which permanent indirect effects will occur for plant species (see Table 4–5), up to 740 acres of modeled Red Bluff dwarf rush habitat will be permanently indirectly affected by permanent development covered activities Plan Area-wide[157], 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). These permanent indirect effects will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.29.2.2 Outside Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects will result in permanent direct effects on 109 acres of modeled Red Bluff dwarf rush modeled habitat outside of UPAs and distributed among all the CAZs (Table 4–9). The effects of such loss of modeled habitat on Red Bluff dwarf rush are the same as described for the permanent direct effects of implementing permanent

[156] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.
[157] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

development projects in the UPAs. No known occurrences of Red Bluff dwarf rush will be impacted (Table 4–9).

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include introduction of contaminants and erosion and sedimentation associated with construction related activities (Table 4–1). The effects of these impact mechanisms on Red Bluff dwarf rush are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs. The potential for temporary direct effects on Red Bluff dwarf rush will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 250-foot distance from permanent new developments within which temporary direct effects will occur for plant species (see Table 4–5), up to 740 acres of modeled habitat will be temporarily directly affected by permanent development covered activities Plan Area-wide[158], 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include increased human activity associated with new recreational developments in and adjacent to natural areas, altered hydrology, and introduction of nonnative species (see Table 4–1). These effects could cause the direct removal of Red Bluff dwarf rush plants, alter the hydrology necessary for supporting its habitat, or introduce nonnative species that could negatively affect Red Bluff dwarf rush habitat adjacent to permanent development areas.

Based on an average 250-foot distance from permanent new developments within which permanent indirect effects will occur for plant species (see Table 4–5), up to 740 acres of modeled Red Bluff dwarf rush habitat will be permanently indirectly affected by permanent development covered activities Plan Area-wide[159], 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K).

[158] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts inside UPAs.
[159] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts inside UPAs.

4.4.29.3 Recurring Maintenance Activities

4.4.29.3.1 Within Urban Permit Areas

Permanent Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on Red Bluff dwarf rush (see Table 4–1).

Temporary Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in temporary direct effects on Red Bluff dwarf rush (see Table 4–1).

Permanent Indirect Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent indirect effects on Red Bluff dwarf rush (see Table 4–1).

4.4.29.3.2 Outside Urban Permit Areas

Permanent Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on Red Bluff dwarf rush (see Table 4–1).

Temporary Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in temporary direct effects on Red Bluff dwarf rush (see Table 4–1).

Permanent Indirect Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent indirect effects on Red Bluff dwarf rush (see Table 4–1).

4.4.29.4 Effects of Covered Activities within Conservation Lands

4.4.29.4.1 Permanent Direct Effects

Operation of equipment to implement conservation measures to enhance, restore, and manage conservation lands could result in burying or killing Red Bluff dwarf rush if present as a result of

operating equipment and the potential for introduction of contaminants and erosion and sedimentation (Table 4–1). Habitat restoration actions could remove unknown occurrences of Red Bluff dwarf rush if present, however, BCAG will avoid removal of any occurrences discovered within potential habitat restoration sites during BRCP biological surveys. The potential for permanent direct effects on Red Bluff dwarf rush will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.29.4.2 Temporary Direct Effects

Operation of equipment to implement conservation measures to enhance, restore, and manage conservation lands could cause localized erosion and sedimentation that could temporarily cover leaves and flowers on individual Red Bluff dwarf rush plants if present and impede their ability to photosynthesize or produce seed. The potential for temporary direct effects on Red Bluff dwarf rush will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.29.4.3 Permanent Indirect Effects

Permanent indirect effects associated with implementation of conservation measures include altered hydrology and the introduction of nonnative species (see Table 4–1). Impacts due to altered hydrological function are not expected as vernal pool and other seasonal wetlands restoration actions will increase the hydrological function necessary for supporting its habitat. Additionally, the potential for temporary direct effects on Red Bluff dwarf rush due to the negative effects of nonnative species will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7 and through the implementation of the conservation measures.

4.4.29.5 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of Red Bluff dwarf rush within the Plan Area.

4.4.29.5.1 Permanent Direct Effects

Loss of up to 1,422 acres of modeled Red Bluff dwarf rush habitat (Tables 4-8 and 4-9) could result in localized fragmentation and/or disruption of seed or pollen dispersal patterns in occupied habitat adjacent to removed habitat areas potentially leading to reduction in genetic diversity or the increased likelihood of stochastic factors extirpating small populations. Up to 1 of the 32 known occurrences of Red Bluff dwarf rush will be removed by the covered activities (Table 4–8). As indicated in Table 6-3, however, removal of all plants within unknown occurrences in permanent development activity footprints and up to eight (8) additional currently unknown occurrences that are discovered over the term of the BRCP is permitted unless, in consultation with USFWS and CDFW, it is determined that the proposed project would remove a significant occurrence that is necessary to maintain the genetic diversity or maintain the regional

distribution of the species Permanent direct effects of these impacts will be avoided and minimized with implementation of the applicable AMMs in Table 4–7.

4.4.29.5.2 Temporary Direct Effects

A temporary reduction in the functions of up to 740 acres of modeled Red Bluff dwarf rush habitat would result from the effects of covered activities, 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Temporary direct effects on Red Bluff dwarf rush will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.29.5.3 Permanent Indirect Effects

A permanent reduction in the functions of up to 740 acres of modeled Red Bluff dwarf rush habitat would result from covered activities Plan Area-wide, 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K) Permanent indirect effects on Red Bluff dwarf rush will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.29.6 Overall Impact Likely to Result from Take

The primary threat to Red Bluff dwarf rush has been the historical loss of its habitat (CNPS 2010). The covered activities will result in the loss of up to 1,422 acres of modeled habitat, representing approximately 4 percent of the current extent of modeled habitat (see Table 4–8 and Figure 4–45). Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. One of the 32 known occurrences of Red Bluff dwarf rush in the Plan Area will be impacted (Figure 4–45).

Based on the available information regarding the status and distribution of Red Bluff dwarf rush (see Appendix A), it is likely that the most of the modeled habitat that is removed by the covered activities is unoccupied by Red Bluff dwarf rush. Implementation of AMM3 (see Chapter 6, *Conditions on Covered Activities*) permits the removal of newly discovered occurrences unless BCAG in coordination with USFWS and CDFW determines that those occurrences are not necessary for the survival and recovery of Red Bluff dwarf rush. Implementation of the remaining applicable AMMs (see Tables 4-7 and 5-23) will serve to further minimize impacts on Red Bluff dwarf rush.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on Red Bluff dwarf rush or adversely affect its Plan Area distribution or abundance.

4.4.30 Butte County Meadowfoam

The maximum acreage of modeled Butte County meadowfoam primary and secondary habitat that will be permanently affected, directly and indirectly, with implementation of the covered activities is 2,059 acres, representing approximately 9 percent of the current extent of modeled habitat (see Table 4–8, Appendix K, Table 5-7, and Figures 4–46a to 4–46d [separate files]). Within these impact areas, up to 12 occurrences will be affected to varying degrees (see Table 4–10, *Butte County Meadowfoam Impact Analysis by Occurrence* [separate file]).

4.4.30.1 Effects Common among Covered Activities

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction, habitat restoration, and recurring maintenance activities) could result in damage or destruction of Butte County meadowfoam in unknown occurrences if present in affected habitat areas. For example, plants and seeds could be removed from soil with construction of new structures and plants could be crushed by construction- or maintenance-related equipment. Plants and seeds could suffer mortality from contamination or changes to the in the hydrology of Butte County meadowfoam habitat, and invasive nonnative species could be introduced and negatively affect its habitat. These potential impacts will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7 and specific avoidance requirements are provided for Occurrences #22 and #25 (see Figures 4–46d, *Butte County Meadowfoam Avoidance Requirement for Wurlitzer Property* and O–28b, *Butte County Meadowfoam Avoidance Requirement for Occurrence #22* in Appendix O).

4.4.30.2 Permanent Development Projects

Direct effects of permanent development projects will result in the permanent removal of up to 331 acres of modeled Butte County meadowfoam primary habitat and 1,161 acres of modeled secondary habitat representing approximately 2 percent and 18 percent, respectively, of modeled habitat in the Plan Area (Table 4–8). Within these impact areas, up to 5 known occurrences could be removed by covered activities and up to 7 occurrences could be indirectly affected to varying degrees (Table 4–10). Indirect effects of permanent development projects will result in reduced functions of up to 567 acres of habitat in the Plan Area, 244 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Figure O–28, *Butte County Meadowfoam Habitat in the Plan Area with full BRCP Implementation* in Appendix O and Table 4–8 provide the acreage of modeled Butte County meadowfoam habitat remaining within the Plan Area (including BRCP protected lands and lands that are not impacted by the covered activities) with full implementation of the covered activities.

4.4.30.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects within the Chico, Neal Road Drop-Off and Recycling Facility, and State Route 99 UPAs will result in permanent direct effects on up to 1,447 acres of modeled Butte County meadowfoam habitat: 288 acres of modeled primary habitat and 1,159 acres of modeled secondary habitat (Table 4–9). Loss of this habitat area could result in localized fragmentation of habitat and/or disruption of seed or pollen dispersal patterns in occupied habitat adjacent to removed habitat areas, potentially leading to reduction in genetic diversity or the increased likelihood of stochastic factors extirpating small populations.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include introduction of contaminants and erosion and sedimentation associated with construction related activities (Table 4–1). These impacts could cover leaves and flowers on individual Butte County meadowfoam plants and impede their ability to photosynthesize or produce seed. The potential for temporary direct effects on Butte County meadowfoam will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7. While the area of the effect for Butte County meadowfoam will be established through field delineations (Table 4–5), based on an average 250-foot distance from permanent new developments within which temporary direct effects will occur for plant species (see Table 4–5), up to 567 acres of modeled Butte County meadowfoam habitat will be temporarily directly affected by permanent development covered activities Plan Area-wide[160], 244 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include increased human activity associated with new recreational developments in and adjacent to natural areas, altered hydrology, and introduction of nonnative species (see Table 4–1). These effects could cause the direct removal of Butte County meadowfoam plants, alter the hydrology necessary for supporting its habitat, or introduce nonnative species that could negatively affect Butte County meadowfoam habitat adjacent to permanent development areas.

While the area of these effects on Butte County meadowfoam will be established through field delineations (Table 4–5), based on an average 250-foot distance from permanent new developments within which permanent indirect effects will occur for plant species (see -5), up to 567 acres of modeled Butte County meadowfoam habitat will be permanently indirectly affected by permanent development covered activities Plan Area-wide[161], 244 acres of which overlap

[160] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.
[161] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K) These permanent indirect effects will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.30.2.2 Outside Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects will result in permanent direct effects on 46 acres of modeled Butte County meadowfoam habitat: up to 43 acres of modeled primary habitat and up to 3 acres of modeled secondary habitat outside of UPAs and distributed among all the CAZs (Table 4–9). Specific avoidance requirements are provided for Occurrences #22 and #25 (see Figures 4–46d and O–28b in Appendix O). The effects of such loss of modeled habitat on Butte County meadowfoam are the same as described for the permanent direct effects of implementing permanent development projects in the UPAs.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include introduction of contaminants and erosion and sedimentation associated with construction related activities (Table 4–1). The effects of these impacts on Butte County meadowfoam are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs. The potential for temporary direct effects on Butte County meadowfoam will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7 and the specific avoidance requirements for Occurrences #22 and #25 (see Figures 4–46d and O–28b in Appendix O).

While the area of the effect for Butte County meadowfoam will be established through field delineations (Table 4–5), based on an average 250-foot distance from permanent new developments within which temporary direct effects will occur for plant species (see Table 4–5), up to 567 acres of modeled Butte County meadowfoam habitat will be temporarily directly affected by permanent development covered activities Plan Area-wide[162], 244 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include increased human activity associated with new recreational developments in and adjacent to natural areas, altered hydrology, and introduction of nonnative species (see Table 4–1). These effects could cause the

[162] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts inside UPAs.

direct removal of Butte County meadowfoam plants, alter the hydrology necessary for supporting its habitat, or introduce nonnative species that could negatively affect Butte County meadowfoam habitat adjacent to permanent development areas.

While the area of the effect for Butte County meadowfoam will be established through field delineations (Table 4–5), based on an average 250-foot distance from permanent new developments within which permanent indirect effects will occur for plant species (see Table 4-5), up to 567 acres of modeled Butte County meadowfoam habitat will be permanently indirectly affected by permanent development covered activities Plan Area-wide[163], 244 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K).

4.4.30.3 Recurring Maintenance Activities

4.4.30.3.1 Within Urban Permit Areas

Permanent Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on Butte County meadowfoam (see Table 4–1).

Temporary Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in temporary direct effects on Butte County meadowfoam (see Table 4–1).

Permanent Indirect Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent indirect effects on Butte County meadowfoam (see Table 4–1).

4.4.30.3.2 Outside Urban Permit Areas

Permanent Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on Butte County meadowfoam (see Table 4–1).

[163] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts inside UPAs.

Temporary Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in temporary direct effects on Butte County meadowfoam (see Table 4–1).

Permanent Indirect Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent indirect effects on Butte County meadowfoam (see Table 4–1).

4.4.30.4 Effects of Covered Activities within Conservation Lands

4.4.30.4.1 Permanent Direct Effects

Implementation of conservation measures to restore vernal pool and other seasonal wetland will convert grassland that includes modeled Butte County meadowfoam habitat. Restoration projects for vernal pools and emergent wetland would not remove any unknown occurrences found during surveys unless BCAG in coordination with USFWS and CDFW determines that those occurrences are not necessary for the survival and recovery of Butte County meadowfoam. Permanent direct effects of habitat restoration projects will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.30.4.2 Temporary Direct Effects

Temporary direct effects are associated with implementation of conservation measures include introduction of contaminants and erosion and sedimentation associated with restoration related activities (Table 4–1). These impact mechanisms could cover leaves and flowers on individual Butte County meadowfoam plants and impede their ability to photosynthesize or produce seed. The primary temporary direct effect on Butte County meadowfoam will be associated with restoration of up to 306 acres of vernal pool and other seasonal wetlands (see Table 5-7) within its modeled habitat. Conversion of existing lower functioning grassland habitat (small extent of appropriate hydrology) to higher functioning habitat (larger extent of appropriate hydrology) will temporarily reduce the hydrological function of the restored habitat. The potential for temporary direct effects on Butte County meadowfoam will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.30.4.3 Permanent Indirect Effects

Permanent indirect effects associated with implementation of conservation measures include altered hydrology and the introduction of nonnative species (see Table 4–1). Impacts due to altered hydrological function are not expected as vernal pool and other seasonal wetlands restoration actions will increase the hydrological function necessary for supporting its habitat. Additionally, the potential for temporary direct effects on Butte County meadowfoam due to the

negative effects of nonnative species will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7 and through the implementation of the conservation measures.

4.4.30.5 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of Butte County meadowfoam within the Plan Area.

4.4.30.5.1 Permanent Direct Effects

Loss of up to 1,493[164] acres of modeled Butte County meadowfoam habitat; 331 acres of primary habitat and 1,161 acres of secondary habitat (Table 4–8) could result in localized fragmentation and/or disruption of seed or pollen dispersal patterns in occupied habitat adjacent to removed habitat areas potentially leading to reduction in genetic diversity or the increased likelihood of stochastic factors extirpating small populations. Up to 5 occurrences will be removed with implementation of the covered activities (Table 4–10). In addition, as described in Table 6-3, removal of plants in up to six (6) currently unknown occurrences totaling no more than 10,000 plants in normal moisture years that are discovered over the term of the BRCP is permitted unless, in consultation with USFWS and CDFW, it is determined that the proposed project would remove a significant occurrence that is necessary to maintain the genetic diversity or maintain the regional distribution of the species. Permanent direct effects of these impacts will be avoided and minimized with implementation of the applicable AMMs in Table 4–7.

4.4.30.5.2 Temporary Direct Effects

A temporary reduction in the functions of up to 567 acres of modeled Butte County meadowfoam habitat would result from the effects of covered activities, 244 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Conversion of grassland to restore vernal pool and other seasonal wetland land cover will result in up to an additional 306 acres of temporary effects although the actual extent of effects is likely to be significantly less. The acreage of removal of habitat will be the amount of actual restored vernal pool and other seasonal wetland habitat that is located within the area of affected modeled habitat. Temporary direct effects on Butte County meadowfoam will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.30.5.3 Permanent Indirect Effects

Implementation of the covered activities will result in permanent indirect effects on up to 7 known occurrences. A permanent reduction in the functions of up to 567 acres of modeled Butte County meadowfoam habitat would result from covered activities Plan Area-wide, 244 acres of

[164] Does not includes 306 acres of grassland restored to vernal pool and other seasonal wetlands land cover that are not included in the primary and secondary habitat figures because the 306acres cannot be spatially allocated.

which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). Permanent indirect effects on Butte County meadowfoam will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.30.6 Overall Impact Likely to Result from Take

The primary threat to Butte County meadowfoam has been the historical loss of its habitat due to urban development and the intensification of agriculture (USFWS 2005, 2006c). Within the Plan Area, Butte County meadowfoam has been recorded in 33 occurrences (Table A.32-1).

The covered will result in the loss of up to 1,493 acres of modeled habitat, representing 6.5 percent of the current extent of modeled habitat (see Table 4–8 and Figures 4–46a–d). Within these impact areas, up to 12 occurrences could be directly and/or indirectly affected to varying degrees (Table 4–10). Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less.

Based on the available information regarding the status and distribution of Butte County meadowfoam (see Appendix A), it is likely that most of the modeled habitat that will be removed by the covered activities is currently unoccupied by Butte County meadowfoam. Implementation of AMM3 (see Chapter 6, *Conditions on Covered Activities*) permits the removal of newly discovered occurrences unless BCAG in coordination with USFWS and CDFW determines that those occurrences are necessary for the survival and recovery of Butte County meadowfoam. AMM3 is designed to be implemented in conjunction with the Chico Butte County Meadowfoam Preserve, which will protect all occurrences and supporting habitat that are necessary for the survival and recovery of Butte County meadowfoam (Table 4–10). Implementation of the remaining applicable AMMs (see Tables 4-7 and 5-23) and the specific avoidance requirements for Occurrences #22 and #25 (see Figures 4-46d and O–28b in Appendix O) will serve to further minimize impacts on Butte County meadowfoam.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on Butte County meadowfoam or adversely affect its Plan Area distribution or abundance.

4.4.31 Veiny Monardella

A habitat suitability model has not been developed for veiny monardella because there is insufficient information regarding its habitat requirements and the distribution of the physical attributes that support its habitat in the Plan Area. None of the 8 known occurrences of veiny monardella will be adversely affected by the covered activities (Table 4–8). No take of this species is permitted until the 8 known occurrences have been protected and at least 8 new occurrences are discovered or established and protected in the Plan Area. (Table 6–3).

4.4.31.1 Effects Common among Covered Activities

There will be no take of veiny monardella until the eight known occurrences have been protected and at least eight new occurrences are discovered or established and protected in the Plan Area and any potential impacts will be avoided with implementation of the applicable AMMs indicated in Table 4–7.

4.4.31.2 Permanent Development Projects

Permanent development projects will not affect currently known occurrences in the Plan Area. As indicated in Tables 4--6 and 5-23, when at least four currently unknown occurrences in addition to the eight known occurrences are protected or established and with concurrence of USFWS and CDFW, up to four occurrences discovered within proposed project footprints may be removed, as long as those occurrences do not total more than 20 percent of the mean annual number of plants in protected occurrences. Direct and indirect effects of permanent development projects on veiny monardella will be minimized with implementation the applicable AMMs indicated in Table 4–7.

4.4.31.2.1 Within Urban Permit Areas

Permanent Direct Effects

Direct effects of permanent development projects could result in the removal of newly discovered veiny monardella plants and habitat if present in project sites will be avoided with implementation of the applicable AMMs in Table 4–7 until the conditions for permitting of potential future take described in Table 4–6 are achieved. Any future removal of veiny monardella will be limited to occurrences deemed by USFWS and CDFW to not be integral to maintaining the distribution, abundance, and genetic diversity of veiny monardella in the Plan Area.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include introduction of contaminants and erosion and sedimentation associated with construction related activities (Table 4–1). These impacts could cover leaves and flowers on individual veiny monardella plants if present in project sites and impede their ability to photosynthesize or produce seed. The potential for temporary direct effects on veiny monardella will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include increased human activity associated with new permanent developments in and adjacent to natural areas, altered hydrology, and introduction of nonnative species (see Table 4–1). These effects could cause the loss of veiny monardella plants, alter the hydrology necessary for supporting its habitat, or introduce

nonnative species that could negatively affect veiny monardella habitat, if present, adjacent to permanent development areas. These affects will be minimized with the implementation of the applicable AMMs described in Table 4–7.

4.4.31.2.2 Outside Urban Permit Areas

Permanent Direct Effects

Direct effects of permanent development projects could result in the removal of newly discovered veiny monardella plants and habitat if present in project sites will be avoided as described for effects within UPAs.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include introduction of contaminants and erosion and sedimentation associated with construction related activities (Table 4–1). The effects of these impact mechanisms on veiny monardella are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs. The potential for temporary direct effects on veiny monardella will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include increased human activity associated with new recreational developments in and adjacent to natural areas, altered hydrology, and introduction of nonnative species (see Table 4–1). These effects could cause the loss of veiny monardella plants, alter the hydrology necessary for supporting its habitat, or introduce nonnative species that could negatively affect veiny monardella habitat adjacent to permanent development areas. These affects will be minimized with the implementation of the applicable AMMs described in Table 4–7.

4.4.31.3 Recurring Maintenance Activities

4.4.31.3.1 Within Urban Permit Areas

Permanent Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on veiny monardella (see Table 4–1).

Temporary Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in temporary direct effects on veiny monardella (see Table 4–1).

Permanent Indirect Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent indirect effects on veiny monardella (see Table 4–1).

4.4.31.3.2 Outside Urban Permit Areas

Permanent Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on veiny monardella (see Table 4–1).

Temporary Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in temporary direct effects on veiny monardella (see Table 4–1).

Permanent Indirect Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent indirect effects on veiny monardella (see Table 4–1).

4.4.31.4 Effects of Covered Activities within Conservation Lands

4.4.31.4.1 Permanent Direct Effects

Operation of equipment to implement conservation measures to enhance, restore, and manage conservation lands could result in burying or killing unknown occurrences of veiny monardella if present as a result of operating equipment and the potential for introduction of contaminants and erosion and sedimentation (Table 4–1). Habitat restoration actions could remove unknown occurrences of veiny monardella if present; however, BCAG will avoid removal of any occurrences discovered within potential habitat restoration sites by BRCP biological surveys. The potential for permanent direct effects on veiny monardella will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.31.4.2 Temporary Direct Effects

Operation of equipment to implement conservation measures to enhance, restore, and manage conservation lands could cause localized erosion and sedimentation that could temporarily cover leaves and flowers on individual veiny monardella plants if present and impede their ability to photosynthesize or produce seed. The potential for temporary direct effects on veiny monardella will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.31.4.3 Permanent Indirect Effects

Implementation of the conservation measures are not expected to result in permanent indirect effects on veiny monardella.

4.4.31.5 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of veiny monardella within the Plan Area.

4.4.31.5.1 Permanent Direct Effects

All direct take of veiny monardella associated with implementation of permanent development projects and conservation measures will be avoided with implementation of the applicable AMMs in Table 4–7 until the conditions for permitting of potential future take described in Tables 4-6 and 5-23 are achieved. . If the conditions for future take described in Tables 4-6 and 5-23 are achieved, there will be no take of occurrences deemed by USFWS and CDFW to be necessary to maintain the genetic diversity or regional distribution of the species.

4.4.31.5.2 Temporary Direct Effects

Implementation of covered activities adjacent to occupied habitat, if present, could result in a temporary reduction in the functions of veiny monardella habitat. Temporary direct effects on veiny monardella will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.31.5.3 Permanent Indirect Effects

Construction of permanent development projects adjacent to occupied habitat, if present, could result in a permanent reduction in the functions of veiny monardella habitat if present. Permanent direct effects on veiny monardella will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.31.6 Overall Impact Likely to Result from Take

The primary threat to veiny monardella is development (CNPS 2010). None of the 8 known occurrences of veiny monardella will be adversely affected by the covered activities (Table 4–8).

Implementation of AMM3 (see Chapter 6, *Conditions on Covered Activities*) requires that no take of this species is permitted until the 8 known occurrences are protected and at least 8 new occurrences are discovered or established in the Plan Area. After the 8 existing and the 8 new occurrences are protected, and with concurrence of USFWS and CDFW, up to four occurrences discovered within proposed project footprints may be removed as long as those occurrences do not include more than 20 percent of the mean annual number of plants in protected occurrences. However, plants may not be removed if, in consultation with USFWS and CDFW, it is

determined that the proposed project would remove a significant occurrence that is necessary to maintain the genetic diversity or maintain the regional distribution of the species. Implementation of the remaining applicable AMMs (see Tables 4-7 and 5-23) will serve to further avoid and minimize impacts on veiny monardella.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on veiny monardella or adversely affect its Plan Area distribution or abundance.

4.4.32 Hairy Orcutt Grass

The maximum acreage of hairy Orcutt grass habitat that will be permanently affected, directly and indirectly, with implementation of the covered activities is 2,162 acres, representing approximately 6 percent of the current extent of modeled habitat (see Table 4–8, Appendix K, and Figure 4–47, *Hairy Orcutt Grass: Direct Impacts of Covered Activities* [separate files]). The one known occurrence of hairy Orcutt grass will not be adversely affected by the covered activities and no take of this species is permitted until at least 8 new occurrences are discovered or established in the Plan Area (Table 6-3 and Figure 4–47).

4.4.32.1 Effects Common among Covered Activities

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction, habitat restoration, and recurring maintenance activities) could result in damage or destruction of hairy Orcutt grass in unknown occurrences if present in affected habitat areas. For example, plants and seeds could be removed from soil with construction of new structures and plants could be crushed by construction- or maintenance-related equipment. Plants and seeds could suffer mortality from contamination or changes to the in the hydrology of hairy Orcutt grass habitat, and invasive nonnative species could be introduced and negatively affect its habitat. These potential impacts will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.32.2 Permanent Development Projects

Direct effects of permanent development projects will result in the permanent removal of up to 1,422 acres of modeled hairy Orcutt grass habitat representing approximately 4 percent of modeled habitat in the Plan Area (Table 4–8). No known occurrences of hairy Orcutt grass will be impacted. As indicated in Tables 4-6 and 5-23, removal of plants in up to two currently unknown occurrences that are discovered over the term of the BRCP is permitted once eight additional occurrences are discovered and protected or established in the Plan Area. Indirect effects of permanent development projects will result in reduced functions of up to 740 acres of modeled habitat in the Plan Area, 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Figure O–27 in Appendix O and Table 4–8 provide the acreage of modeled hairy Orcutt grass habitat remaining within the Plan Area (including BRCP protected lands and lands that are not impacted by the covered activities) with full implementation of the covered activities.

4.4.32.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects within the Chico, Foothill Area, Neal Road Drop-Off and Recycling Facility, Oroville, and State Route 99 UPAs will result in permanent direct effects on up to 1,313 acres of modeled hairy Orcutt grass habitat (Table 4–9). Loss of this habitat area could result in localized fragmentation habitat and/or disruption of seed or pollen dispersal patterns in occupied habitat adjacent to removed habitat areas potentially leading to reduction in genetic diversity or the increased likelihood of stochastic factors extirpating small populations.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include introduction of contaminants and erosion and sedimentation associated with construction related activities (Table 4–1). These impacts could cover leaves and flowers on individual hairy Orcutt grass plants and impede their ability to photosynthesize or produce seed. The potential for temporary direct effects on hairy Orcutt grass will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7. Based on an average 250-foot distance from permanent new developments within which temporary direct effects will occur for plant species (see Table 4–5), up to 740 acres of modeled hairy Orcutt grass habitat will be temporarily directly affected by permanent development covered activities Plan Area-wide[165], 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include increased human activity associated with new recreational developments in and adjacent to natural areas, altered hydrology, and introduction of nonnative species (see Table 4–1). These effects could cause the direct removal of hairy Orcutt grass plants, alter the hydrology necessary for supporting its habitat, or introduce nonnative species that could negatively affect hairy Orcutt grass habitat adjacent to permanent development areas.

Based on an average 250-foot distance from permanent new developments within which permanent indirect effects will occur for plant species (see Table 4–5), up to 740 acres of modeled hairy Orcutt grass habitat will be permanently indirectly affected by permanent

[165] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

development covered activities Plan Area-wide[166], 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). These permanent indirect effects will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.32.2.2 Outside Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects will result in permanent direct effects on 109 acres of modeled hairy Orcutt grass modeled habitat outside of UPAs and distributed among all the CAZs (Table 4–9). The effects of such loss of modeled habitat on hairy Orcutt grass are the same as described for the permanent direct effects of implementing permanent development projects in the UPAs.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include introduction of contaminants and erosion and sedimentation associated with construction related activities (Table 4–1). The effects of these impacts on hairy Orcutt grass are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs. The potential for temporary direct effects on hairy Orcutt grass will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 250-foot distance from permanent new developments within which temporary direct effects will occur for plant species (see Table 4–5), up to 740 acres of modeled habitat will be temporarily directly affected by permanent development covered activities Plan Area-wide[167], 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include increased human activity associated with new recreational developments in and adjacent to natural areas, altered hydrology, and introduction of nonnative species (see Table 4–1). These effects could cause the direct removal of hairy Orcutt grass plants, alter the hydrology necessary for supporting its habitat, or introduce nonnative species that could negatively affect hairy Orcutt grass habitat adjacent to permanent development areas.

[166] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.
[167] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts inside UPAs.

Based on an average 250-foot distance from permanent new developments within which permanent indirect effects will occur for plant species (see Table 4–5), up to 740 acres of modeled hairy Orcutt grass habitat will be permanently indirectly affected by permanent development covered activities Plan Area-wide[168], 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K)

4.4.32.3 Recurring Maintenance Activities

4.4.32.3.1 Within Urban Permit Areas

Permanent Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on hairy Orcutt grass (see Table 4–1).

Temporary Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in temporary direct effects on hairy Orcutt grass (see Table 4–1).

Permanent Indirect Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent indirect effects on hairy Orcutt grass (see Table 4–1).

4.4.32.3.2 Outside Urban Permit Areas

Permanent Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on hairy Orcutt grass (see Table 4–1).

Temporary Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in temporary direct effects on hairy Orcutt grass (see Table 4–1).

[168] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts inside UPAs.

Permanent Indirect Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent indirect effects on hairy Orcutt grass (see Table 4–1).

4.4.32.4 Effects of Covered Activities within Conservation Lands

Permanent Direct Effects

Operation of equipment to implement conservation measures to enhance, restore, and manage conservation lands could result in burying or killing hairy Orcutt grass if present as a result of operating equipment and the potential for introduction of contaminants and erosion and sedimentation (Table 4–1). Habitat restoration actions could remove unknown occurrences of hairy Orcutt grass if present; however, BCAG will avoid removal of any occurrences discovered within potential habitat restoration sites by BRCP biological surveys. The potential for permanent direct effects on hairy Orcutt grass will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

Temporary Direct Effects

Operation of equipment to implement conservation measures to enhance, restore, and manage conservation lands could cause localized erosion and sedimentation that could temporarily cover leaves and flowers on individual hairy Orcutt grass plants if present and impede their ability to photosynthesize or produce seed. The potential for temporary direct effects on hairy Orcutt grass will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

Implementation of the conservation measures are not expected to result in permanent indirect effects on hairy Orcutt grass.

4.4.32.5 Impacts on Critical Habitat

Approximately 8 acres of hairy Orcutt grass designated critical habitat (Unit 2) are present in the Plan Area, all of which are located near (but not encompassing) the known occurrence of hairy Orcutt grass along Highway 99 north of the Highway 149 interchange. The PCEs essential for this species' conservation as stated in the designation of critical habitat are as follows:

Topographic features characterized by isolated mound and intermound complex within a matrix of surrounding uplands that result in continuously or intermittently flowing surface water in the depressional features, including swales connecting the pools described in PCE (ii), providing for dispersal and promoting hydroperiods of adequate length in the pools.

Depressional features, including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and continuously hold water, or whose soils are saturated for a period long enough to promote germination, flowering, and seed production of predominantly annual native wetland species and typically exclude both native and nonnative upland plant species in all but the driest years. As these features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands.

The implementation of proposed Highway 99 expansion and improvement projects and associated maintenance activities could remove up to 8 acres of designated critical habitat. Current land uses that completely occupy all of the designated critical habitat located in the Plan Area consist of a portion of State Route 99, a metals scrap yard, and an abandoned section of a contour rice field. These land uses predate the designation of critical habitat. The leveling and/or paving over of the critical habitat has eliminated the characteristic vernal pool topographic features defined in PCE 1 and has also either completely eliminated or severely altered the characteristic seasonal hydrology defined in PCE 2. Therefore, because the PCEs no longer exist within the designated critical habitat, no critical habitat will be degraded by the proposed Highway 99 expansion and improvement projects and associated maintenance activities.

Based on this assessment, the covered activities and conservation measures are not expected to impact PCEs of designated critical habitat and will not preclude the ability to recover hairy Orcutt grass.

4.4.32.6 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of hairy Orcutt grass within the Plan Area.

4.4.32.6.1 Permanent Direct Effects

Loss of up to 1,422 acres of modeled hairy Orcutt grass habitat (Tables 4–8 and 4–9) could result in localized fragmentation and/or disruption of seed or pollen dispersal patterns in occupied habitat adjacent to removed habitat areas potentially leading to reduction in genetic diversity or the increased likelihood of stochastic factors extirpating small populations. No known occurrences of hairy Orcutt grass will be removed. As indicated in Tables 4–6 and 5–23, removal of plants in up to two currently unknown occurrences that are discovered over the term of the BRCP is permitted once eight additional occurrences are discovered and protected or established in the Plan Area. Permanent direct effects of these impacts will be avoided and minimized with implementation of the applicable AMMs in Table 4–7.

4.4.32.6.2 Temporary Direct Effects

A temporary reduction in the functions of up to 740 acres of modeled hairy Orcutt grass habitat would result from the effects of covered activities, 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Temporary direct effects on hairy Orcutt grass will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.32.6.3 Permanent Indirect Effects

A permanent reduction in the functions of up to 740 acres of modeled hairy Orcutt grass habitat would result from covered activities Plan Area-wide, 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). Permanent indirect effects on hairy Orcutt grass will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.32.7 Overall Impact Likely to Result from Take

The primary threat to hairy Orcutt grass has been the historical loss of its habitat (USFWS 2005). The covered activities will result in the loss of up to 1,422 acres of modeled habitat, representing approximately 4 percent of the current extent of modeled habitat (see Table 4–8 and Figure 4–47). Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. The one known occurrence of hairy Orcutt grass in the Plan Area will not be impacted (Figure 4–47). As noted above, because the PCEs no longer exist within the designated critical habitat, no critical habitat will be degraded within the Plan Area.

Based on the available information regarding the status and distribution of hairy Orcutt grass (see Appendix A), it is likely that the most of the modeled habitat that is removed by the covered activities is unoccupied by hairy Orcutt grass. Implementation of AMM3 (see Chapter 6, *Conditions on Covered Activities*, Table 6-3) requires that no take of this species is permitted until at least 8 new occurrences are discovered or established in the Plan Area. After the 8 additional occurrences are protected or established and with concurrence of USFWS and CDFW, up to two occurrences discovered within proposed project footprints may be removed as long as those occurrences do not include more than 20 percent of the mean annual number of plants in protected occurrences. However, plants may not be removed if, in consultation with USFWS and CDFW, it is determined that the proposed project would remove a significant occurrence that is necessary to maintain the genetic diversity or maintain the regional distribution of the species. Implementation of the remaining applicable AMMs (see Tables 4–7 and 5–23) will serve to further avoid and minimize impacts on hairy Orcutt grass.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on hairy Orcutt grass or adversely affect its Plan Area distribution or abundance.

4.4.33 Slender Orcutt Grass

The maximum acreage of slender Orcutt grass habitat that will be permanently affected, directly and indirectly, with implementation of the covered activities is 2,162 acres, representing approximately 6 percent of the current extent of modeled habitat (see Table 4–8, Appendix K, and Figure 4–48, *Slender Orcutt Grass: Direct Impacts of Covered Activities* [separate files]). The two known occurrences of slender Orcutt grass will not be adversely affected by the covered activities and no take of this species is permitted until at least eight new occurrences are discovered or established in the Plan Area (Table 6-3 and Figure 4–48).

4.4.33.1 Effects Common among Covered Activities

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction, habitat restoration, and recurring maintenance activities) could result in damage or destruction of slender Orcutt grass in unknown occurrences if present in affected habitat areas. For example, plants and seeds could be removed from soil with construction of new structures and plants could be crushed by construction- or maintenance-related equipment. Plants and seeds could suffer mortality from contamination or changes to the in the hydrology of slender Orcutt grass habitat, and invasive nonnative species could be introduced and negatively affect its habitat. These potential impacts will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.33.2 Permanent Development Projects

Direct effects of permanent development projects will result in the permanent removal of up to 1,422 acres of modeled slender Orcutt grass habitat representing approximately 4 percent of modeled habitat in the Plan Area (Table 4–8). No known occurrences of slender Orcutt grass will be impacted. As indicated in Tables 4–6 and 5–23, removal of plants in up to two currently unknown occurrences that are discovered over the term of the BRCP is permitted once eight additional occurrences are discovered and protected or established in the Plan Area. Indirect effects of permanent development projects will result in reduced functions of up to 740 acres of modeled habitat in the Plan Are, 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments a (see Appendix K).

Figure O–27 in Appendix O and Table 4–8 provide the acreage of modeled slender Orcutt grass habitat remaining within the Plan Area (including BRCP protected lands and lands that are not impacted by the covered activities) with full implementation of the covered activities.

4.4.33.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects within the Chico, Foothill Area, Neal Road Drop-Off and Recycling Facility, Oroville, and State Route 99 UPAs will result in permanent direct effects on up to 1,313 acres of modeled slender Orcutt grass habitat (Table 4–9). Loss of this habitat could result in localized fragmentation habitat and/or disruption of seed or pollen dispersal patterns in occupied habitat adjacent to removed habitat areas potentially leading to reduction in genetic diversity or the increased likelihood of stochastic factors extirpating small populations.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include introduction of contaminants and erosion and sedimentation associated with construction related activities (Table 4–1). These impacts could cover leaves and flowers on individual slender Orcutt grass plants and impede their ability to photosynthesize or produce seed. The potential for temporary direct effects on slender Orcutt grass will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7. Based on an average 250-foot distance from permanent new developments within which temporary direct effects will occur for plant species (see Table 4–5), up to 740 acres of modeled slender Orcutt grass habitat will be temporarily directly affected by permanent development covered activities Plan Area-wide[169], 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include increased human activity associated with new recreational developments in and adjacent to natural areas, altered hydrology, and introduction of nonnative species (see Table 4–1). These effects could cause the direct removal of slender Orcutt grass plants, alter the hydrology necessary for supporting its habitat, or introduce nonnative species that could negatively affect slender Orcutt grass habitat adjacent to permanent development areas.

Based on an average 250-foot distance from permanent new developments within which permanent indirect effects will occur for plant species (see Table 4–5), up to 740acres of modeled slender Orcutt grass habitat will be permanently indirectly affected by permanent development covered activities Plan Area-wide[170], 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in

[169] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.
[170] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

addition to the acreage of temporary direct effects (see Appendix K). These permanent indirect effects will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.33.2.2 Outside Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects will result in permanent direct effects on 109 acres of modeled slender Orcutt grass modeled habitat outside of UPAs and distributed among all the CAZs (Table 4–9). The effects of such loss of modeled habitat on slender Orcutt grass are the same as described for the permanent direct effects of implementing permanent development projects in the UPAs.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include introduction of contaminants and erosion and sedimentation associated with construction related activities (Table 4–1). The effects of these impacts on slender Orcutt grass are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs. The potential for temporary direct effects on slender Orcutt grass will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 250-foot distance from permanent new developments within which temporary direct effects will occur for plant species (see Table 4–5), up to 740 acres of modeled habitat will be temporarily directly affected by permanent development covered activities Plan Area-wide[171], 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include increased human activity associated with new recreational developments in and adjacent to natural areas, altered hydrology, and introduction of nonnative species (see Table 4–1). These effects could cause the direct removal of slender Orcutt grass plants, alter the hydrology necessary for supporting its habitat, or introduce nonnative species that could negatively affect slender Orcutt grass habitat adjacent to permanent development areas.

Based on an average 250-foot distance from permanent new developments within which permanent indirect effects will occur for plant species (see Table 4–5), up to 740 acres of modeled slender Orcutt grass habitat will be permanently indirectly affected by permanent

[171] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts inside UPAs.

development covered activities Plan Area-wide[172], 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K).

4.4.33.3 Recurring Maintenance Activities

4.4.33.3.1 Within Urban Permit Areas

Permanent Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on slender Orcutt grass (see Table 4–1).

Temporary Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in temporary direct effects on slender Orcutt grass (see Table 4–1).

Permanent Indirect Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent indirect effects on slender Orcutt grass (see Table 4–1).

4.4.33.3.2 Outside Urban Permit Areas

Permanent Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on slender Orcutt grass (see Table 4–1).

Temporary Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in temporary direct effects on slender Orcutt grass (see Table 4–1).

[172] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts inside UPAs.

Permanent Indirect Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent indirect effects on slender Orcutt grass (see Table 4–1).

4.4.33.4 Effects of Covered Activities within Conservation Lands

Permanent Direct Effects

Operation of equipment to implement conservation measures to enhance, restore, and manage conservation lands could result in burying or killing slender Orcutt grass if present as a result of operating equipment and the potential for introduction of contaminants and erosion and sedimentation (Table 4–1). Habitat restoration actions could remove unknown occurrences of slender Orcutt grass if present; however, BCAG will avoid removal of any occurrences discovered within potential habitat restoration sites by BRCP biological surveys. The potential for permanent direct effects on slender Orcutt grass will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

Temporary Direct Effects

Operation of equipment to implement conservation measures to enhance, restore, and manage conservation lands could cause localized erosion and sedimentation that could temporarily cover leaves and flowers on individual slender Orcutt grass plants if present and impede their ability to photosynthesize or produce seed. The potential for temporary direct effects on slender Orcutt grass will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

Implementation of the conservation measures are not expected to result in permanent indirect effects on slender Orcutt grass.

4.4.33.5 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of slender Orcutt grass within the Plan Area.

4.4.33.5.1 Permanent Direct Effects

Loss of up to 1,422 acres of modeled slender Orcutt grass habitat (Tables 4–8 and 4–9) could result in localized fragmentation and/or disruption of seed or pollen dispersal patterns in occupied habitat adjacent to removed habitat areas potentially leading to reduction in genetic diversity or the increased likelihood of stochastic factors extirpating small populations. No known occurrences of slender Orcutt grass will be removed. As indicated in Tables 4–6 and 5–23, removal of plants in up to two currently unknown occurrences that are discovered over

the term of the BRCP is permitted once eight additional occurrences are discovered and protected or established in the Plan Area. Permanent direct effects of these impacts will be avoided and minimized with implementation of the applicable AMMs in Table 4–7.

4.4.33.5.2 Temporary Direct Effects

A temporary reduction in the functions of up to 740 acres of modeled slender Orcutt grass habitat would result from the effects of covered activities, 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Temporary direct effects on slender Orcutt grass will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.33.5.3 Permanent Indirect Effects

A permanent reduction in the functions of up to 240 acres of modeled slender Orcutt grass habitat would result from covered activities Plan Area-wide, 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). Permanent indirect effects on slender Orcutt grass will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.33.6 Overall Impact Likely to Result from Take

The primary threat to slender Orcutt grass has been the historical loss of its habitat (USFWS 2005). The covered activities will result in the loss of up to 1,422 acres of modeled habitat, representing approximately 4 percent of the current extent of modeled habitat (see Table 4–8 and Figure 4–48). Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. Neither of the 2 known occurrences of slender Orcutt grass in the Plan Area will be impacted (Figure 4–48).

Based on the available information regarding the status and distribution of slender Orcutt grass (see Appendix A), it is likely that the most of the modeled habitat that is removed by the covered activities is unoccupied by slender Orcutt grass. Implementation of AMM3 (see Chapter 6, *Conditions on Covered Activities*, 23) requires that no take of this species is permitted until at least 8 new occurrences are discovered or established in the Plan Area. After the 8 additional occurrences are protected or established and with concurrence of USFWS and CDFW, up to two occurrences discovered within proposed project footprints may be removed as long as those occurrences do not include more than 20 percent of the mean annual number of plants in protected occurrences. However, plants may not be removed if, in consultation with USFWS and CDFW, it is determined that the proposed project would remove a significant occurrence that is necessary to maintain the genetic diversity or maintain the regional distribution of the

species. Implementation of the remaining applicable AMMs (see Tables 4–7 and 5–23) will serve to further avoid and minimize impacts on slender Orcutt grass.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on slender Orcutt grass or adversely affect its Plan Area distribution or abundance.

4.4.34 Ahart's Paronychia

The maximum acreage of Ahart's paronychia habitat that will be permanently affected, directly and indirectly, with implementation of the covered activities is 2,160 acres, representing approximately 6 percent of the current extent of modeled habitat (see Table 4–8, Appendix K, *Temporary Direct and Permanent Indirect Effects of Covered Activities*, and Figure 4–51, *Ahart's Paronychia: Direct Impacts of Covered Activities* [separate files]). No known occurrences of Ahart's paronychia will be adversely affected by the covered activities (Figure 4–51).

4.4.34.1 Effects Common among Covered Activities

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction, habitat restoration, and recurring maintenance activities) could result in damage or destruction of Ahart's paronychia in unknown occurrences if present in affected habitat areas. For example, plants and seeds could be removed from soil with construction of new structures and plants could be crushed by construction- or maintenance-related equipment. Plants and seeds could suffer mortality from contamination or changes to the in the hydrology of Ahart's paronychia habitat, and invasive nonnative species could be introduced and negatively affect its habitat. These potential impacts will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.34.2 Permanent Development Projects

Direct effects of permanent development projects will result in the permanent removal of up to 1,422 acres of modeled Ahart's paronychia habitat representing approximately 4 percent of modeled habitat in the Plan Area (Table 4–8). No known occurrences of Ahart's paronychia will be impacted. As indicated in Tables 4–6 and 5–23, removal of plants in up to eight (8) currently unknown occurrences that are discovered over the term of the BRCP is permitted unless, in consultation with USFWS and CDFW, it is determined that the proposed project would remove a significant occurrence that is necessary to maintain the genetic diversity or maintain the regional distribution of the species. Indirect effects of permanent development projects will result in reduced functions of up to 740 acres of modeled habitat in the Plan Area, 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K, *Temporary Direct and Permanent Indirect Effects of Covered Activities*).

Figure 5–34 and Table 4–8 provide the acreage of modeled Ahart's paronychia habitat remaining within the Plan Area (including BRCP protected lands and lands that are not impacted by the covered activities) with full implementation of the covered activities.

4.4.34.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects within the Chico, Foothill Area, Neal Road Drop-Off and Recycling Facility, Oroville, and State Route 99 UPAs will result in permanent direct effects on up to 1,313 acres of modeled Ahart's paronychia habitat (Table 4–9). Loss of this habitat area could result in localized fragmentation habitat and/or disruption of seed or pollen dispersal patterns in occupied habitat adjacent to removed habitat areas potentially leading to reduction in genetic diversity or the increased likelihood of stochastic factors extirpating small populations.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include introduction of contaminants and erosion and sedimentation associated with construction related activities (Table 4–1). These impacts could cover leaves and flowers on individual Ahart's paronychia plants and impede their ability to photosynthesize or produce seed. The potential for temporary direct effects on Ahart's paronychia will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7. Based on an average 250-foot distance from permanent new developments within which temporary direct effects will occur for plant species (see Table 4–5), up to 740 acres of modeled Ahart's paronychia habitat will be temporarily directly affected by permanent development covered activities Plan Area-wide[173], 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K, *Temporary Direct and Permanent Indirect Effects of Covered Activities*).

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include increased human activity associated with new recreational developments in and adjacent to natural areas, altered hydrology, and introduction of nonnative species (see Table 4–1). These effects could cause the direct removal of Ahart's paronychia plants, alter the hydrology necessary for supporting its habitat, or introduce nonnative species that could negatively affect Ahart's paronychia habitat adjacent to permanent development areas.

Based on an average 250-foot distance from permanent new developments within which permanent indirect effects will occur for plant species (see Table 4–5), up to 740 acres of modeled Ahart's paronychia habitat will be permanently indirectly affected by permanent

[173] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

development covered activities Plan Area-wide[174], 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K, *Temporary Direct and Permanent Indirect Effects of Covered Activities*). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K, *Temporary Direct and Permanent Indirect Effects of Covered Activities*). These permanent indirect effects will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.34.2.2 Outside Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects will result in permanent direct effects on 109 acres of modeled Ahart's paronychia modeled habitat outside of UPAs and distributed among all the CAZs (Table 4–9). The effects of such loss of modeled habitat on Ahart's paronychia are the same as described for the permanent direct effects of implementing permanent development projects in the UPAs.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include introduction of contaminants and erosion and sedimentation associated with construction related activities (Table 4–1). The effects of these impacts on Ahart's paronychia are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs. The potential for temporary direct effects on Ahart's paronychia will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 250-foot distance from permanent new developments within which temporary direct effects will occur for plant species (see Table 4–5), up to 740 acres of modeled habitat will be temporarily directly affected by permanent development covered activities Plan Area-wide[175], 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K, *Temporary Direct and Permanent Indirect Effects of Covered Activities*).

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include increased human activity associated with new recreational developments in and adjacent to natural areas, altered hydrology, and introduction of nonnative species (see Table 4–1). These effects could cause the direct removal of Ahart's paronychia plants, alter the hydrology necessary for supporting its

[174] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.
[175] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts inside UPAs.

habitat, or introduce nonnative species that could negatively affect Ahart's paronychia habitat adjacent to permanent development areas.

Based on an average 250-foot distance from permanent new developments within which permanent indirect effects will occur for plant species (see Table 4–5), up to 740 acres of modeled Ahart's paronychia habitat will be permanently indirectly affected by permanent development covered activities Plan Area-wide[176] , 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K, *Temporary Direct and Permanent Indirect Effects of Covered Activities*). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K, *Temporary Direct and Permanent Indirect Effects of Covered Activities*).

4.4.34.3 Recurring Maintenance Activities

4.4.34.3.1 Within Urban Permit Areas

Permanent Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on Ahart's paronychia (see Table 4–1).

Temporary Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in temporary direct effects on Ahart's paronychia (see Table 4–1).

Permanent Indirect Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent indirect effects on Ahart's paronychia (see Table 4–1).

4.4.34.3.2 Outside Urban Permit Areas

Permanent Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on Ahart's paronychia (see Table 4–1).

[176] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts inside UPAs.

Temporary Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in temporary direct effects on Ahart's paronychia (see Table 4–1).

Permanent Indirect Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent indirect effects on Ahart's paronychia (see Table 4–1).

4.4.34.4 Effects of Covered Activities within Conservation Lands

4.4.34.4.1 Permanent Direct Effects

Operation of equipment to implement conservation measures to enhance, restore, and manage conservation lands could result in burying or killing Ahart's paronychia if present as a result of operating equipment and the potential for introduction of contaminants and erosion and sedimentation (Table 4–1). Habitat restoration actions could remove unknown occurrences of Ahart's paronychia if present, however, BCAG will avoid removal of any occurrences discovered within potential habitat restoration sites during BRCP biological surveys. The potential for permanent direct effects on Ahart's paronychia will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.34.4.2 Temporary Direct Effects

Temporary direct effects are associated with implementation of conservation measures include introduction of contaminants and erosion and sedimentation associated with restoration related activities (Table 4–1). These impacts could cover leaves and flowers on individual Ahart's paronychia plants and impede their ability to photosynthesize or produce seed. The primary temporary direct effect on Ahart's paronychia will be associated with restoration of up to 306 acres of vernal pool and other seasonal wetlands (see Table 5-5) within its modeled habitat. Conversion of existing lower functioning grassland habitat (small extent of appropriate hydrology) to higher functioning habitat (larger extent of appropriate hydrology) will temporarily reduce the hydrological function of the restored habitat. The potential for temporary direct effects on Ahart's paronychia will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.34.4.3 Permanent Indirect Effects

Permanent indirect effects associated with implementation of conservation measures include altered hydrology and the introduction of nonnative species (see Table 4–1). Impacts due to altered hydrological function are not expected as vernal pool and other seasonal wetlands restoration actions will increase the hydrological function necessary for supporting its habitat.

Additionally, the potential for temporary direct effects on Ahart's paronychia due to the negative effects of nonnative species will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7 and through the implementation of the conservation measures.

4.4.34.5 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of Ahart's paronychia within the Plan Area.

4.4.34.5.1 Permanent Direct Effects

Loss of up to 1,422 acres of modeled Ahart's paronychia habitat (Tables 4–8 and 4–9) could result in localized fragmentation and/or disruption of seed or pollen dispersal patterns in occupied habitat adjacent to removed habitat areas potentially leading to reduction in genetic diversity or the increased likelihood of stochastic factors extirpating small populations. No known occurrences of Ahart's paronychia will be removed (Table 4–8). As indicated in Table 6-3, however, removal of up to eight (8) currently unknown occurrences that are discovered over the term of the BRCP is permitted unless, in consultation with USFWS and CDFW, it is determined that the proposed project would remove a significant occurrence that is necessary to maintain the genetic diversity or maintain the regional distribution of the species. Permanent direct effects of these impacts will be avoided and minimized with implementation of the applicable AMMs in Table 4–7.

4.4.34.5.2 Temporary Direct Effects

A temporary reduction in the functions of up to 740 acres of modeled Ahart's paronychia habitat would result from the effects of covered activities, 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Temporary direct effects on Ahart's paronychia will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.34.5.3 Permanent Indirect Effects

A permanent reduction in the functions of up to 740 acres of modeled Ahart's paronychia habitat would result from covered activities Plan Area-wide, 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). Permanent indirect effects on Ahart's paronychia will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.34.6 Overall Impact Likely to Result from Take

The primary threat to Ahart's paronychia has been the historical loss of its habitat (CNPS 2010). The covered activities will result in the loss of up to 1,422 acres of modeled habitat, representing approximately 4 percent of the current extent of modeled habitat (see Table 4–8 and Figure 4–49). Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. None of the 5 known occurrences of Ahart's paronychia in the Plan Area will be impacted (Figure 4–49).

Based on the available information regarding the status and distribution of Ahart's paronychia (see Appendix A), it is likely that the most of the modeled habitat that is removed by the covered activities is unoccupied by Ahart's paronychia. Implementation of AMM3 (see Chapter 6, *Conditions on Covered Activities*, Table 6-3) permits the removal of newly discovered occurrences unless BCAG in coordination with USFWS and CDFW determines that those occurrences are not necessary for the survival and recovery of Ahart's paronychia. Implementation of the remaining applicable AMMs (see Tables 4–7 and 5–23) will serve to further minimize impacts on Ahart's paronychia.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on Ahart's paronychia or adversely affect its Plan Area distribution or abundance.

4.4.35 California Beaked-Rush

A habitat suitability model has not been developed for California beaked-rush because there is insufficient information regarding its habitat requirements and the distribution of the physical attributes that support its habitat in the Plan Area. None of the seven known occurrences of California beaked-rush will be adversely affected by the covered activities (Table 4–8).

4.4.35.1 Effects Common among Covered Activities

Except for the seven known occurrences, California beaked-rush plants may be removed unless in consultation with USFWS and CDFW, it is determined that the proposed project would remove a significant occurrence that is necessary to maintain the genetic diversity or maintain the regional distribution of the species and any potential impacts will be avoided or minimized with implementation of the applicable AMMs indicated in Tables 4–7 and 5–23.

4.4.35.2 Permanent Development Projects

Permanent development projects will not affect currently known occurrences in the Plan Area. As indicated in Tables 4–6 and 5–23, up to 8 currently unknown occurrences of California beaked-rush may be removed by the covered activities. Direct and indirect effects of permanent development projects on California beaked-rush will be minimized with implementation the applicable AMMs indicated in Table 4–7.

4.4.35.2.1 Within Urban Permit Areas

Permanent Direct Effects

Direct effects of permanent development projects could result in the removal of newly discovered California beaked-rush plants and habitat if present in project sites. Implementation of the applicable AMMs in Table 4–7, however, will avoid impacts on any occurrences that are necessary to maintain the distribution, abundance, and genetic diversity of newly discovered in the Plan Area.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include introduction of contaminants and erosion and sedimentation associated with construction related activities (Table 4–1). These impacts could cover leaves and flowers on individual California beaked-rush plants if present in project sites and impede their ability to photosynthesize or produce seed. The potential for temporary direct effects on California beaked-rush will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include increased human activity associated with new permanent developments in and adjacent to natural areas, altered hydrology, and introduction of nonnative species (see Table 4–1). These effects could cause the direct removal of California beaked-rush plants, alter the hydrology necessary for supporting its habitat, or introduce nonnative species that could negatively affect California beaked-rush habitat, if present, adjacent to permanent development areas. These affects will be minimized with the implementation of the applicable AMMs described in Table 4–7.

4.4.35.2.2 Outside Urban Permit Areas

Permanent Direct Effects

Direct effects of permanent development projects could result in the removal of newly discovered California beaked-rush plants and habitat if present in project sites. Implementation of the applicable AMMs in Table 4–7, however, will avoid impacts on any occurrences that are necessary to maintain the distribution, abundance, and genetic diversity of California beaked-rush in the Plan Area.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include introduction of contaminants and erosion and sedimentation associated with construction related activities (Table 4–1). The effects of these impacts on California beaked-rush are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs. The potential for temporary direct effects on California

beaked-rush will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include increased human activity associated with new recreational developments in and adjacent to natural areas, altered hydrology, and introduction of nonnative species (see Table 4–1). These effects could cause the loss of California beaked-rush plants, alter the hydrology necessary for supporting its habitat, or introduce nonnative species that could negatively affect California beaked-rush habitat adjacent to permanent development areas.

4.4.35.3 Recurring Maintenance Activities

4.4.35.3.1 Within Urban Permit Areas

Permanent Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on California beaked-rush (see Table 4–1).

Temporary Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in temporary direct effects on California beaked-rush (see Table 4–1).

Permanent Indirect Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent indirect effects on California beaked-rush (see Table 4–1).

4.4.35.3.2 Outside Urban Permit Areas

Permanent Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on California beaked-rush (see Table 4–1).

Temporary Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in temporary direct effects on California beaked-rush (see Table 4–1).

Permanent Indirect Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent indirect effects on California beaked-rush (see Table 4–1).

4.4.35.4 Effects of Covered Activities within Conservation Lands

4.4.35.4.1 Permanent Direct Effects

Operation of equipment to implement conservation measures to enhance, restore, and manage conservation lands could result in burying or killing California beaked-rush if present as a result of operating equipment and the potential for introduction of contaminants and for erosion and sedimentation (Table 4–1). Habitat restoration actions could remove unknown occurrences of California beaked-rush if present; however, BCAG will avoid removal of any occurrences discovered within potential habitat restoration sites during BRCP biological surveys. The potential for permanent direct effects on California beaked-rush will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.35.4.2 Temporary Direct Effects

Operation of equipment to implement conservation measures to enhance, restore, and manage conservation lands could cause localized erosion and sedimentation that could temporarily cover leaves and flowers on individual California beaked-rush plants if present and impede their ability to photosynthesize or produce seed. The potential for temporary direct effects on California beaked-rush will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.35.4.3 Permanent Indirect Effects

Implementation of the conservation measures are not expected to result in permanent indirect effects on California beaked-rush.

4.4.35.5 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of California beaked-rush within the Plan Area.

4.4.35.5.1 Permanent Direct Effects

No known occurrences of California beaked-rush will be directly impacted by the covered activities. As indicated in Table 6-3, however, removal of up to eight (8) currently unknown occurrences that are discovered over the term of the BRCP is permitted unless, in consultation with USFWS and CDFW, it is determined that the proposed project would remove a significant occurrence that is necessary to maintain the genetic diversity or maintain the regional

distribution of the species. If California beaked-rush plants are found within project sites, coordination with USFWS and CDFW will prevent the removal of significant occurrences necessary to maintain the genetic diversity or regional distribution of the species.

4.4.35.5.2 Temporary Direct Effects

Implementation of covered activities adjacent to occupied habitat could result in a temporary reduction in the functions of California beaked-rush habitat. Temporary direct effects on California beaked-rush will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.35.5.3 Permanent Indirect Effects

Construction of permanent development projects adjacent to occupied habitat could result in a permanent reduction in the functions of California beaked-rush habitat if present. Permanent direct effects on California beaked-rush will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.35.6 Overall Impact Likely to Result from Take

The occurrences of California beaked-rush in Little Chico Creek could be subjected to overgrazing (CNDDB 2012) and are adjacent to an active rock mining quarry. None of the 7 known occurrences of California beaked-rush will be adversely affected by the covered activities (Table 4–8).

Implementation of AMM3 (see Chapter 6, *Conditions on Covered Activities*, Table 6-3) requires that none of the seven known occurrences may be removed. With concurrence of USFWS and CDFW, newly discovered occurrences within proposed project footprints may be removed unless it is determined that the proposed project would remove a significant occurrence that is necessary to maintain the genetic diversity or maintain the regional distribution of the species. Implementation of the remaining applicable AMMs (see Tables 4–7 and 5–23) will serve to further avoid and minimize impacts on California beaked-rush.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on California beaked-rush or adversely affect its Plan Area distribution or abundance.

4.4.36 Butte County Checkerbloom

The maximum acreage of Butte County checkerbloom habitat that will be permanently affected, directly and indirectly, with implementation of the covered activities is 3,286 acres, representing approximately 9 percent of the current extent of modeled habitat (see Table 4–8, Appendix K, and Figure 4–50, *Butte County Checkerbloom: Direct Impacts of Covered Activities* [separate

files]). Eight of the 127 known occurrence of Butte County checkerbloom will be adversely affected by the covered activities (Figure 4–50).

4.4.36.1 Effects Common among Covered Activities

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction, habitat restoration, and recurring maintenance activities) could result in damage or destruction of Butte County checkerbloom in unknown occurrences if present in affected habitat areas. For example, plants and seeds could be removed from soil with construction of new structures and plants could be crushed by construction- or maintenance-related equipment. Plants and seeds could suffer mortality from contamination or changes to the in the hydrology of Butte County checkerbloom habitat, and invasive nonnative species could be introduced and negatively affect its habitat. These potential impacts will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.36.2 Permanent Development Projects

Direct effects of permanent development projects will result in the permanent removal of up to 2,638 acres of modeled Butte County checkerbloom habitat representing approximately 8 percent of modeled habitat in the Plan Area (Table 4–8). Up to 8 of the 127 known occurrences of Butte County checkerbloom will be removed by the covered activities (Table 4–8). In addition, as indicated in Tables 4–6 and 5–23, removal of plants in permanent development activity footprints and in up to 20 currently unknown occurrences of this species that are discovered over the term of the BRCP is permitted unless, in consultation with USFWS and CDFW, it is determined that the proposed project would remove a significant occurrence that is necessary to maintain the genetic diversity or maintain the regional distribution of the species. Indirect effects of permanent development projects will result in reduced functions of up to 648 acres of modeled habitat in the Plan Area, 454 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Figure O–29, *Butte County Checkerbloom Habitat in the Plan Area with full BRCP Implementation* in Appendix O and Table 4–8 provide the acreage of modeled Butte County checkerbloom habitat remaining within the Plan Area (including BRCP protected lands and lands that are not impacted by the covered activities) with full implementation of the covered activities.

4.4.36.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects within the Chico, Foothill Area, and the Neal Road Drop-Off and Recycling Facility UPAs will result in permanent direct effects on up to 2,638 acres of modeled Butte County checkerbloom habitat and removal of up to 8 known occurrences (Table 4–9). Loss of this habitat area could result in localized fragmentation habitat

and/or disruption of seed or pollen dispersal patterns in occupied habitat adjacent to removed habitat areas potentially leading to reduction in genetic diversity or the increased likelihood of stochastic factors extirpating small populations.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include introduction of contaminants and erosion and sedimentation associated with construction related activities (Table 4–1). These impacts could cover leaves and flowers on individual Butte County checkerbloom plants and impede their ability to photosynthesize or produce seed. The potential for temporary direct effects on Butte County checkerbloom will be minimized with implementation of the applicable AMMs indicated in Table 4–7. Based on an average 250-foot distance from permanent new developments within which temporary direct effects will occur for plant species (see Table 4–5), up to 648 acres of modeled Butte County checkerbloom habitat will be temporarily directly affected by permanent development covered activities Plan Area-wide[177], 454 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include increased human activity associated with new recreational developments in and adjacent to natural areas, altered hydrology, and introduction of nonnative species (see Table 4–1). These effects could cause the direct removal of Butte County checkerbloom plants, alter the hydrology necessary for supporting its habitat, or introduce nonnative species that could negatively affect Butte County checkerbloom habitat adjacent to permanent development areas.

Based on an average 250-foot distance from permanent new developments within which permanent indirect effects will occur for plant species (see Table 4–5), up to 648 acres of modeled Butte County checkerbloom habitat will be permanently indirectly affected by permanent development covered activities Plan Area-wide[178], 454 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). These permanent indirect effects will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.36.2.2 Outside Urban Permit Areas

There are no effects on Butte County checkerbloom outside of the UPAs.

[177] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.
[178] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

4.4.36.3 Recurring Maintenance Activities

4.4.36.3.1 Within Urban Permit Areas

Permanent Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on Butte County checkerbloom (see Table 4–1).

Temporary Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in temporary direct effects on Butte County checkerbloom (see Table 4–1).

Permanent Indirect Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent indirect effects on Butte County checkerbloom (see Table 4–1).

4.4.36.3.2 Outside Urban Permit Areas

There are no effects on Butte County checkerbloom outside of the UPAs.

4.4.36.4 Effects of Covered Activities within Conservation Lands

4.4.36.4.1 Permanent Direct Effects

Operation of equipment to implement conservation measures to enhance, restore, and manage conservation lands could result in burying or killing Butte County checkerbloom if present as a result of operating equipment and the potential for introduction of contaminants and erosion and sedimentation (Table 4–1). Habitat restoration actions could remove unknown occurrences of Butte County checkerbloom if present; however, BCAG will avoid removal of any occurrences discovered within potential habitat restoration sites during BRCP biological surveys. The potential for permanent direct effects on Butte County checkerbloom will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.36.4.2 Temporary Direct Effects

Operation of equipment to implement conservation measures to enhance, restore, and manage conservation lands could cause localized erosion and sedimentation that could temporarily cover leaves and flowers on individual Butte County checkerbloom plants if present and impede their ability to photosynthesize or produce seed. The potential for temporary direct effects on Butte

County checkerbloom will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.36.4.3 Permanent Indirect Effects

Implementation of the conservation measures are not expected to result in permanent indirect effects on Butte County checkerbloom.

4.4.36.5 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of Butte County checkerbloom within the Plan Area.

4.4.36.5.1 Permanent Direct Effects

Loss of up to 2,638 acres of modeled Butte County checkerbloom habitat and 8 of 93 known occurrences (Table 4–8) could result in localized fragmentation and/or disruption of seed or pollen dispersal patterns in occupied habitat adjacent to removed habitat areas potentially leading to reduction in genetic diversity or the increased likelihood of stochastic factors extirpating small populations. In addition, as indicated in Tables 4–6 and 5–23, removal of plants in permanent development activity footprints and in up to 20 currently unknown occurrences of this species that are discovered over the term of the BRCP is permitted unless, in consultation with USFWS and CDFW, it is determined that the proposed project would remove a significant occurrence that is necessary to maintain the genetic diversity or maintain the regional distribution of the species. Permanent direct effects of these impacts will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.36.5.2 Temporary Direct Effects

A temporary reduction in the functions of up to 648 acres of modeled Butte County checkerbloom habitat would result from the effects of covered activities, 454 acres of which overlap with areas subject to ongoing effects of existing permanent developments s (see Appendix K). Temporary direct effects on Butte County checkerbloom will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.36.5.3 Permanent Indirect Effects

A permanent reduction in the functions of up to 648 acres of modeled Butte County checkerbloom habitat would result from covered activities Plan Area-wide, 454 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K).

Permanent indirect effects on Butte County checkerbloom will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.36.6 Overall Impact Likely to Result from Take

The primary threats to Butte County checkerbloom are nonnative plants and possibly development, and fire suppression (CNPS 2010). The covered activities, including conservation measures, will result in the loss of up to 2,638 acres of modeled habitat, representing approximately 8 percent of the current extent of modeled habitat (see Table 4–8 and Figure 4–50). Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. Eight of the 127 known occurrence of Butte County checkerbloom will be adversely affected by the covered activities (Figure 4–50).

Based on the available information regarding the status and distribution of Butte County checkerbloom (see Appendix A), it is likely that the most of the modeled habitat that is removed by the covered activities is unoccupied by Butte County checkerbloom. Implementation of AMM3 (see Chapter 6, *Conditions on Covered Activities*, Table 6-3) permits the removal of newly discovered occurrences unless BCAG in coordination with USFWS and CDFW determines that those occurrences are not necessary for the survival and recovery of Butte County checkerbloom. Implementation of the remaining applicable AMMs (see Tables 4–7 and 5–23) will serve to further minimize impacts on Butte County checkerbloom.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on Butte County checkerbloom or adversely affect its Plan Area distribution or abundance.

4.4.37 Butte County Golden Clover

The maximum acreage of Butte County golden clover habitat that will be permanently affected, directly and indirectly, with implementation of the covered activities is 462 acres, representing approximately 3 percent of the current extent of modeled habitat (see Table 4–8, Appendix K, and Figure 4–51, *Butte County Golden Clover: Direct Impacts of Covered Activities* [separate files]). No known occurrences of Butte County golden clover will be adversely affected by the covered activities (Figure 4–51).

4.4.37.1 Effects Common among Covered Activities

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction, habitat restoration, and recurring maintenance activities) could result in damage or destruction of Butte County golden clover in unknown occurrences if present in affected habitat areas. For example, plants and seeds could be removed from soil with construction of new structures and plants could be crushed by construction- or maintenance-related equipment. Plants and seeds could suffer mortality from contamination or changes to the in the hydrology of Butte County golden clover habitat, and invasive nonnative species could be introduced and

negatively affect its habitat. These potential impacts will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.37.2 Permanent Development Projects

Direct effects of permanent development projects will result in the permanent removal of up to 236 acres of modeled Butte County golden clover habitat representing approximately 2 percent of modeled habitat in the Plan Area (Table 4–8). No known occurrences of Butte County golden clover will be removed by the covered activities (Table 4–8). As indicated in Tables 4–6 and 5-23, however, removal of plants in up to four currently unknown occurrences of this species that are discovered over the term of the BRCP is permitted unless, in consultation with USFWS and CDFW, it is determined that the proposed project would remove a significant occurrence that is necessary to maintain the genetic diversity or maintain the regional distribution of the species. Indirect effects of permanent development projects will result in reduced functions of up to 226 acres of modeled habitat in the Plan Area, 42 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Figure O–30, *Butte County Golden Clover Habitat in the Plan Area with full BRCP Implementation* in Appendix O and Table 4–8 provide the acreage of modeled Butte County golden clover habitat remaining within the Plan Area (including BRCP protected lands and lands that are not impacted by the covered activities) with full implementation of the covered activities.

4.4.37.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects within the Chico, Foothill Area, Neal Road Drop-Off and Recycling Facility, and State Route 99 UPAs will result in permanent direct effects on up to 170 acres of modeled Butte County golden clover habitat (Table 4–9). Loss of this habitat area could result in localized fragmentation habitat and/or disruption of seed or pollen dispersal patterns in occupied habitat adjacent to removed habitat areas potentially leading to reduction in genetic diversity or the increased likelihood of stochastic factors extirpating small populations.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include introduction of contaminants and erosion and sedimentation associated with construction related activities (Table 4–1). These impacts could cover leaves and flowers on individual Butte County golden clover plants and impede their ability to photosynthesize or produce seed. The potential for temporary direct effects on Butte County golden clover will be minimized with implementation of the applicable AMMs indicated in Table 4–7. Based on an average 250-foot distance from permanent new developments within which temporary direct effects will occur for plant species (see Table 4–5), up to 226 acres of modeled Butte County

golden clover habitat will be temporarily directly affected by permanent development covered activities Plan Area-wide[179], 42 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include increased human activity associated with new recreational developments in and adjacent to natural areas, altered hydrology, and introduction of nonnative species (see Table 4–1). These effects could cause the direct removal of Butte County golden clover plants, alter the hydrology necessary for supporting its habitat, or introduce nonnative species that could negatively affect Butte County golden clover habitat adjacent to permanent development areas.

Based on an average 250-foot distance from permanent new developments within which permanent indirect effects will occur for plant species (see Table 4–5), up to 226 acres of modeled Butte County golden clover habitat will be permanently indirectly affected by permanent development covered activities Plan Area-wide[180], 42 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). These permanent indirect effects will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.37.2.2 Outside Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects will result in permanent direct effects on 65 acres of modeled Butte County golden clover modeled habitat outside of UPAs and distributed among all the CAZs (Table 4–9). The effects of such loss of modeled habitat on Butte County golden clover are the same as described for the permanent direct effects of implementing permanent development projects in the UPAs.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include introduction of contaminants and erosion and sedimentation associated with construction related activities (Table 4–1). The effects of these impacts on Butte County golden clover are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs. The potential for temporary direct effects on Butte County

[179] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.
[180] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

golden clover will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 250-foot distance from permanent new developments within which temporary direct effects will occur for plant species (see Table 4–5), up to 226 acres of modeled habitat will be temporarily directly affected by permanent development covered activities Plan Area-wide[181], 42 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include increased human activity associated with new recreational developments in and adjacent to natural areas, altered hydrology, and introduction of nonnative species (see Table 4–1). These effects could cause the direct removal of Butte County golden clover plants, alter the hydrology necessary for supporting its habitat, or introduce nonnative species that could negatively affect Butte County golden clover habitat adjacent to permanent development areas.

Based on an average 250-foot distance from permanent new developments within which permanent indirect effects will occur for plant species (see Table 4–5), up to 226 acres of modeled Butte County golden clover habitat will be permanently indirectly affected by permanent development covered activities Plan Area-wide[182], 42 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K).

4.4.37.3 Recurring Maintenance Activities

4.4.37.3.1 Within Urban Permit Areas

Permanent Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on Butte County golden clover (see Table 4–1).

Temporary Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in temporary direct effects on Butte County golden clover (see Table 4–1).

[181] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts inside UPAs.
[182] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts inside UPAs.

Permanent Indirect Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent indirect effects on Butte County golden clover (see Table 4–1).

4.4.37.3.2 Outside Urban Permit Areas

Permanent Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on Butte County golden clover (see Table 4–1).

Temporary Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in temporary direct effects on Butte County golden clover (see Table 4–1).

Permanent Indirect Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent indirect effects on Butte County golden clover (see Table 4–1).

4.4.37.4 Effects of Covered Activities within Conservation Lands

4.4.37.4.1 Permanent Direct Effects

Operation of equipment to implement conservation measures to enhance, restore, and manage conservation lands could result in burying or killing Butte County golden clover if present as a result of operating equipment and the potential for introduction of contaminants and erosion and sedimentation (Table 4–1). Habitat restoration actions could remove unknown occurrences of Butte County golden clover if present; however, BCAG will avoid removal of any occurrences discovered within potential habitat restoration sites during BRCP biological surveys. The potential for permanent direct effects on Butte County golden clover will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.37.4.2 Temporary Direct Effects

Operation of equipment to implement conservation measures to enhance, restore, and manage conservation lands could cause localized erosion and sedimentation that could temporarily cover leaves and flowers on individual Butte County golden clover plants if present and impede their ability to photosynthesize or produce seed. The potential for temporary direct effects on Butte County golden clover will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.37.4.3 Permanent Indirect Effects

Implementation of the conservation measures are not expected to result in permanent indirect effects on Butte County golden clover.

4.4.37.5 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of Butte County golden clover within the Plan Area.

4.4.37.5.1 Permanent Direct Effects

Loss of up to 236 acres of modeled Butte County golden clover habitat (Tables 4–8 and 4–9) could result in localized fragmentation and/or disruption of seed or pollen dispersal patterns in occupied habitat adjacent to removed habitat areas potentially leading to reduction in genetic diversity or the increased likelihood of stochastic factors extirpating small populations. In addition, as indicated in Tables 4–6 and 5–23, removal of plants in up to four currently unknown occurrences of this species that are discovered over the term of the BRCP is permitted unless, in consultation with USFWS and CDFW, it is determined that the proposed project would remove a significant occurrence that is necessary to maintain the genetic diversity or maintain the regional distribution of the species. The acreage of removal of Butte County golden clover will be the amount of actual habitat that is located within the area of affected modeled habitat. An additional small, but indeterminable, amount of direct impacts could be associated with habitat fragmentation. Permanent direct effects of these impacts will be minimized with implementation of the applicable AMMs.

4.4.37.5.2 Temporary Direct Effects

A temporary reduction in the functions of up to 226 acres of modeled Butte County golden clover habitat would result from the effects of covered activities, 42 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Temporary direct effects on Butte County golden clover will be minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.37.5.3 Permanent Indirect Effects

A permanent reduction in the functions of up to 226 acres of modeled Butte County golden clover habitat would result from covered activities Plan Area-wide, 42 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). Permanent indirect effects on Butte County golden clover will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.37.6 Overall Impact Likely to Result from Take

There are no known threats to Butte County golden clover as it appears to always have been a rare species of very limited distribution. The covered activities will result in the loss of up to 236 acres of modeled habitat, representing approximately 2 percent of the current extent of modeled habitat (see Table 4–8 and Figure 4–51). Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. No known occurrences of Butte County golden clover will be adversely affected by the covered activities (Figure 4–51).

Based on the available information regarding the status and distribution of Butte County golden clover (see Appendix A), it is likely that the most of the modeled habitat that is removed by the covered activities is unoccupied by Butte County golden clover. Implementation of AMM3 (see Chapter 6, *Conditions on Covered Activities*) permits the removal of newly discovered occurrences unless BCAG in coordination with USFWS and CDFW determines that those occurrences are not necessary for the survival and recovery of Butte County golden clover. Implementation of the remaining applicable AMMs (see Tables 4–7 and 5–23) will serve to further minimize impacts on Butte County golden clover.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on Butte County golden clover or adversely affect its Plan Area distribution or abundance.

4.4.38 Greene's Tuctoria

The maximum acreage of Greene's tuctoria habitat that will be permanently affected, directly and indirectly, with implementation of the covered activities is 2,162 acres, representing approximately 6 percent of the current extent of modeled habitat (see Table 4–8, Appendix K, and Figure 4–52, *Greene's Tuctoria: Direct Impacts of Covered Activities* [separate files]). The 5 known occurrences of Greene's tuctoria will not be adversely affected by the covered activities and no take of this species is permitted until at least 4 new occurrences are discovered or established in the Plan Area. (Table 6-3 and Figure 4–52).

4.4.38.1 Effects Common among Covered Activities

Actions undertaken to implement the covered activities (e.g., operation of equipment for construction, habitat restoration, and recurring maintenance activities) could result in damage or destruction of Greene's tuctoria in unknown occurrences if present in affected habitat areas. For example, plants and seeds could be removed from soil with construction of new structures and plants could be crushed by construction- or maintenance-related equipment. Plants and seeds could suffer mortality from contamination or changes to the in the hydrology of Greene's tuctoria habitat, and invasive nonnative species could be introduced and negatively affect its habitat. These potential impacts will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.38.2 Permanent Development Projects

Direct effects of permanent development projects will result in the permanent removal of up to 1,422 acres of modeled Greene's tuctoria habitat representing approximately 4 percent of modeled habitat in the Plan Area (Table 4–8). No known occurrences of Greene's tuctoria will be impacted. As indicated in Tables 4–6 and 5–23, removal of plants in up to two currently unknown occurrences that are discovered over the term of the BRCP is permitted once four additional occurrences are discovered and protected or established in the Plan Area. Indirect effects of permanent development projects will result in reduced functions of up to 740 acres of modeled habitat in the Plan Area, 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Figure O–27 in Appendix O and Table 4–8 provide the acreage of modeled Greene's tuctoria habitat remaining within the Plan Area (including BRCP protected lands and lands that are not impacted by the covered activities) with full implementation of the covered activities.

4.4.38.2.1 Within Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects within the Chico, Foothill Area, Neal Road Drop-Off and Recycling Facility, Oroville, and State Route 99 UPAs will result in permanent direct effects on up to 1,313 acres of modeled Greene's tuctoria habitat (Table 4–9), which could result in localized fragmentation habitat and/or disruption of seed or pollen dispersal patterns in occupied habitat adjacent to removed habitat areas potentially leading to reduction in genetic diversity or the increased likelihood of stochastic factors extirpating small populations.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include introduction of contaminants and erosion and sedimentation associated with construction related activities (Table 4–1). These impacts could cover leaves and flowers on individual Greene's tuctoria plants and impede their ability to photosynthesize or produce seed. The potential for temporary direct effects on Greene's tuctoria will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7. Based on an average 250-foot distance from permanent new developments within which temporary direct effects will occur for plant species (see Table 4–5), up to 740 acres of modeled Greene's tuctoria habitat will be temporarily directly affected by permanent development covered activities Plan Area-wide[183], 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

[183] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include increased human activity associated with new recreational developments in and adjacent to natural areas, altered hydrology, and introduction of nonnative species (see Table 4–1). These effects could cause the direct removal of Greene's tuctoria plants, alter the hydrology necessary for supporting its habitat, or introduce nonnative species that could negatively affect Greene's tuctoria habitat adjacent to permanent development areas.

Based on an average 250-foot distance from permanent new developments within which permanent indirect effects will occur for plant species (see Table 4–5), up to 740 acres of modeled Greene's tuctoria habitat will be permanently indirectly affected by permanent development covered activities Plan Area-wide[184], 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). These permanent indirect effects will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.38.2.2 Outside Urban Permit Areas

Permanent Direct Effects

Implementation of permanent development projects will result in permanent direct effects on 109 acres of modeled Greene's tuctoria modeled habitat outside of UPAs and distributed among all the CAZs (Table 4–9). The effects of such loss of modeled habitat on Greene's tuctoria are the same as described for the permanent direct effects of implementing permanent development projects in the UPAs.

Temporary Direct Effects

Temporary direct effects are associated with construction of permanent development projects and include introduction of contaminants and erosion and sedimentation associated with construction related activities (Table 4–1). The effects of these impacts on Greene's tuctoria are the same as described for the temporary direct effects of implementing permanent development projects in the UPAs. The potential for temporary direct effects on Greene's tuctoria will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

Based on an average 250-foot distance from permanent new developments within which temporary direct effects will occur for plant species (see Table 4–5), up to 740 acres of modeled habitat will be temporarily directly affected by permanent development covered activities Plan

[184] Impacts within UPAs will be less than shown because the acreage of impact includes impacts outside of UPAs.

Area-wide[185], 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K).

Permanent Indirect Effects

Permanent indirect effects of permanent development projects include increased human activity associated with new recreational developments in and adjacent to natural areas, altered hydrology, and introduction of nonnative species (see Table 4–1). These effects could cause the direct removal of Greene's tuctoria plants, alter the hydrology necessary for supporting its habitat, or introduce nonnative species that could negatively affect Greene's tuctoria habitat adjacent to permanent development areas.

Based on an average 250-foot distance from permanent new developments within which permanent indirect effects will occur for plant species (see Table 4–5), up to 740 acres of modeled Greene's tuctoria habitat will be permanently indirectly affected by permanent development covered activities Plan Area-wide[186], 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K).

4.4.38.3 Recurring Maintenance Activities

4.4.38.3.1 Within Urban Permit Areas

Permanent Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on Greene's tuctoria (see Table 4–1).

Temporary Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in temporary direct effects on Greene's tuctoria (see Table 4–1).

Permanent Indirect Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent indirect effects on Greene's tuctoria (see Table 4–1).

[185] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts inside UPAs.
[186] Impacts outside UPAs will be less than shown because the acreage of impact includes impacts inside UPAs.

4.4.38.3.2 Outside Urban Permit Areas

Permanent Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent direct effects on Greene's tuctoria (see Table 4–1).

Temporary Direct Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in temporary direct effects on Greene's tuctoria (see Table 4–1).

Permanent Indirect Effects

There are no additional impact mechanisms associated with implementation of recurring maintenance activities that are expected to result in permanent indirect effects on Greene's tuctoria (see Table 4–1).

4.4.38.4 Effects of Covered Activities within Conservation Lands

4.4.38.4.1 Permanent Direct Effects

Operation of equipment to implement conservation measures to enhance, restore, and manage conservation lands could result in burying or killing Greene's tuctoria if present as a result of operating equipment and the potential for introduction of contaminants and erosion and sedimentation (Table 4–1). Habitat restoration actions could remove unknown occurrences of Greene's tuctoria if present; however, BCAG will avoid removal of any occurrences discovered within potential habitat restoration sites during BRCP biological surveys. The potential for permanent direct effects on Greene's tuctoria will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.38.4.2 Temporary Direct Effects

Operation of equipment to implement conservation measures to enhance, restore, and manage conservation lands could cause localized erosion and sedimentation that could temporarily cover leaves and flowers on individual Greene's tuctoria plants if present and impede their ability to photosynthesize or produce seed. The potential for temporary direct effects on Greene's tuctoria will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.38.4.3 Permanent Indirect Effects

Implementation of the conservation measures are not expected to result in permanent indirect effects on Greene's tuctoria.

4.4.38.5 Impacts on Critical Habitat

Approximately 8 acres of Greene's tuctoria designated critical habitat (Unit 2) are present in the Plan Area, all of which are located near (but not encompassing) the known occurrence of Greene's tuctoria along Highway 99 north of the Highway 149 interchange. The PCEs essential for this species' conservation as stated in the designation of critical habitat are as follows:

Topographic features characterized by isolated mound and intermound complex within a matrix of surrounding uplands that result in continuously or intermittently flowing surface water in the depressional features, including swales connecting the pools described in PCE (ii), providing for dispersal and promoting hydroperiods of adequate length in the pools.

Depressional features, including isolated vernal pools with underlying restrictive soil layers that become inundated during winter rains and continuously hold water, or whose soils are saturated for a period long enough to promote germination, flowering, and seed production of predominantly annual native wetland species and typically exclude both native and nonnative upland plant species in all but the driest years. As these features are inundated on a seasonal basis, they do not promote the development of obligate wetland vegetation habitats typical of permanently flooded emergent wetlands.

The implementation of proposed Highway 99 expansion and improvement projects and associated maintenance activities could remove up to 8 acres of designated critical habitat. Current land uses that completely occupy all of the designated critical habitat located in the Plan Area consist of a portion of State Route 99, a metals scrap yard, and an abandoned section of a contour rice field. These land uses predate the designation of critical habitat. The leveling and/or paving over of the critical habitat has eliminated the characteristic vernal pool topographic features defined in PCE 1 and has also either completely eliminated or severely altered the characteristic seasonal hydrology defined in PCE 2. Therefore, because the PCEs no longer exist within the designated critical habitat, no critical habitat will be degraded by the proposed Highway 99 expansion and improvement projects and associated maintenance activities.

Based on this assessment, the covered activities and conservation measures are not expected to impact PCEs of designated critical habitat and will not preclude the ability to recover Greene's tuctoria.

4.4.38.6 Estimated Level of Take

Implementation of all BRCP covered activities will result in the following level of estimated take of Greene's tuctoria within the Plan Area.

4.4.38.6.1 Permanent Direct Effects

Loss of up to 1,422 acres of modeled Greene's tuctoria habitat (Tables 4–8 and 4–9) could result in localized fragmentation and/or disruption of seed or pollen dispersal patterns in occupied habitat adjacent to removed habitat areas potentially leading to reduction in genetic diversity or the increased likelihood of stochastic factors extirpating small populations. No known occurrences of Greene's tuctoria will be removed. As indicated in Tables 4–6 and 5–23, removal of plants in up to two currently unknown occurrences that are discovered over the term of the BRCP is permitted once four additional occurrences are discovered and protected or established in the Plan Area. Permanent direct effects of these impacts will be avoided and minimized with implementation of the applicable AMMs in
Table 4–7.

4.4.38.6.2 Temporary Direct Effects

A temporary reduction in the functions of up to 740 acres of modeled Greene's tuctoria habitat would result from the effects of covered activities, 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Temporary direct effects on Greene's tuctoria will be avoided and minimized with implementation of the applicable AMMs indicated in
Table 4–7.

4.4.38.6.3 Permanent Indirect Effects

A permanent reduction in the functions of up to 740 acres of modeled Greene's tuctoria habitat would result from covered activities Plan Area-wide, 222 acres of which overlap with areas subject to ongoing effects of existing permanent developments (see Appendix K). Because temporary direct effects associated with projects have been included within the footprint for permanent direct effects, the acreage of permanent indirect effects for each project is the same as and not in addition to the acreage of temporary direct effects (see Appendix K). Permanent indirect effects on Greene's tuctoria will be avoided and minimized with implementation of the applicable AMMs indicated in Table 4–7.

4.4.38.7 Overall Impact Likely to Result from Take

The primary threat to Greene's tuctoria has been the historical loss of its habitat (USFWS 2005). The covered activities will result in the loss of up to 1,422 acres of modeled habitat, representing approximately 4 percent of the current extent of modeled habitat (see Table 4–8 and Figure 4–52). Because modeled habitat overestimates the actual acreage of habitat in the Plan Area, the acreage of actual habitat removed will be less. The four known extant occurrences of Greene's tuctoria in the Plan Area will not be impacted (Figure 4–52). As noted above, because the PCEs no longer exist within the designated critical habitat, no critical habitat will be degraded within the Plan Area.

Based on the available information regarding the status and distribution of Greene's tuctoria (see Appendix A), it is likely that the most of the modeled habitat that is removed by the covered activities is unoccupied by Greene's tuctoria. Implementation of AMM3 (see Chapter 6, *Conditions on Covered Activities*) requires that no take of this species is permitted until at least 4 new occurrences are discovered or established in the Plan Area. After the 4 additional occurrences are protected or established and with concurrence of USFWS and CDFW, up to two occurrences discovered within proposed project footprints may be removed as long as those occurrences do not include more than 20 percent of the mean annual number of plants in protected occurrences. However, plants may not be removed if, in consultation with USFWS and CDFW, it is determined that the proposed project would remove a significant occurrence that is necessary to maintain the genetic diversity or maintain the regional distribution of the species. Implementation of the remaining applicable AMMs (see Tables 4–7 and 5–23) will serve to further avoid and minimize impacts on Greene's tuctoria.

Based on this evaluation, implementation of the covered activities is not expected to result in adverse population-level effects on Greene's tuctoria or adversely affect its Plan Area distribution or abundance.

4.5 REQUESTED LEVEL OF TAKE AND PERMIT COVERAGE

This section describes the level of BRCP incidental take requested for coverage under ESA section 10(a)(1)(B) and Natural Community Conservation Planning Act (NCCPA) section 2835 permits (referred to collectively as the "Permits") issued for the BRCP. This request is based on the assessment of impacts of the covered activities on natural communities and covered species described in Sections 4.3 and Section 4.4 with implementation of all applicable avoidance and minimization measures (Table 4–8, Chapter 6, *Conditions on Covered Activities*), and the assessment of impacts on covered species on lands covered under neighboring landowner agreements (see Section 8.9, *Neighboring Land Owner Assurances*).

4.5.1 Natural Communities

Table 4–4 presents the maximum extent of removal (permanent direct effects) of natural communities and agricultural habitats, as mapped in the BRCP land cover mapping (Chapter 3, *Ecological Baseline Conditions*), that would result from implementation of permanent development and recurring maintenance covered activities. The maximum extent of temporary direct and permanent indirect impacts on natural communities and agricultural habitats that would result from implementation of the covered activities are presented in Table K-1, *Temporary Direct and Permanent Indirect Effects of the Covered Activities on Natural Communities and Agricultural Habitats* (in Appendix K). These natural communities support occurrences and habitat of covered species and all take of covered species resulting from removal of these natural communities is requested for coverage under the Permits.

4.5.2 Covered Species

Table 4–9 presents the maximum extent of habitat for each covered species, as modeled for the BRCP (Appendix A), requested under the Permits issued for the BRCP that could be removed by permanent development and recurring maintenance activities. Limits on the direct removal of covered plant species occurrences and take of covered wildlife species occurrences are identified in Table 4–6. Maximum allowable habitat removal for covered species is by CAZ and UPA using the species habitat models generated from the BRCP GIS dataset for covered activities.

All federal and state take of covered wildlife species and federal damage or destruction and state take of covered plant species associated with implementation of the covered activities as described in Section 4.4, with application of the avoidance and minimization measures described in Chapter 6, *Conditions on Covered Activities* is requested for authorization under the take permits. Specific prohibitions on federal and state take for specific covered species described in Table 4–6 will be followed. Take of covered species that are "fully protected" under the California Fish and Game Code[187] (greater sandhill crane, California black rail, white-tailed kite, and bald eagle) is requested as a part of the Section 2835 authorization, but only for deaths of individuals that might result from habitat removal by covered activities. No direct mortality of individuals of fully protected species from covered activities is anticipated nor requested to be covered by the permit.

Periodic and ongoing modification of habitat that supports covered species associated with implementation of the recurring maintenance activities described in Chapter 2, *Covered Activities*, are requested to be covered under the take permits with implementation of applicable avoidance and minimization measures.

All temporary direct and permanent indirect effects, up to the maximum extent of these impacts indicated in Table K-2, *Acreage of Temporary Direct and Permanent Indirect Effects of the Covered Activities on Covered Species Habitat* (in Appendix K), of the covered activities on covered species associated with implementation of applicable avoidance and minimization measures are requested to be covered under the take permits.

4.5.3 Conservation Strategy Implementation

The requested level of take resulting from direct and indirect impacts of implementing the Conservation Strategy including the conservation measures and avoidance and minimization measures described in Section 5.4; the monitoring actions described in Chapter 7, *Monitoring and Adaptive Management*; and directed studies and other adaptive management actions that may be implemented through the adaptive management process described in Chapter 7, *Monitoring and Adaptive Management* includes the following:

[187] California Fish and Game Code Sections 3511 (birds), 4700 (mammals), 5050 (reptiles and amphibians) and 5515 (fish).

- Permanent and temporary direct and indirect impacts on covered species associated with the restoration of covered species habitats on 1,118 acres of land supporting existing covered species habitats (CM4, Develop and Implement Site Specific Wetland and Riparian Restoration Plans in Section 5.4.2.1, Table 5-7) as described in Section 4.4;
- All impacts described in Section 4.4 associated with implementation of conservation measures CM1–CM3 and CM5–CM14 (Section 5.4) that may result in take of covered species;
- All take of covered species that may result from implementation of the avoidance and minimization measures (Chapter 6, *Conditions on Covered Activities*);
- All take of covered species that may be associated with implementation of the monitoring program (Section 7.2, *Monitoring Program*); and
- All take of covered species that may be associated with implementation of directed studies[188] and other adaptive management actions that may be implemented through the adaptive management process described in Section 7.3, *Adaptive Management Plan*.

4.5.4 Neighboring Landowner Agreements

Take of covered species on "neighboring lands" within 0.5 mile of BRCP conservation lands may be covered under the Permits through neighboring landowner agreements entered into by participating land owners (see Section 8.9). Take of covered species as a result of routine and on-going agricultural practices on up to 2,105 acres of neighboring agricultural lands (see Section 8.91, *Eligible Lands and Estimated Enrollment*) that is in excess of baseline conditions for the covered species on those lands is requested to be covered under the Permits.

4.6 CUMULATIVE EFFECTS

The ESA regulations define cumulative effects as "those effects of future State or private activities, not involving federal activities, that are reasonably certain to occur within the action area of the federal action subject to consultation" (50 CFR §402.02). In the case of the BRCP, the "federal action" is the issuance of incidental take permits by USFWS and NMFS and the federal "action area" is the BRCP Plan Area, as no impacts of covered activities are anticipated to extend beyond the Plan Area boundary. This definition only applies to ESA section 7 analyses and differs from the broader definition under NEPA and CEQA. The BRCP EIR/EIS presents a thorough analysis of the cumulative effects of all projects (i.e., federal and nonfederal) when combined with the effects of the covered activities.

[188] Take of covered species that may be associated with implementation of directed studies will be identified by BCAG and approved by USFWS, NMFS, and DFG before study-related actions that could result in take are implemented. Note that such take may be authorized under separate ESA section 10(a)(1)(A) scientific and enhancement permits issued to individuals conducting the research.

This section addresses the cumulative effects on covered species and their habitat from state, local, and private actions in the Plan Area that are not included in the BRCP covered activities and BRCP Conservation Strategy and could be implemented during the term of the BRCP. This analysis of cumulative effects is not a requirement under ESA section 10 or Natural Community Conservation Planning Act (NCCPA), but serves to support the cumulative effects analysis required for the USFWS and NMFS internal ESA section 7 BRCP consultations.

The following sections describe the probable effects of foreseeable nonfederal projects on covered species.

4.6.1 Flood Control Infrastructure and Improvements

The California Department of Water Resources (DWR) maintains flood control levees along the Feather River and Cherokee Canal. Levee maintenance activities are expected to be ongoing throughout the term of the BRCP. DWR levee maintenance and improvement activities are expected to result in the periodic removal of riparian vegetation that may support habitat for western yellow-billed cuckoo, yellow-breasted chat, and valley elderberry longhorn beetle between levee improvement and maintenance events. Waterside levee improvements and maintenance activities and channel stabilization activities could remove or degrade in-channel structure (e.g., in-channel woody debris, channel substrate composition, and channel side vegetation) that support habitat for the covered fish species. Ongoing maintenance of levees and channel banks will perpetuate conditions that inhibit the natural floodplain processes (i.e., sedimentation, erosion, and channel migration) that support the establishment of riparian vegetation that provides habitat for riparian-associated covered species and rearing and spawning habitat for the covered fish species.

DWR's FloodSafe Program is in the process of developing the Central Valley Flood Control Improvement Program which will identify flood improvement projects to be implemented over many years in the Central Valley (DWR 2010). The draft plan identified a potential development of a new flood bypass for the Feather River by modifying the configuration and operation of Cherokee Canal (DWR 2011). Development and operation of Cherokee Canal as a flood bypass would remove agricultural lands from production of crop types that support habitat for greater sandhill crane, Swainson's hawk, white-tailed kite, giant garter snake, and western pond turtle. Additional agricultural lands could be removed from production during years the bypass is operated if the timing of flooding precludes cultivation of crops or if the frequency of bypass operation is such that it becomes no longer economically feasible to farm within the flood footprint of the bypass. Operation of the bypass could also result in drowning of giant garter snakes that hibernate within the bypass and that cannot escape inundation and would create a barrier to north-south movement of giant garter snake within its current habitat. This proposed Feather River Bypass along the alignment of the existing Cherokee Canal was subsequently removed from the Final Central Valley Board Protection Plan adopted by the Central Valley Flood Protection Board on June 29, 2012 (California Farm Bureau Federation 2012) and therefore the impacts described here would presumably not occur.

4.6.2 Ongoing Management and Use of CDFW Wildlife Areas

The Oroville Wildlife Area and Gray Lodge Wildlife Area are located within the Plan Area. The Oroville Wildlife Area is managed primarily for controlled recreation (e.g., hunting, camping, and fishing) and Graylodge Wildlife Area is managed primarily to provide habitat for wintering waterfowl and for waterfowl and upland game hunting. Management of the Oroville Wildlife Area includes maintenance of existing recreational access and facilities. Any proposed expansion of these facilities could result in removal of riparian, wetland, and herbaceous land cover types that support modeled habitat for tricolored blackbird, western burrowing owl, American peregrine falcon, Swainson's hawk, white-tailed kite, western pond turtle, western spadefoot toad, valley elderberry longhorn beetle, and covered vernal pool shrimp and plant species. Effects of removing these habitats on associated covered species, however, are expected to be minimal because CDFW is expected to design any such expansion of facilities to minimize impacts on sensitive resources. In addition, under CM6, Maintain and Enhance Covered Species Habitat on Public and Easement Habitat Lands, BCAG will work with CDFW to identify means by which this wildlife area can be managed to benefit covered species.

Effects of any expansion of Gray Lodge Wildlife Area recreational facilities on covered species are expected to be the same as described for the Oroville Wildlife Area. Habitat management practices (e.g., the areal extent of maintained habitat types, water and other management practices) implemented on the Graylodge Wildlife Area are expected to change over the term of the BRCP. Changes in the acreage of each managed habitat could reduce or increase the availability or value of habitat for American peregrine falcon, Swainson's hawk, white-tailed kite, bald eagle, giant garter snake, and western pond turtle. In addition, under CM6, Maintain and Enhance Covered Species Habitat on Public and Easement Habitat Lands, BCAG will coordinate with CDFW to identify means by which this wildlife area can be managed to benefit covered species.

4.6.3 Wind Energy Development

The *Butte County General Plan* identifies as a land use the construction and operation of wind turbines on lands designated as agriculture within its jurisdiction (*Butte County General Plan 2030*, update 2012-04-18). Wind turbine farms are expected to be few in number and relatively small. Construction of wind turbine towers would remove agricultural, grassland, and grassland with vernal swale complex land cover types within the footprint of towers and appurtenant facilities (e.g., maintenance roads and transmission lines). Removal of these land cover types could remove habitat for the following 28 covered species.

- Tricolored blackbird
- Western burrowing owl
- Greater sandhill crane
- American peregrine falcon
- Swainson's hawk
- White-tailed kite
- Bald eagle
- Giant garter snake
- Western pond turtle
- Western spadefoot toad
- Valley elderberry longhorn beetle
- Vernal pool tadpole shrimp
- Conservancy fairy shrimp
- Vernal pool fairy shrimp
- Ferris' milkvetch
- Lesser saltscale
- Hoover's spurge
- Ahart's dwarf rush
- Red Bluff dwarf rush
- Butte County meadowfoam
- Veiny monardella
- Hairy Orcutt grass
- Slender Orcutt grass
- Ahart's paronychia
- California beaked-rush
- Butte County checkerbloom
- Butte County golden clover
- Greene's tuctoria

Rotating wind turbine blades are known to cause mortality or injury in birds and bats during seasonal migrations and local foraging flights. The susceptibility of each species for wind turbine fatalities is a function of their flight behavior (e.g., flying height above the ground), wind speed, and atmospheric conditions (e.g., foggy conditions). Operation of wind turbines in the Plan Area could result in injury and mortality of individuals of the following covered species: tricolored blackbird, Western yellow-billed cuckoo, western burrowing owl, greater sandhill crane, American peregrine falcon, Swainson's hawk, white-tailed kite, and bald eagle.

4.6.4 Utilities Infrastructure

During the term of BRCP implementation, new or replacement gas and electric utility infrastructure and facilities (e.g., gas pipelines, electric transmission lines, and substations) that are not covered under the BRCP[189] could be constructed and operated within the Plan Area. Depending on where such facilities are be located, the constructed footprints of these and associated facilities (e.g., maintenance roads), habitat for all of the covered bird, reptile, amphibian, invertebrate, and plant species could be removed. New above ground electric transmission lines would also create a collision and electrocution hazard for each of the covered bird species, though sandhill cranes and covered raptors are likely to be more susceptible to these hazards because of their foraging flight habits.

[189] Note that many gas, electric transmission, and other utility lines are covered under the BRCP – see Chapter 2, *Covered Activities*.

4.6.5 Agricultural and Ranching Practices

Routine cultivation practices on agricultural lands and grazing practices will continue over the term of the BRCP.

Ongoing ranching operations such as road construction, road maintenance, and livestock grazing may limit or degrade habitat for covered species, including western pond turtle, foothill yellow-legged frog, vernal pool invertebrates, and grassland and vernal pool plant species. Ranching activities such as pond maintenance and moderate livestock grazing, however, contribute to maintaining habitat functions for associated covered species, such as western pond turtle and western spadefoot toad. Rodent control on grazing lands not brought into the BRCP conservation land system may adversely affect western burrowing owl through reductions in prey and nesting habitat. Pesticide runoff from agricultural lands could reduce water quality in covered fish species habitats. Some ongoing cultivated agricultural activities may limit or degrade foraging habitat for tricolored blackbird and western burrowing owl. Covered species could be trampled by cattle in ranchlands and habitat could be lost due to agricultural practices that change the hydrology of an area.

Water transfers that result in fallowing or idling farm land or changing the mix of crop types grown could remove or increase/decrease the function of crop lands as habitat for agricultural-associated covered species, such as greater sandhill crane, American peregrine falcon, Swainson's hawk, bald eagle, giant garter snake, and western pond turtle. For example, fallowing or idling of rice land would remove habitat for the greater sandhill crane, giant garter snake, and western pond turtle while creating foraging habitat for Swainson's hawk. Water transfers may also directly affect the availability of aquatic habitat for giant garter snake and western pond turtle (e.g., dewatering of conveyance channels that support habitat) and flow and water quality conditions for covered fish species. Changes in crop types and cropping practices in response to changing agricultural markets and new technologies can result in similar effects on agricultural-associated covered species.

Conversion of natural habitats to agriculture or seasonal wetlands may result in removing habitat for covered species (e.g., vernal pools as habitat for associated covered species) or altering the function of the converted land as habitat for covered species (e.g., conversion of grassland to cropland may result in increasing or decreasing the foraging habitat value of the converted land for Swainson's hawk, depending on the crop types that are grown). Similarly, grading of ranching lands may remove or reduce the function of vernal pools and grassland as habitat for associated covered species. Individuals engaging in actions to grade or alter vernal pool habitats are required to first obtain permits under section 404 of the CWA, ESA, and/or California Endangered Species Act (CESA).

4.6.6 Commercial Firewood Harvest

Harvest of blue oak and other native trees in oak woodland and savanna communities could remove nesting and roosting habitat for bald eagle, Swainson's hawk, and white-tailed kite. The effects of commercial harvest, however, is expected to minimal on the availability of habitat for these species (which commonly nest and roost in single or sparse stands of trees) unless active nest and roost sites are removed.

4.6.7 Existing and New Roadways

Ongoing vehicular traffic on existing roadways, private roads, and new roadways that are not covered under the BRCP (e.g., ranchland access roads) will continue to result in collisions and subsequent mortality or injury of susceptible covered species (e.g., giant garter snake, western pond turtle, foothill yellow-legged frog) and, to a lesser extent, covered bird species (the behaviors and mobility of the covered bird species along roadways typically result in low risk for vehicle collisions).

4.6.8 Summary of the Effects of Covered Activities in Addition to Cumulative Effects

Effects of implementing the BRCP covered activities, including BRCP conservation measures, include removal of covered species habitat and the harassment, injury and mortality of covered species. Though habitat for riparian- and emergent wetland-associated covered species will be removed, implementation of habitat restoration actions will result in a net increase in habitat for these species. In addition, implementation of the BRCP conservation measures will protect over 90,000 acres of existing upland and wetland natural communities and 52 miles of perennial and intermittent streams that support habitat for the covered species. Restored and protected habitats will also be managed to maintain and improve habitat conditions for covered species and will be geographically distributed to ensure connectivity among protected and remaining unprotected habitat areas within and outside of the Plan Area. Providing this connectivity among habitat areas provides for the movement and genetic exchange of covered species across the Plan Area. As described in Section 5.6, the overall effect of implementing the BRCP covered activities and BRCP conservation measures on covered species is beneficial and therefore, implementation of the BRCP will not contribute to cumulative impacts.

4.7 JURISDICTIONAL WETLANDS AND OTHER WATERS IMPACTS

The existing extents of wetlands and other waters of the United States in the Plan Area are presented in Section 3.9, *Extent of Potential Jurisdictional Wetlands and Other Waters in the Plan Area,* using the methods to estimate existing acreage described in section 3.4.5, *Potential Jurisdictional Wetlands and Other Waters*. Table 4–11, *Impacts Estimated for Potential Jurisdictional Wetlands and Other Waters in the Plan Area by Watershed Unit* (see separate file) provides a breakdown of the impacts on jurisdictional wetlands and other waters by HUC 10

watersheds in the Plan Area. Table 4–12, *Impacts Estimated for Potential Jurisdictional Wetlands and Other Waters in the Plan Area by CAZ* (see separate file) provides a breakdown of the impacts on jurisdictional wetlands and other waters by CAZ.

While Tables 4–11 and 4–12 provide estimates of the impacts on jurisdictional waters of the United States, actual impacts will be calculated during BRCP implementation when specific projects are proposed (see Chapter 8, *Plan Implementation*). The BRCP requires jurisdictional delineation of all proposed projects to assess actual impacts. The impacts on wetlands and other waters of the United States (regulated under CWA section 404) and riparian habitats (regulated under CFGC section 1602) provided in this section give general estimates for impacts and the distribution of those impacts resulting from covered activities (described in Chapter 2, *Covered Activities*) for a regional-scale understanding of the effects of the placement of dredge and fill material into wetlands and other waters and the effects of alterations to stream banks.

4.7.1 Vernal Pools and Other Seasonal Wetlands

Vernal pools and other seasonal wetlands are found predominantly in grassland with vernal swale complex. Grassland away from streams supports scattered vernal pools and other seasonal wetlands. Grasslands associated with streams support a higher density of seasonal wetlands with very few vernal pools. Estimates of permanent direct impacts on wetlands within these three land cover types are provided in Table 4–12. Table 4–13, *Impacts on Vernal Pools and Other Seasonal Wetlands* (see separate file) depicts the methods used to calculate impacts and provides a breakdown of the estimated impacts on vernal pools and other seasonal wetlands by CAZ. Impacts on vernal pools and other seasonal wetlands (Table 4–13, part B) were estimated by multiplying the total acres of grasslands to be permanently removed by covered activities (Table 4–13, part A) that support vernal pools and other seasonal wetlands by the typical densities of wetlands in grassland, stream associated grassland, and grassland with vernal swale complex (see section 3.4.5, *Potential Jurisdictional Wetlands and Other Waters*, for description of these types). To separate the vernal pools impacts (Table 4–13, part C) from other seasonal wetlands impacts, the impacts acres for vernal pools and other seasonal wetlands (Table 4–13, part B) was multiplied by typical proportions of delineated jurisdictional wetlands that were vernal pools (Appendix I-2, *USACE-Verified Wetland Delineations Used to Estimate Density of Vernal Pools and Other Seasonal Wetlands*). The estimate for permanent direct impacts on vernal pools and other seasonal wetlands resulting from covered activities across the Plan Area is 304 acres with approximately 38 acres of this total projected to be vernal pools. Most of the impacts on vernal pools and other seasonal wetlands would result from fill for the construction of residential, commercial, and industrial developments. The potential impacts on vernal pools and other seasonal wetlands are minimized by strict limits for each UPA and CAZ set in the BRCP.

4.7.2 Riparian Habitats

Impacts on riparian forest and scrub habitats are presented in Table 4–11 by watershed and 4-12 by CAZ. Impacts on riparian forest types are estimated at 335 acres and riparian scrub at 11

acres at build-out of covered activities across the Plan Area. Most of the impacts on riparian forest and scrub habitats would result from fill for the construction of residential, commercial, and industrial developments. The potential impacts on riparian forest and scrub habitats are minimized by strict limits for each UPA and CAZ set in the BRCP.

4.7.3 Permanent Emergent Wetland

Impacts on permanent emergent wetlands are presented in Table 4–11 by watershed and 4-12 by CAZ. Impacts on permanent emergent wetlands are estimated at 35 acres at build-out of covered activities across the Plan Area. Most of the impacts on permanent emergent wetlands would result from fill for the construction of residential, commercial, and industrial developments. The potential impacts on permanent emergent wetlands are minimized by strict limits for each UPA and CAZ set in the BRCP.

4.7.4 Managed Wetlands and Managed Seasonal Wetlands

Impacts on managed wetlands and managed seasonal wetlands are presented in Table 4–11 by watershed and 4-12 by CAZ. Impacts are expected to me limited with only about 12 acres removed. Most of the impacts on permanent emergent wetlands would result from fill for the construction of residential, commercial, and industrial developments.

4.7.5 Agricultural Wetlands

Impacts on jurisdictional wetlands that may be found within agricultural lands (rice, irrigated cropland, and irrigated pasture) are presented in Table 4–11 by watershed and 4-12 by CAZ. Methods used to estimate density of wetlands within each agricultural type are provided in Table 3-16, *Potential Jurisdictional Wetlands and Other Waters in the Plan Area*. Impacts on jurisdictional wetlands within agricultural lands are estimated at 101 acres at build-out of covered activities. Most of the impacts on wetlands in agricultural lands would result from fill for the construction of residential, commercial, and industrial developments.

4.7.6 Non-Wetland Waters

Streams, drainage channels, ponds, and open water (mostly large reservoirs and major canals) comprise the non-wetland, other waters of the United States, in the Plan Area. No permanent direct impacts on natural permanent and intermittent streams are allowed under the BRCP. No permanent direct impacts on the reservoirs and major canals are allowed under the BRCP. Where agricultural lands are developed, agricultural drainages would be removed. Up to 52 ponds may be removed by covered activities. At a mean pond size of 0.48 acres, the removal of 52 ponds would amount to approximately 25 acres of impacts on waters of the U.S.

CHAPTER 5. CONSERVATION STRATEGY

5.1 INTRODUCTION

This chapter presents the Butte Regional Conservation Plan (BRCP) Conservation Strategy, which consists of multiple components that are designed collectively to achieve the BRCP planning goals and conservation objectives described in Chapter 1, *Introduction*, and the Planning Agreement (Appendix H, *Butte Regional Conservation Plan Planning Agreement*). The Conservation Strategy identifies the intended biological outcomes of BRCP implementation and describes the means by which these outcomes will be achieved. The Conservation Strategy includes specific and measurable BRCP biological goals and objectives and a comprehensive set of conservation measures designed to provide for the conservation of covered species and the natural communities upon which they depend, and to appropriately avoid, minimize, and mitigate for the impacts of the covered activities (Chapter 2, *Covered Activities*) on these resources. The Conservation Strategy provides for the establishment of monitoring and adaptive management programs to ensure the BRCP conservation measures can evolve as new data and information become available. The BRCP Conservation Strategy has been developed to meet the regulatory standards of section 10 of the federal Endangered Species Act (ESA)[1] and the state Natural Community Conservation Planning Act (NCCPA).

The elements of the Conservation Strategy are as follows:

- Methods and approach to achieving conservation, including a framework and assembly principles for the development of the system of conservation lands based on the principles of conservation biology (Section 5.2, *Methods and Approach*).
- Biological goals and objectives for landscape, natural community, and species-specific levels that represent the intended biological outcomes of BRCP implementation (Section 5.3, *Biological Goals and Objectives*).
- Conservation measures (Section 5.4, *Conservation Measures*) to achieve the biological goals and objectives
- A description of how implementation of the conservation measures is expected to conserve each of the natural communities, covered species, and BRCP local concern species (described in Section 5.5, *Conservation Provided for Natural Communities*, Section 5.6, *Conservation Provided for Covered Species*, and Appendix N, *Benefits of Conservation Measures for Local Concern Species*, respectively).

[1] The BRCP also provides the necessary information for (U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NFMS) intra-agency consultations under section 7 of the ESA to support the permit issuance decisions by these agencies.

5.2 METHODS AND APPROACH

The methods and approach to developing the Conservation Strategy are described in this section, including the framework of the Conservation Strategy and the development of the terrestrial and aquatic components of the Conservation Strategy.

5.2.1 Framework for the Conservation Strategy

The Conservation Strategy is designed to meet the regulatory requirements of ESA and the NCCPA and to streamline compliance with California Environmental Quality Act of 1970 (CEQA), National Environmental Policy Act of 1969 (NEPA), and other applicable environmental regulations (Chapter 1, *Introduction*). To meet the NCCPA permit standards, the Conservation Strategy provides for the conservation of covered species by protecting, enhancing, restoring, and managing natural communities and species habitat. The Conservation Strategy also achieves the objectives listed below, pursuant to the NCCPA (Fish and Game Code Section 2820).

- Conserve, restore, and provide for the management of representative natural and semi-natural[2] landscapes.
- Establish reserves that provide for the conservation of covered species within the BRCP geographic area and linkages to adjacent habitat outside the BRCP Plan Area.
- Protect and maintain habitat areas that are large enough to support sustainable populations of covered species.
- Incorporate in the reserves (BRCP conservation lands) a range of environmental gradients and high habitat diversity to provide for shifting species distributions in response to changing circumstances.
- Sustain the effective movement and interchange of organisms between habitat areas in a manner that maintains the ecological integrity of the reserve system (BRCP conservation lands).

The Conservation Strategy is based on the best scientific data available (Chapter 3, *Ecological Baseline Conditions* and Appendix A, *Covered Species Accounts*) and was designed using a multi-level ecological approach in accordance with principles of conservation biology (Noss 1987). At the highest ecological level, biological goals and objectives were developed to encompass ecological processes, environmental gradients, biological diversity, and regional landscape connectivity. Conservation measures were developed to achieve these landscape-level goals and objectives. At the middle ecological level, goals, objectives, and conservation measures were developed to conserve natural communities through the protection, enhancement,

[2] A semi-natural landscape is defined as one that is disturbed by human activity but still provides important habitat for a variety of native species.

restoration, and management of physical habitat. At the finest ecological level goals, objectives, and conservation measures address additional specific needs (additional to the landscape-level and natural community-level conservation) of covered species to protect individuals and populations and to protect and enhance specific areas of species habitat.

Using this hierarchical approach, the conservation needs of many covered species are met through the landscape and natural community-level measures, with additional conservation needs met by species-specific measures for covered species whose conservation needs could not be fully addressed at the landscape and natural community levels.

The conservation measures are described with sufficient detail and specificity to allow for their implementation. Because of the large scale and long timeframe over which the BRCP will be implemented, the conservation measures are also designed to be flexible to allow for adaptive management with ever increasing knowledge over time. For example, natural community-level actions provide broad management guidelines and principles so future land managers can implement specific techniques on the grounds that are best suited to site conditions. Preserving this flexibility is an important component of the Conservation Strategy.

5.2.2 Information Sources

Primary sources of information used to develop the Conservation Strategy include the following:

- Ecological information presented in Chapter 3, *Ecological Baseline Conditions*;
- Covered species life history and status information presented in Appendix A;
- Recommendations provided by the BRCP Independent Science Advisory Panel (see Appendix G, *Independent Science Advisors Reports*;
- Relevant United States Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) biological opinions issued under ESA;
- The *Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon* (USFWS 2005);
- The public draft recovery plan for Central Valley salmonids (NMFS 2009);
- Previously prepared species conservation and management plans applicable to the Plan Area;
- Information provided by technical experts familiar with the ecological resources of and conservation opportunities in the Plan Area;
- Information provided by USFWS, NMFS, and California Department of Fish and Wildlife (CDFW) resource experts; and
- Covered species habitat models presented in Appendix A.

5.2.3 Assembly of Conservation Lands

5.2.3.1 Regulatory Context

A major aspect of a Natural Community Conservation Plan (NCCP) is to describe the proposed design of a reserve system[3] within the plan area. The NCCPA requires that a reserve system (referred to as a "system of habitat reserves") or equivalent conservation be described in the plan:

> *The plan provides for the protection of habitat, natural communities, and species diversity on a landscape or ecosystem level through the creation and long-term management of habitat reserves or other measures that provide equivalent conservation of covered species appropriate for land, aquatic, and marine habitats within the plan area. [Section 2820(3)].*

The reserve system does not need to be specifically described with demarcated boundaries on a map; rather, it can be described based on a defined process driven by a set of design criteria. Such design criteria for the BRCP follow the BRCP conservation land assembly principles described in Section 5.2.3.6, *Role of Public and Easement Habitat Lands* and are listed as site selection criteria in Conservation Measure 1. The reserve system under the BRCP is referred to as the "BRCP conservation lands."

5.2.3.2 Ecosystem Considerations

The NCCPA requires that the plan address the conservation of ecosystem functions, environmental gradients, biological diversity, and shifting species distributions. A well-prepared Habitat Conservation Plan (HCP) under the ESA also addresses these issues, though there is no specific regulatory requirement to do so under the ESA. As a joint HCP/NCCP the BRCP addresses the species, habitat, and natural community conservation requirements of both ESA and NCCPA. Conservation of biological diversity in the Plan Area is addressed through a number of conservation measures and application of the following elements of the Conservation Strategy.

- **Landscape-Level Conservation.** Landscape-level goals address the spatial distribution of natural communities on major geomorphic surfaces or landforms in the Plan Area This approach conserves the natural communities and biodiversity associated with each of the geomorphic landforms.
- **Connectivity and Patch Size.** Conservation land assembly principles addressing minimum patch sizes and connectivity for each natural community also support

[3] The term reserve" refers to any area of land or water used in implementing the HCP/NCCP to achieve the conservation goals of the plan. These areas may be acquired and protected through fee title or conservation easement and may include existing, restored, created, or enhanced habitat. The reserve system refers to the complete assemblage of reserves within the plan area. The BRCP refers to this "reserve system" as the "BRCP conservation lands."

conservation of biodiversity. Species with the largest range and movement requirements and species that are most sensitive to movement barriers were used to set minimum thresholds for protection of natural communities and thus serve as appropriate parameters for addressing these habitat requirements for other native species in the Plan Area.

- **Environmental Gradients.** Measures to protect environmental gradients also protect biodiversity. Environmental gradients are important to biodiversity, individual and population movement and migration, and shifting species distributions. The landscape-level goals and objectives are designed to direct the distribution of and spatial relationships among BRCP conservation lands so natural environmental gradients present in the Plan Area will be protected. Regional climate change as a result of factors causing global climate change is anticipated to result in shifting species distributions within the Plan Area. Based on predicted changes in local climate, it is anticipated that species distributions will shift to higher altitudes and higher latitudes (though some plant and invertebrate distributions may shift more in response to moisture changes). Thus, protecting natural environmental gradients across elevations in the Plan Area will provide an appropriate range of conditions to accommodate these distributional shifts.
- **Ecological Processes.** The conservation strategy includes conservation land assembly principles and habitat management measures to address ecological processes. The configuration of BRCP conservation lands (size, shape, and proximity to developed land) can have a profound effect on the type and effectiveness of habitat management techniques that can be used (e.g., managed grazing, controlled fire, and watershed management). Habitat management measures to recreate natural disturbance regimes and a mosaic of successional ecological communities also serve to maintain biodiversity.

5.2.3.3 Landscape Context -- Conservation Acquisition Zones

To facilitate the development of a spatially explicit conservation strategy, and to ensure that biological goals and objectives are addressed consistently throughout the Plan Area, the Plan Area is divided into six Conservation Acquisition Zones (CAZs): Sierra Foothills, Cascade Foothills, Northern Orchards, Southern Orchards, Basin, and Sacramento River (Figure 3–1, *Butte Regional Conservation Plan Conservation Acquisition Zones (CAZ)*).

CAZs are large sections of the Plan Area each dominated by different large-scale ecological, geomorphic and land use conditions. Each CAZ supports its own predominant ecological, topographical, landscape, and other natural community conditions that differentiate it from other CAZs. While CAZs were generally identified for major natural geomorphic and ecological features, the specific CAZ boundaries were delineated using clearly recognizable features, such as roads and parcel boundaries, rather than vegetation, soil type, or geologic feature edges, to allow for easy identification of those boundaries for planning and implementation of the BRCP.

The primary purpose of CAZ units is to describe the specific areas in which conservation actions (such as land acquisition and habitat restoration) will occur without necessarily identifying

individual parcels for the actions. For each CAZ, specific goals and criteria are identified in the conservation strategy for the protection of natural communities and species habitats they support such that an organized assembly of the system of conservation lands can be conducted by Butte County Association of Governments (BCAG) as the Implementing Entity (see Chapter 9, *Implementation Structure*).

This approach focuses conservation actions in a spatially explicit manner while maintaining the flexibility to conduct these actions on different parcels within a CAZ to meet the same conservation objectives (i.e., to respond to willing sellers where they arise). The arrangement of the CAZs also provides a mechanism to apply conservation actions at several spatial scales using consistent units (e.g., within a watershed, within a combination of CAZs, or within a single habitat type).

In defining BRCP covered activities, 11 Urban Permit Areas (UPAs) were delineated to address impacts and conservation within the existing and planned future urban portion of the Plan Area (Chapter 2, *Covered Activities*). These UPAs are a spatial subset of the CAZs in which they are contained. Thus, the spatial scale at which biological goals and objectives were developed is relevant biologically through the CAZs that represent major ecosystem units (Figure 3–1) and also related to the UPAs that comprise the areas in which most future development and impacts on biological resources are projected to occur.

Brief descriptions of major features of the CAZs are provided below:

Sierra Foothills CAZ is dominated by the geologic features that define the foothills of the Sierra Nevada within the Plan Area. Highway 70 was used as a clear way to identify the boundary between the Sierra Foothills and Cascade Foothills CAZs, though the actual geologic boundary is just north of Highway 70. Highways 70 and 99 were used as a clear way to identify boundaries between the Sierra Foothill CAZ and the Southern Orchard and Basin CAZs. The Sierra Foothills CAZ encompasses portions of several major geological formations including Jurassic Volcanic Rock, Laguna, Lovejoy, and Riverbank. The land cover is dominated by grasslands, vernal pools terrain, and oak woodlands and savanna natural communities; Lake Oroville and associated forebay and afterbay; and the urban and rural residential communities associated with the City of Oroville.

Cascade Foothills CAZ is dominated by the geologic features that define the foothills of the Cascade Range within the Plan Area. Highway 70 was used as a clear way to identify the boundary between the Cascade Foothills and Sierra Foothills CAZs, though the actual geologic boundary is just north of Highway 70. Highway 99 was used as a clear way to identify boundary between the Cascade Foothill CAZ and the Northern Orchard CAZ. This CAZ encompasses portions of the Red Bluff, Riverbank, and Tuscan geological formations. The land cover is dominated by grasslands, vernal pool terrain, and oak woodlands and savanna natural communities and the urban and rural residential communities associated with the City of Chico.

Northern Orchards CAZ is dominated by orchards and lies on more recent and coarser textured alluvial soils between the flood plain of the Sacramento River and Highway 99, which generally corresponds to the break in the slope at the toe of the Cascade Foothills. While this CAZ is dominated by the Modesto geomorphic formation, at the northern end of the CAZ there is an area comprised of the older Riverbank and Red Bluff formations. The northern boundary of the CAZ corresponds to the border of Butte County while the southern boundary with the Basin CAZ roughly corresponds to the northern extent of finer textured basin soils and areas of rice production and follows parcel boundaries and the channel of Butte Creek.

Southern Orchards CAZ is dominated by orchards and, similar to the southernmost area of the Northern Orchard CAZ, lies on the Lower Modesto geological formation geological formation with coarser textured soils than the clay soils of the rice production region in the Basin CAZ to the west. The northern end of the CAZ follows the southern border of the Thermalito Afterbay while the southern boundary corresponds to the border of Butte County.

Basin CAZ is dominated by rice production, duck clubs, and CDFW areas. Its western border is Butte Creek and the Butte County line and its southern border is also the county line. Its northern and southeastern borders are demarcated by parcel boundaries between the Northern Orchard and Southern Orchard CAZs that generally mark soil transitions. Its northeastern border follows Highway 99.

Sacramento River CAZ is dominated by riparian forest and scrub, managed wetlands, irrigated cropland, and orchards on soils associated with the Sacramento River formed by natural levee, channel, and basin deposits. Seven Mile Road and River Road mark the eastern boundary of the CAZ, separating it from areas dominated by rice land and orchards in the Basin and Northern Orchards CAZs.

5.2.3.4 Spatial Considerations for Conservation Lands

Spatial considerations are important in conservation reserve design (Spencer et al. 2010, Huber et al. 2010). The development of a conservation lands reserve system for covered species is intricately linked to dynamic landscape processes (e.g., dispersal, seasonal distribution, migration, metapopulation structure).

The BRCP conservation lands design tenets are based on numerous studies and theoretical components of the discipline of conservation biology (Kirkpatrick 1983; Margules et al. 1988; Vane-Wright et al. 1991; Nicholls and Margules 1993; Pressey et al. 1993, 1996, 1997; Church et al. 1996; Ando et al. 1998; Polasky et al. 2001, Spencer et al. 2010).

Typically, diversity, rarity, naturalness, size and representativeness are the most widely used design criteria for reserve systems (Margules et al. 1988). Other considerations include island biogeography design principles (MacArthur and Wilson 1963, 1967). These are: 1) area effect – the larger the reserve, the greater the species richness (i.e., species/area relationship) and the greater the chances of long-term viability of populations (more individuals); 2) isolation or

distance effect – the less the distance between reserve units, the greater the opportunity for gene flow, colonization, and rescue effect (e.g., also see Brown and Kodric-Brown 1977); 3) species equilibrium – the number of species that an area can support is determined by a balance between colonization and extinction; and 4) edge effect – the larger the ratio of reserve area to reserve perimeter, the lesser the edge effect. An edge effect is defined as a change in the "conditions or species composition within an otherwise uniform habitat as one approaches a boundary with a different habitat" (Ricklefs 1993). Edge effects at the boundary between natural lands and human-occupied lands ("urban edge effects") arise due to human-related intrusions such as unofficial youth recreational activities, invasive species, feral predators (dogs, cats), lighting, noise, off-road activities, contaminants, and other disturbances. Although some species may be unaffected by edges or even show preferences for them, human-induced edge effects are generally unfavorable to native species

Patch size is related to the concept of ecological thresholds (i.e., a point or zone at which a relatively rapid change occurs from one condition to another) (Huggett 2005). For example, some species are limited in the maximum distance between patches they will cross, or in the minimum habitat patch a species requires to fulfill its reproductive needs. Most special-status species are area-sensitive and breed or forage only in patches exceeding a certain minimum size. In addition, rates of predation or nest parasitism may increase as patch size declines (Donovan et al. 1995, Robinson et al. 1995, Tewksbury et al. 2006). Patch configuration is important for various factors. If patches are spatially aggregated, they are prone to suffer simultaneously from large-scale disturbances such as fires or floods.

A particularly important spatial requirement is the connectivity of landscapes, which has been shown to influence the persistence of metapopulations (a number of distinct populations of a species in the same general area). Landscape connectivity is a measure of "the degree to which the landscape facilitates or impedes movement among resource patches" (Taylor et al. 1993). Impaired or reduced connectivity within a landscape increases habitat fragmentation and isolation, which in turn can lead to lower species diversity (Bolger et al. 1997, Bolger et al. 2000) or extinction of local populations (Hanski 1994, Gu et al. 2002, Nabe-Nielsen et al. 2010). If patches are too distant from each other or separated by an inhospitable "matrix," species may not recolonize patches or may suffer from genetic isolation. Barrier-limited species are sensitive to fragmentation and edges as they restrict movements or may impose increasing mortality (e.g., roads). Populations are thus more likely to persist in larger, better connected habitat fragments. It is the challenge of an effective reserve strategy to relate the structural connectivity (among map elements) to the functional connectivity (the response of individuals to the landscape's structure).

Wildlife movement corridors are increasingly considered as an important management concept that can aid in the enhancement of landscape connectivity (Price et al. 1994, Beier and Noss 1998). Movement corridors are often linear and facilitate efficient movement by providing adequate cover and lack of physical obstacles for movement (Beier and Loe 1992), but generally do not provide a full complement of life history requirements. Linkages, in contrast, provide

resources that meet the life history requirements for the species as well as movement habitat for a particular species. Landscape linkages are capable of sustaining a full range of natural community and ecosystem processes, such as seed dispersal and animal movement over a period of generations. Because habitat connections may function only as movement corridors for some species, but provide a linkage for others, the BRCP conservation strategy's focus is on identifying linkages, assuming that they do not constrain movement for the majority of covered species. Linkages, therefore, serve to ameliorate habitat fragmentation and isolation.

"Assembly principles" are rules used in regional conservation planning to describe desired land and habitat characteristics and to guide selection of high-value conservation lands during plan development and plan implementation. The conservation land assembly principles will guide BCAG in the acquisition of lands for the establishment of the conservation lands system over time during BRCP implementation. Spatial considerations that address landscape-level needs of the covered species (e.g., dispersal, seasonal distribution, migration, metapopulation structure) are important in ensuring that conservation lands are assembled in a manner that achieves the biological goals and objectives. The NCCP General Process Guidelines (Department of Fish and Game [DFG] 1998) and NCCPA describe reserve design tenets that provide the framework for the conservation planning process, and can be summarized as follows:

- Conserve covered species and their habitats throughout the Plan Area;
- Conserve large habitat blocks;
- Conserve habitat diversity;
- Keep reserves contiguous and connected; and
- Protect reserves from encroachment and invasion by nonnative species.

The conservation land assembly principles are consistent with these tenets and have been developed to provide guidance to BCAG in its evaluation and selection of conservation lands. Criteria based on these principles for acquisition of specified natural communities are described in conservation measure CM1, Acquire Lands (Section 5.4.1.1).

5.2.3.4.1 Conservation Lands System Assembly Principles

- Select lands known to be occupied by covered species or that support suitable habitat that is contiguous with occupied habitat (lands currently known to be occupied by covered species).
- Select patches of natural communities that support the highest functioning habitat for covered species that are available.
- Select lands with ecological functions that will serve to achieve multiple biological objectives.
- Select lands that will protect covered species of limited distribution.

- Select lands with high connectivity to other habitat areas that support other life history functions of the target covered species (e.g., acquire Swainson's hawk riparian nesting habitat that is located within the foraging flight distance of Swainson's hawk to foraging habitat areas).
- Select lands that capture the range of variability (e.g., gradients, geological substrates) on which a natural community occurs.
- Select lands that support the most reliable hydrology for maintaining protected natural communities and habitats into the future (i.e., lands that protect wetlands, ponds, and streams and their supporting intact and relatively undisturbed watersheds).
- Select lands that maximize connections to conservation lands within and outside of the Plan Area to provide connectivity to covered species and other native species populations and occurrences within and outside the Plan Area, to maintain gene flow and the movement of individuals and populations at all time-scales.
- Select lands that, in addition to supporting covered species habitats and occurrences, are occupied by non-covered special-status wildlife and plant species.
- Select lands that provide habitat mosaics (e.g., grassland/oak woodland) as opposed to lands with only single vegetation communities represented.
- Select lands that are of sufficient size and configuration to ensure that they can be effectively managed to maintain or enhance ecological processes and habitat function given site constraints. This includes protecting large, connected and contiguous grasslands, which facilitate effective grazing and range management.
- Select lands with a watershed context and maximize the acreage of watersheds protected. Conserve all or as much of entire watersheds as practicable consistent with achieving acreage targets to maintain natural hydrological connectivity and water quality (e.g., from tributaries to mainstem rivers, from wetlands to uplands).
- Select lands that include confluences of riverine/riparian systems (i.e., junctions of tributaries with larger streams or rivers) as riparian junctions can serve as biodiversity hotspots.
- For achieving aquatic natural community and species habitat targets, select lands with sufficient upland habitat around aquatic habitats to maintain water quality and ecological integrity. Protect habitat buffer zones based on stream size and order, adjacent vegetation types, and the needs of associated species.

5.2.3.4.2 Conservation Lands System Assembly Concepts

The following describes important conservation land assembly concepts embedded within the assembly principles and that capture the dynamic interdependencies among sites and species populations.

Patch Size. Applying conservation protection to larger units of land supporting natural communities and covered species habitats contributes to achieving a variety of conservation goals and objectives. Larger land areas provide for species with larger home range sizes, such as large mammals and raptors. Larger units also are more likely to support more species, larger populations of covered species, and more diverse ecological conditions at varied elevations. Large conservation parcels have a lower edge-to-area ratio, and therefore have less potential to experience detrimental effects of adjacent land uses. In addition, larger parcels often provide more ecological functions, such as supporting pollinator and prey populations, and they can be more efficiently managed than several smaller parcels encompassing the same acreage of land. However, small parcels can also provide viable conservation functions, especially when they are essential in sustaining covered species (i.e., localized occurrences of rare plants), where they may provide a "stepping stone" in bridging gaps between larger units, or where preserving large parcels is not an option. For example, the conservation strategy will prioritize the protection of small freshwater springs and seeps as likely hotspots of aquatic insect diversity and endemism (Erman 1996).

Desired minimum patch sizes that will be used to guide BCAG in its acquisition of each natural community are presented in Table 5–1, *Natural Community Acquisition Patch Size, Configuration, and Habitat Connectivity Considerations Based on Planning Species* (see separate file). These minimum patch sizes are based on the habitat requirements of the "planning species"[4] listed in Table 5–1 that were selected for this purpose. These species were selected as planning species for establishing minimum patch size requirements because they currently or historically occurred in the Plan Area and because they are "area-limited species"[5] and include two covered species (i.e., western yellow-billed cuckoo and yellow-breasted chat). They have the largest habitat patch size requirements among native species inhabiting each of the natural communities; thus, achieving the patch size requirements for these species fulfills achieving the patch size requirements of all the covered species and most other native species associated with each of the natural communities. It is also important to consider minimum patch size constraints within the context of the landscape and adjacent parcels. A medium-sized parcel connected to another medium-sized parcel may provide a combined patch size sufficient to provide ecological functions to covered species, while a larger parcel embedded in an inhospitable land cover matrix may not. Thus, minimum desired patch sizes may be attained by acquiring smaller patches of the natural community that adjoin other existing protected patches of a size sufficient to achieve the overall patch size objective. To achieve the habitat acquisition targets for some covered species, it may not be possible to acquire natural communities in the recommended patch sizes; in these instances, the minimum covered species habitat patch size requirements for covered species listed in Table 5–2, *Covered Wildlife Species Habitat Acquisition Patch Size,*

[4] Planning species are species with habitat requirements or other needs that assist in developing plan goals and objectives. Such species may be area-, dispersal-, resource-, or process-limited (Lambeck 1997).

[5] *Area-limited species* have large home ranges, occur at low densities, or otherwise require large areas to maintain viable populations. Examples include large mammals (especially carnivores) and large raptors (Lambeck 1997).

Configuration, and Habitat Connectivity Considerations (see separate file) will be used to guide acquisition of conservation lands.

Connectivity with Existing Habitat Areas. The life history requirements of many of the covered wildlife species are supplied by several habitat types that are located within the movement distance of the target covered species. Consequently, it is important that habitat types on lands protected under the BRCP be located within the movement distance of the target covered species to lands supporting other habitat types required by the covered species. Connectivity of habitats and their spatial arrangement affect not only the persistence of species but also the general ecological functioning of protected lands and the ability to effectively manage them (Williams et al. 2005). The focus of the BRCP conservation strategy is the development of effective conservation land assemblages (Gurd et al. 2001) consisting of various parcel sizes linked by migration corridors and protected by buffer zones (Spencer et al 2010). The position of a parcel within the context of the landscape and the patch's contribution to ecosystem functions and processes are important considerations.

Wide-ranging and migratory species, such as black-tailed deer herds, was used to identify important corridors among and the spatial arrangement of Conservation System Lands (Table 5–1). Establishing terrestrial and aquatic buffer zones will be considered based on the ecological context (stream size, ecotone type, and species and ecological functions to be protected [Semlitsch and Bodie 2003]). Maintaining upland habitat buffers around riparian and aquatic systems is a crucial element for maintaining the integrity and connectivity of aquatic systems (Naiman and Decamps 1997) and for the conservation of amphibians and reptiles (Roe and Georges 2007). The habitat connectivity considerations for each of the covered wildlife and fish species that will be used by BCAG to guide selection of conservation lands for acquisition are presented in Table 5–2.

Covered Species Occurrence. Conservation of habitat for the covered species is one purpose of the BRCP. In general, areas that support more covered species or larger populations of covered species will receive priority for selection as conservation lands. The estimated extent (areal or linear) of habitat that will need to be conserved to achieve the goals and objectives was based on presently known species occurrences and species habitat models (Appendix A). Land protection thus will be guided by accumulating information on species occurrences during Plan implementation, to ensure protection of areas of known species occurrence (rather than relying solely on predicted occurrence based on species habitat models).

Natural Disturbance Regimes. Erosion, sedimentation, floods, fire, drought, storms and herbivory are important ecosystem processes that have formed and maintained the natural diversity of the Plan Area. The ability to maintain these natural disturbance processes, as well as other ecosystem processes, is important to maintaining natural diversity. Livestock grazing and proper range management are important management tools for grasslands, swale complex, vernal pool, and oak savanna communities and specific covered species habitats within these communities. The BRCP conservation strategy recognizes the cultural and ecological role of

livestock grazing that has shaped the working landscapes of the Plan Area. Managed grazing can maintain desired vegetation conditions, biological diversity, and some covered species in the Plan Area. For example, grazing can control woody vegetation and maintain some grassy stream and pond banks for use by pond turtles, giant garter snakes, or other species; maintain desired habitat conditions for grassland species like burrowing owls and tricolored blackbirds; and control invasive plants that otherwise can dominate vernal pool vegetation and adversely affect covered plants. Management actions on conservation lands will include continuation of successful grazing practices and modification of grazing practices to improve ecological conditions as appropriate. Management actions such as prescribed burning may be required to restore or maintain ecological processes. Conservation lands will be selected based in part on the degree to which natural hydrologic and other physical disturbance processes (e.g., herbivory, fire regime) are intact or can be restored quickly. Major riparian corridors are the "backbones" of a hydrologically connected assemblage of protected lands, and riparian junctions provide opportunities to develop protected nodes. Protection of mature riparian vegetation communities, native floodplains, and restoration of native riparian vegetation and hydrological functions to broaden existing riparian vegetation and floodplains is a high priority, where feasible. A diversity of flow regimes of aquatic systems will be considered, to support the biological diversity and productivity associated with seasonal or intermittent flow regimes (Maslin et al. 1997, Richter and Richter 2000).

Relationship to Existing Conservation Areas. BCAG will give preference to acquisition of conservation lands that adjoin or may be linked to other Public and Easement Habitat Lands (PEHL; see Section 5.2.3.6), in balance with other conservation land assembly needs (i.e., to achieve wide geographic representation of habitats). Spatial scale in designing the conservation lands assembly is an important consideration, as it ensures not only effective linkages between locally important patches but also an ecologically meaningful connectivity with conservation lands outside the Plan Area (Huber et al. 2010). Lands proximal to, and linking with, existing PEHL are better suited to support mobile species, allow greater management flexibility (e.g., prescribed fire), and buffer conservation lands from external disturbances. Hydrological connectivity is important for supporting ecological function in aquatic, wetland, and riparian systems. (Mount 1995). As lands are protected during Plan Implementation, decisions regarding selection of subsequent lands to be protected will be based in part on the configuration of conservation lands in place at that time.

Compatibility with Other Conservation Programs. BCAG will give preference to acquisition of conservation lands that also serve to achieve other regional and local conservation programs where those other programs are compatible and consistent with BRCP goals and objectives. Examples are protecting lands that contribute to the strategy of the California Essential Habitat Connectivity Project (Spencer et al 2010) and that provide connectivity with habitat planned for protection in adjacent counties (e.g., Yuba-Sutter HCP/NCCP), and areas of specific local concern, such as protecting watershed conditions that are important salmon or steelhead fish runs in Butte County streams (e.g., Butte Creek, Big Chico Creek).

Adjacent Sources of Disturbance. Developed and disturbed areas adjacent to conservation lands, including roads, towns, and agricultural lands, have the potential to introduce a variety of influences that may disrupt natural processes and degrade resource values, including noxious weeds, pesticide drift, incursion by free-ranging pets and nonnative wildlife, unplanned fire ignitions, ground disturbance from trespass use, noise, poaching, spread of disease and other disturbances (Possingham et al. 2000, Shafer 2001). Furthermore, roads and other linear structures may impede the movement of species among patches, thereby fragmenting habitats. Road effects can be mitigated with a variety of enhancement actions (See Spencer et al 2010 for a framework for considering roads essential habitat connectivity areas) which may be integrated in site-specific management plans for conservation lands. "Soft" edges [6] between protected land and sources of disturbances are desired and may be enhanced with appropriate protective buffers. Effects of adjacent land uses and effects of conservation land management on adjacent land uses will be considered in selecting conservation lands and prescribing management to protect and enhance values.

5.2.3.5 Setting of Conservation Targets

Conservation targets were established for the natural communities and the covered species habitats they support. Conservation targets represent the extent (e.g., acreage, linear miles of channel, number of ponds) and distribution of natural communities and covered species habitats to be protected, enhanced, and restored to contribute to the conservation of each of the covered species and meet the regulatory requirements of the ESA and the NCCPA. The conservation targets serve as the basis for the natural community and habitat conservation-related biological objectives described in Section 5.3. Conservation targets encompass actions sufficient to provide for the habitat-related conservation needs of the covered species. The process used to develop conservation targets is presented in Figure 5–1, *Process for Establishing Natural Community and Covered Species Habitat Targets and Conservation Measures* (see separate file).

The development of conservation targets was an iterative process that relied on numerous information sources and several sequential steps of analysis and refinement. Information used to develop the conservation targets for both natural community and covered species included the following:

- Distribution and extent (areal or linear) of each natural community and its constituent land cover types within the Plan Area (Figures 3–11 through 3–19; Table 5–3, *Existing Acreage of Natural Communities and Land Cover Types within CAZs and UPAs* [see separate files]).

[6] "Edge permeability" or "edge abruptness" between habitat patches in a mosaic landscape has a strong influence on the distribution of species and their population structure. In natural landscapes, edges between habitat patches may be subtle or "soft" (e.g., ecotones between mixed oak and blue oak woodlands), compared to abrupt or "hard" edges that often result from human influences or disturbances (e.g., roads, clearcuts, agricultural fields). Individual organisms respond differently to soft and hard edges (Wiens et al. 1985). Hard edges are often perceived as barriers by organisms and tend to create movement along the edge, while soft edges favor movement of organisms across an edge.

- Distribution and extent (areal or linear) of each covered species' modeled habitat located within the Plan Area (Appendix A; Table 5–4, *Existing Extent Modeled Covered Species Habitat Types and Covered Plant Species Occurrences within CAZs and UPAs* [see separate files]).
- Primary threats and stressors for each of the covered species (Appendix A).
- Location of habitat areas known to be occupied by each of the covered species (Appendix A).
- The distribution and extent (areal or linear) of existing patches of PEHL for each natural community and covered species habitat (Figure 5-2, *Existing Protected Lands and Conservation Acquisition Zones* [see separate file] and Section 5.2.3.6).

To establish the conservation targets, the above information was evaluated for each of the following variables:

- **Patch size and connectivity.** With the exception of species with limited habitat requirements and distributions (e.g., Butte County meadowfoam), the conservation targets were formulated to include large patches of connected natural communities and modeled covered species habitats and to exclude small fragmented patches.
- **The proportion of each natural community type currently protected within each of the CAZs.** The conservation targets were formulated to include consideration for the extent (areal or linear) and location of PEHL natural communities and covered species habitats that are present in each of the CAZs.
- **Connectivity with existing protected habitats.** The conservation targets were formulated to include consideration for establishing connectivity of BRCP conservation lands with PEHL in the Plan Area and protected lands adjacent to the Plan Area.
- **Natural communities supporting covered species habitats.** The conservation targets were formulated to include the portions of natural communities that support modeled habitat for multiple species, and exclude areas that supported modeled habitat for no or a relatively small number of species, except where patches are important to the conservation of a particular species.
- **Location of important known covered wildlife species population centers and covered plant species occurrences.** The conservation targets were formulated to protect a proportion of these habitat areas such that these populations and occurrences will be conserved.
- **Proximity of covered species modeled habitats to known occupied habitat.** The conservation targets were formulated to protect occupied habitats, as well as unoccupied habitat areas that are connected to known occupied habitat areas such that unoccupied habitats can be occupied in the future through natural processes or with implementation of habitat enhancement measures.

The conservation targets for protecting each of the natural communities is presented in Table 5–5, *Natural Community Protection Targets* (see separate file) and the rationale for each of the natural community conservation targets is presented in Table 5–6, *Rationale for the Natural Community and Agricultural Habitat Protection Targets* (see separate file). Natural community restoration targets are presented in Table 5–7, *BRCP Restoration Targets* (see separate file). Section 5.5 provides a description of how achieving the natural community targets presented in Table 5–5 will conserve each of the natural communities. A description of how achieving the natural community conservation targets are expected to benefit local concern species is presented in Appendix N.

Covered species habitat conservation targets were further established through an iterative process that involved the following activities:

- Evaluating a set of criteria (see below) based on the conservation status of each covered species and need for protecting its habitat to contribute to its conservation;
- Using these criteria ratings to assign an overall priority rating and associated habitat conservation goal; and
- Re-evaluating and adjusting the goals based on individual species conservation needs that were not fully captured through application of the criteria.

The following criteria were used to evaluate the conservation needs of each of the covered species for the Plan Area.

- **Rarity.** The listed status of a covered species is a general indication of the species' overall ecological status and rarity, representing the results of a formal evaluation process with scientific and public input. Species that have been designated as Species of Concern by USFWS and Species of Special Concern by CDFW have undergone a scientific review that identified a concern with their conservation status. The listing status of each covered species was rated qualitatively as "high" (listed under ESA or California Environmental Quality Act [CESA] as threatened or endangered), "Moderate" (recognized as a USFWS Species of Concern or CDFW Species of Special Concern or given a California Native Plant Society [CNPS] Rare Plant Rank 1B), or "Low" (not federally or state-listed, on lists of concern, or given a CNPS Rare Plant Rank 1B).
- **Population and Habitat Trend.** Listing status as well as current information on population and habitat trends were used to evaluate the status of covered species populations. Evaluation of this criterion was based on information presented in Appendix A. The following qualitative criterion ratings were used: "High" – Substantial threats and/or decline in habitat, "Moderate" – Moderate threats and ongoing decline habitat, and "Low" – limited decline, stable, or increasing habitat extent (areal or linear).
- **Importance of Plan Area to Statewide Habitat.** Species for which Butte County occurrences are important to their range-wide conservation were considered of high

conservation priority. The importance of occurrences in Butte County to the overall population of a species was determined based on information presented in Appendix A, and on information regarding density and productivity of Butte County occurrences or populations relative to other portions of the species' range. The following qualitative criterion ratings were used: "High" – Butte County supports more than 25 percent of statewide habitat or populations for the species, "Moderate" – Butte County supports 5 to 25 percent of habitat or populations for the species, and "Low" – Butte County supports less than 5 percent of statewide habitat or populations for the species.

- **Degree to Which Butte County Habitat is Limiting to Local Populations.** This criterion addresses whether habitat is the limiting factor that determines the number of occurrences or size of species populations in Butte County. Although many covered species populations are regulated by availability of suitable habitat, populations for a number of species are either influenced by or strongly controlled by other factors, including competing species, availability of seasonal habitats elsewhere, predators, and disease. The conservation targets for protecting each of the covered species modeled habitat types and plant occurrences is presented in Table 5–8, *BRCP Covered Species Modeled Habitat Protection Targets* (see separate file) and the rationale for each of the covered species conservation targets is presented in the rationale statements for the biological objectives established for each of the covered species in Section 5.3.2.3, *Species-Level Biological Goals and Objectives*. Section 5.6 provides a description of how achieving the covered species targets presented in Table 5–8 will contribute to the conservation of each covered species. Conservation actions also include targeted species-specific actions, including actions identified in recovery plans, such as habitat enhancements.

5.2.3.5.1 Mitigation Component of Conservation Targets

This section describes the approach to mitigation for the impacts of BRCP covered activities, in addition to impact avoidance and minimization measures, to address permit issuance requirements of section 10 of the ESA.[7] The acreage of BRCP habitat mitigation is a subset of the overall conservation targets for each natural community and covered species (Tables 5–5, 5-7, and 5–8) as the overall conservation targets are designed to contribute to the conservation of species. The mitigation and conservation components of each of the natural community and covered species conservation targets are presented in Tables 5–7, 5–9, *Natural Community Conservation and Mitigation Targets for Protection and Restoration*, and 5–10, *Covered Species Habitat Conservation and Mitigation Targets* (see separate files), respectively. Table 5–11, *Natural Community Mitigation Requirements for Permanent Direct Effects* (see separate file) presents the mitigation requirements for impacts to natural communities and Table 5–12,

[7] Section 10 of the ESA requires that permit applicants identify the steps to be taken that "minimize and mitigate" the impacts on covered species. 16 USC § 1539(a).

Covered Species Mitigation Requirements for Permanent Direct Effects (see separate file) presents the mitigation requirements for impacts to covered species habitat.

Habitat mitigation is provided through the acquisition, protection, and subsequent management in perpetuity of existing natural communities and covered species habitats and/or restoration of natural communities and covered species habitats. Mitigation may also be provided through acquisition of mitigation credits from qualified mitigation banks. For BCAG to use a mitigation or conservation bank for BRCP purposes, the conditions at the bank must meet all of the BRCP criteria (e.g. level of land protection, quality of habitat, conservation land assembly principles, management plans, monitoring) for the natural communities and covered species or must be brought up to BRCP standards to be credited to the BRCP (see Chapter 8, *Plan Implementation*, Section 8.7.6, *Use of Mitigation and Conservation Banks*). Protected and restored natural communities and habitat must be of equal or greater function than the affected natural communities and covered species habitats.

5.2.3.6 Role of Public and Easement Habitat Lands

An important consideration in the assembly of BRCP conservation lands is the extent (areal or linear) and distribution of lands that are in public ownership or under conservation that serve to conserve natural communities and covered species habitats. These lands are referred to as PEHL in the BRCP Plan Area. The BRCP PEHL Geographic Information System (GIS) dataset was developed to identify existing PEHL within the BRCP Plan Area. It was compiled from various public sources from different time periods. Ownership information was collected and organized into attributes which included County, County Assessor's Parcel Number (APN), Management Level, Management Agency, Alias (if known), Type (type of ownership), and Data Source. Although the boundaries depicted within the data do not represent legal boundaries, they represent the best available information and are sufficient to guide development of the conservation lands system at a landscape level. More detailed information necessary for land acquisition and other decisions will be acquired by the BRCP Implementing Entity during Plan implementation.

The public dataset sources used to generate the PEHL GIS data layer included the following:

- CDFW Lands GIS data layer 2010 (DFG 2010);
- California Protected Areas Database March 2009 (Green Info Network 2009);
- Wildlife Conservation Board 2010;
- CaSIL Conservation Lands data layer 2005 (California Natural Resources Agency 2005);
- CA Public, Conservation and Trust Lands, v5.2 (California Natural Resources Agency 2007); and
- Butte County Land Parcel Data (Butte County 2010).

In addition to these public data sources, BRCP Stakeholder Committee members, including representatives from The Nature Conservancy and the Northern California Land Trust, also provided protected lands information and online web searches were conducted to identify additional protected lands and associated spatial extents (areal or linear) and cross reference the GIS data layers to ensure accuracy.

The data layer was created by overlaying source data on top of county parcel boundary data. Parcels identified as PEHL via source datasets were then attributed with the appropriate information.

Based on the ownership, land manager, and easement information derived from the above sources, the data was evaluated and grouped into two PEHL categories defined as follows.

- **Category 1 PEHL:** Lands that are subject to irrevocable protection against a change in primary land use through local, state or federal authority and with a primary management

goal related to ecological protection. This category of PEHL is considered to meet the definition of "protected" under the BRCP and are also referred to as "existing protected lands."

- **Category 2 PEHL:** Lands that are subject to irrevocable protection against a change in primary land use through local, state or federal authority with a primary land management goal of open space for mixed use in a manner that maintains ecological value.

Only Category 1 PEHL are considered to be protected for conservation purposes. Category 2 PEHL, though not considered to be protected under the BRCP, were used to inform the development of the BRCP (e.g., conservation targets, spatial distribution requirements for BRCP conservation lands, habitat corridors). PEHL may or may not be specifically managed to benefit covered species, but they do protect and may be managed to improve the ecological functions of the natural communities present on PEHL (e.g., providing habitat for covered and other native species, maintaining connectivity among habitat areas, and serving as ecological corridors). Conservation actions may be implemented on PEHL but they may not be credited as contributing towards achieving the conservation component of the conservation targets unless they meet BRCP protection, management, monitoring, and adaptive management standards (see Section 8.7.4, *Land Acquisition*). Properties excluded from consideration as PEHL lands included those owned by the Department of Defense and City and County parks not being managed for ecological function. Figure 5–3, *Decision Matrix for Assigning Public and Easement Habitat Lands (PEHL) Categories* (see separate file) illustrates the decision matrix that was applied to assign PEHL categories. The distribution of existing PEHL by CAZ is presented in Figure 5–2. The areal or linear extent of each natural community and covered species habitat type within existing PEHL are presented in Tables 5–13, *Extent of Natural Communities on Public and Easement Habitat Lands* and 5–14, *Extent of Modeled Covered Species Habitat Types and Occurrences on Public and Easement Habitat Lands* respectively (see separate files).

The following rules were used to identify PEHL Category 1 and Category 2 properties based on ownership, land managers, and easements.

Category 1 properties ("existing protected lands"):

- All CDFW owned and managed lands (e.g., Gray Lodge Wildlife Management Area, Upper Butte Basin Wildlife Management Areas, Jon Bechtel Trust Lands, and Table Mountain Reserve).
- All parts of the Oroville Wildlife Area, including both CDFW and California Department of Water Resources (DWR) owned/managed parcels.
- All USFWS owned and managed lands (e.g., Sacramento River Wildlife Refuge and Llano Seco Wildlife Refuge).
- Permanent private conservation easements (e.g., easements held by The Nature Conservancy, California Wildlife Foundation, Northern California Land Trust, and Ducks

Unlimited; and easements managed by CDFW and USFWS [e.g., private easement parcels associated with Llano Seco Refuge managed by FWS]).

- Esquon Ranch – permanent conservation easement.
- Permanent mitigation lands (e.g., Highway 149 mitigation lands, Wurlitzer mitigation site, City Light Preserve, Enloe Preserve).

Category 2 properties ("other PEHL"):

- City of Chico Bidwell Ranch
- Bureau of Land Management owned lands
- All local parks with undeveloped habitat (e.g., Bidwell Park)
- All State parks (e.g., Bidwell-Sacramento River State Park)
- Department of Water Resources owned properties, except those that are part of the Oroville Wildlife Area (which are Category 1)
- Mitigation banks that have not sold all of their credits (e.g., Dove Ridge Mitigation Bank),
- City of Chico Creekside Open Space

5.3 BIOLOGICAL GOALS AND OBJECTIVES

This section describes the biological goals and objectives for the BRCP. The BRCP biological goals and objectives are consistent with the guidance provided in the federal Five-Point Policy for Habitat Conservation Plans (65 *Federal Register* [FR] No. 106 at 35242, June 1, 2000) and with the BRCP Planning Agreement conservation goals and objectives. Biological goals[8] are defined as broad guiding principles for development of the conservation strategy that can be parsed into more manageable subsets of biological objectives. These biological goals are intended to be broad principles designed to guide the conservation strategy to meet the statutory criteria of the NCCPA and sections 7 and 10 of the ESA. The biological objectives[9], in turn, include measureable metrics[10] by which to assess progress in meeting the goals and to help inform the adaptive

[8] For Biological Goals the Five-Point Policy states, "In the context of HCPs, biological goals are the broad, guiding principles for the operating conservation program of the HCP… Multiple species HCPs may categorize goals by species or by habitat, depending on the structure of the operating conservation program."

[9] For Biological objectives the Five-Point Policy states, "For more complex HCPs, biological objectives can be used to step down the biological goals into manageable, and, therefore, more understandable units… If the operating conservation program is relatively complex, the biological goal is divided into manageable and measurable objectives. Biological objectives are the different components needed to achieve the biological goal such as preserving sufficient habitat, managing the habitat to meet certain criteria, or ensuring the persistence of a specific minimum number of individuals… Biological objectives should include the following: species or habitat indicator, location, action, quantity/state, and timeframe needed to meet the objective."

[10] Metrics are measurements or characteristics of species, natural communities, and ecological systems that are used to track progress toward the achievement of biological goals and objectives. The metric value is the quantity of the specific unit of measurement, for example, the metric may be *acres of protected habitat* and the metric value may be a *target of protecting 100 acres of habitat*.

management process (see Section 7.3, *Adaptive Management Plan*). Monitoring metrics that may be used to measure progress towards achieving the biological objectives are presented in Section 7.2, *Monitoring Program*. The biological goals and objectives were used to develop the conservation measures described in Section 5.4 and will be used by BCAG to guide BRCP implementation.

5.3.1 Development of Biological Goals and Objectives

Development of the biological goals and objectives was based on the following data and information:

- Distribution and extent of each natural community within the Plan Area (see Chapter 3, *Ecological Baseline Conditions*);
- Distribution and extent of each covered species' modeled habitat within the Plan Area (see Appendix A);
- Primary threats and stressors for each of the covered species (see Appendix A);
- Location of habitat areas known to be occupied by each of the covered species (see Appendix A);
- Distribution and extent of existing protected patches of each natural community and covered species habitat (Figure 5–2);
- Potential for increasing connectivity with conserved habitat areas adjacent to the Plan Area (from documents of HCP/NCCPs approved or under development for lands that are adjacent to the Plan Area); and
- Information provided by experts with species-specific knowledge for the BRCP Plan Area.
- Final and draft Recover Plans

Although the Sacramento River and Feather River support habitat for several of the covered species in the Plan Area, BRCP goals, objectives, and conservation actions are not proposed for these rivers because the channels, banks, and flow of these rivers are controlled and managed predominately by state and federal agencies (e.g., DWR, U.S. Army Corps of Engineers, and Bureau of Reclamation), not under the jurisdiction of BCAG. Planning for these rivers has been or is being conducted by those state and federal agencies.

Biological Goals and Objectives were developed at three ecological levels:

- Landscape-level goals and objectives are designed to provide for ecosystem functions, sufficient habitat for covered species, and to maintain the biological diversity in the natural communities of the Plan Area. Landscape-level goals and objectives provide for the maintenance of linkages along ecological (including elevation) gradients, protection of intact watersheds, protection and restoration of habitat mosaics, appropriate disturbance

regimes and successional patterns, and establishment of conservation lands units of appropriate size and shape. Landscape-level goals and objectives address the conservation requirements of species that have large ranges or that migrate between various distinct seasonal habitats (e.g., summer and winter range) as well as specialist species restricted to small patches of unique habitat (e.g., seeps, large vernal pools, alkali soils).

- Natural community-level goals and objectives are designed to provide for the appropriate amounts, distribution, configuration, and management of natural communities to conserve covered species and biodiversity in the Plan Area. Goals and objectives were established based on the broad needs of biological communities as determined through application of the conservation land assembly principles (see Section 5.2.3.6), and the conservation needs for the covered species and their habitats provided by each of the natural communities Natural community protection objectives were established as described in Section 5.2.3.5, *Setting Conservation Targets*, and are expressed as an extent of habitat conservation (in acres or miles) for each covered species by CAZ. The target amount of natural communities to be conserved (both protection and restoration) for each natural community is provided in Table 5–5.
- Species-level biological goals and objectives are designed to address individual species requirements. Species-level habitat objectives were established as described in Section Section 5.2.3.5 and are expressed as an extent of habitat conservation (in acres or miles) for each covered species by CAZ. The target amount of habitat to be conserved (both habitat protection and restoration) for each covered species is provided in Table 5–8. Achieving the natural community-level objectives also achieves the habitat protection, enhancement, and restoration objectives established for each of the covered species.

The Recovery Plan for Vernal Pool Ecosystems of California and Southern Oregon (USFWS 2005) identifies goals and objectives for recovering several of the vernal pool-associated federally listed species covered under the BRCP and for ensuring the long-term conservation of several vernal pool-associated covered species that are not federally listed. The BRCP biological goals and objectives along with the conservation measures (Section 5.4) have been designed such that the applicable Recovery Plan recovery and conservation goals for these species are achieved with BRCP implementation.

The Recovery Plan provides for habitat conservation plans to meet the goals for species recovery using alternative conservation approaches than presented in the Recovery Plan, stating the following:

> While this recovery plan identifies a specific strategy for obtaining recovery of the covered vernal pool plant and animal species, it is not the only mechanism through which recovery may be obtained. Alternative conservation mechanisms, such as currently proposed or future HCPs that cover the species in this plan and vernal pool habitat, may be deemed equivalent to implementation of this Recovery Plan for the covered area if they contain the following elements:

1. Permanently protected vernal pool preserves within the area covered by the HCP in large contiguous blocks of suitable habitat;
2. Protection of the entire genetic range of each listed species within the area covered by the HCP;
3. Protection of all populations of species with 25 or fewer total occurrences addressed in [the Recovery Plan] within the area covered by the HCP[11];
4. Connectivity with other preserves within the area covered by the HCP;
5. Adaptive management of the preserves within the area covered by the HCP to support the species addressed in this recovery plan; and
6. Sufficient funding for management, maintenance, and monitoring of the preserves in perpetuity (USFWS 2005).

The BRCP Conservation Strategy includes all of these elements identified in the Recovery Plan for all applicable covered species and therefore provides an "alternative conservation mechanism" to the Recovery Plan to provide for the conservation of these species:

- Butte County meadowfoam (federal ESA listed),
- Hairy Orcutt grass (federal ESA listed),
- Slender Orcutt grass (federal ESA listed),
- Greene's tuctoria (federal ESA listed),
- Hoover's spurge (federal ESA listed),
- Ferris' milkvetch,
- Ahart's dwarf rush,
- Vernal pool fairy shrimp (federal ESA listed),
- Vernal pool tadpole shrimp (federal ESA listed),
- Conservancy fairy shrimp (federal ESA listed), and
- Western spadefoot toad.

Elements 1 through 4 listed above are addressed in the BRCP through the conservation targets (Tables 5–5 and 5–8), the application of the minimum patch size requirements for conservation of natural communities supporting the species (Table 5–15, *Acreage and Minimum Patch Sizes of Protected Natural Communities* [see separate file]), and requirements for selection of

[11] The following covered species are known from 25 or fewer occurrences and therefore meet this criterion in the Recovery Plan: Conservancy fairy shrimp, Greene's tuctoria, and Ferris' milk-vetch.

conservation lands described in Section 5.2.3.4, *Spatial Considerations for Conservation Lands*. Element 5 is addressed through the vernal pool and other relevant monitoring requirements described in Section 7.1, *Monitoring Program* and application of the adaptive management decision making process described in Section 7.2, *Adaptive Management Plan*. Element 6 is addressed through the funding sources and mechanisms described in Chapter 10, *Implementation Costs and Funding Sources*. How BRCP goals, objectives, conservation measures, and adaptive management provisions address Elements 2 and 3 is described for each of the species in Section 5.6.

5.3.2 Goal and Objective Statements

This section presents the landscape-level, natural community-level, and covered species-level biological goals and objectives. Each goal and objective is assigned a unique alphanumeric code that will assist with monitoring BRCP implementation. Many of the conservation measures address multiple goals and objectives, reflecting both the hierarchy of these goals and objectives and the interrelationships among them. Conservation measures that will collectively achieve all of the biological objectives are presented in Table 5–16, *Applicable BRCP Biological Goals, Objectives, and Conservation Measures for Natural Communities and Covered Species* (see separate file).

Descriptions and models of covered species habitats and natural communities referred to in the biological goals and objectives are presented in Chapter 3, Ecological Baseline Conditions and in Appendix A. The objectives are measurable, and the schedule for implementing conservation measures to achieve the objectives is presented in Chapter 8, Plan Implementation.

5.3.2.1 Landscape-Level Goals and Objectives

Goal LAND1: Large interconnected landscape representing the range of physical and biological attributes (e.g., slope, soils, hydrology, climate, and plant associations) and the diversity of natural communities in the Plan Area.

Protected lands will be spatially distributed to provide a mosaic of geographically and ecologically diverse natural communities, habitat for covered and other native species, and to facilitate elevational and latitudinal movement of natural communities and species in response to climate change.

> **Objective LAND1.1**: Establish a system of 90,417 acres of protected and restored lands in the Plan Area comprised of the quantities of each natural community and land cover type indicated in Tables 5–5 and 5–7 within 45 years (*Note: Chapter 8 contains information regarding the acquisition schedule, including the jump start, stay ahead, and rough proportionality provisions*).
>
> **Objective LAND 1.2:** Control invasive species on reserve lands at a level to ensure sustainable populations of Covered Species.

Goal LAND2: Protection and maintenance of natural ecological processes.

Objective LAND2.1: Ensure hydrological processes (e.g. sloughing) needed to maintain sustainable populations for species like bank swallow.

Goal LAND3: Movement and genetic exchange of native organisms within and between natural communities.

Objective LAND 3.1: Protect at least 40 percent of critical winter range habitat designated for the East Tehama Deer Herd, the Bucks Mountain Dear Herd, and the Mooretown Deer Herd (Figure 3–20, *Deer Herds and Habitat Ranges in the Plan Area*) that is provided by blue oak savanna, blue oak woodland, live oak woodland, and mixed oak woodland within 45 years.

Objective LAND 3.2: Protect at least 20 percent of winter range habitat designated for the East Tehama Deer Herd, the Bucks Mountain Dear Herd, and the Mooretown Deer Herd (Figure 3–20) that is provided by blue oak savanna, blue oak woodland, live oak woodland, and mixed oak woodland within 45 years.

Objective LAND3.3: In the Plan Area north of the City of Chico, establish a habitat corridor comprised of oak woodland and savanna, grassland, riparian, wetland, and aquatic natural communities within 45 years that is along the northeast-southwest elevation gradient between the foothills at the eastern boundary of the Plan Area and the Sacramento River at the western boundary of the Plan Area (across the Cascade Foothills and Northern Orchards CAZs; Figure 5–4, *Locations within which Ecological Corridors will be Protected under the BRCP* [see separate file]). Land cover requirements for these natural communities within these CAZs are provided in Table 5–5 and minimum patch size is provided in Table 5–15. Criteria for corridors are provided in Sections 5.4.1.1.4, *Connectivity* and 5.4.1.3, *CM3: Identify High Priority Locations for Wildlife Passage Structures and Secure Funding*. The BRCP schedule for the conservation component is summarized in Table 8–2, *BRCP Schedule for Conservation Component (i.e., Non-Mitigation) of Specified Biological Resources*.

Objective LAND3.4: In the Plan Area south of the City of Chico and north of the City of Oroville, establish a habitat corridor comprised of oak woodland and savanna, grassland, riparian, wetland, and rice land within 45 years along the east-west elevation gradient between the foothills at the eastern boundary of the Plan Area and Butte Creek at the western boundary of the Plan Area (across the Cascade Foothills and Basin CAZs; Figure 5–4).

Objective LAND3.5: In the Plan Area south of the City of Oroville, establish a habitat corridor comprised of oak woodland and savanna, grassland, riparian, wetland, and agricultural land within 45 years along the east-west elevation gradient between the

foothills at the eastern boundary of the Plan Area and the Feather River (across the Sierra Foothills and Southern Orchard CAZs) (Figure 5–4).

Objective LAND3.6: In the Plan Area adjacent to the Sacramento River, establish a habitat corridor the length of the Sacramento River in the Sacramento River and Northern Orchards CAZs that is comprised of patches of riparian, wetland, and aquatic (e.g., ponds and oxbows) natural communities within 45 years. Habitat patches may be disconnected by intervening orchard lands and the corridor width will be determined by the width of habitat patches lying between river levees (or the top of the river bank where levees are not present) and adjacent orchard or other agricultural lands (Figure 5–4).

Objective LAND3.7: Facilitate movement of native wildlife across roadways (see Section 8.1.5, Conservation Measure 3: Identify high-priority locations for wildlife passage structures and secure funding).

Goal LAND4: Protected seeps distributed throughout the Plan Area.

Objective LAND 4.1: Protect 10 seeps that support emergent wetland vegetation within BRCP protected grassland and oak savanna and oak woodland natural communities.

Goal LAND5: Protected ponds distributed throughout the Plan Area.

Objective LAND5.1: Protect 80 ponds. (See Table 5–3 for more information regarding location of existing ponds. See also Objectives NACO6.3, NACO 6.4, SPEC 11.3, and SPEC 11.4 for more information regarding Covered Species that will benefit from pond protection and management of ponds.)

Goal LAND6: Protected major rock outcrops and cliff faces.

Objective LAND6.1: Protect major rock outcrops and cliff faces. (See Section 5.6.8, *American Peregrine Falcon*, for more information regarding this objective.)

5.3.2.2 Natural Community-Level Goals and Objectives

The following are the biological goals and objectives for natural communities and agricultural lands. The process and considerations used to develop the extent of this land cover type to be protected are described in Section 5.2.3.5 and Tables 5–1 and 5–2. All conservation targets are inclusive of both conservation and mitigation obligations.

Goal NACO1: Large contiguous areas of oak woodland and savanna.

Objective NACO1.1: Protect 20,491 acres of oak woodland and savannah, consisting of 2,862 acres of blue oak savanna, 5,873 acres of blue oak woodland, and 11,756 acres of interior live oak and mixed oak woodland that are spatially distributed as indicated in

Table 5–5. These acreage targets are inclusive of mitigation requirements that, along with geographic distribution requirements, are summarized in Table 5–11.

Goal NACO2: Large contiguous areas of grassland, with and without vernal swale complex.

Objective NACO2.1: Protect 34,841 acres of grassland, consisting of 13,441 acres of grassland without vernal swale complex and 21,400 acres of grassland with vernal swale complex that are spatially distributed as indicated in Table 5–5. These acreage targets are inclusive of mitigation requirements that, along with geographic distribution requirements, are summarized in Table 5–11.

Objective NACO2.2: Within the 21,400 acres of protected grassland with vernal swale complex, restore 306 wetted acres of vernal pools and swales. Pool density, connectivity, and bathymetry of the restored pools will be based on best approximations of historic conditions on the restoration site. This acreage target is inclusive of mitigation requirements that, along with geographic distribution requirements, are summarized in Table 5–11.

Objective NACO2.3: Increase distribution and abundance of burrows in grassland.

Goal NACO3: Large contiguous areas of riparian natural community.

Objective NACO3.1: Protect 6,370 acres of riparian, consisting of 5,650 acres of existing cottonwood-willow /valley oak riparian forest and 720 acres willow scrub that are spatially distributed as indicated in Table 5–5. These acreage targets are inclusive of mitigation requirements that, along with geographic distribution requirements, are summarized in Table 5–11.

Objective NACO3.2: Restore 179 acres of riparian, distributed within the Plan Area as indicated in Table 5–7. Restoration targets will consist of cottonwood-willow riparian forest that attains California Wildlife Habitat Relationships (CWHR) habitat stage 3P[12] within 10 years of initial restoration actions and/or valley oak riparian forest that trends towards achieving a CWHR habitat stage designation of 5D[13] within 50 years. These acreage targets are inclusive of mitigation requirements that, along with geographic distribution requirements, are summarized in Table 5–11.

Objective NACO3.3: Restore 11 acres of willow scrub distributed within the Plan Area as indicated in Table 5–9. Willow scrub will attain CWHR canopy closure class M[14]

[12] 3 = pole tree, canopy diameter 15–30 feet, dbh 6–11 inches; P = Open cover, canopy closure 25–39 percent (Mayer and Laudenslayer 1988).
[13] 5 = medium/large tree, canopy diameter greater than 45 feet, diameter at breast height (dbh) greater than 24 inches; D = Dense cover, canopy closure 60-100 percent (Mayer and Laudenslayer 1988).
[14] M = moderate cover (40-59 percent canopy closure).

within 5 years of initial restoration actions. These acreage targets are inclusive of mitigation requirements that, along with geographic distribution requirements, are summarized in Table 5–11.

Goal NACO4: A diversity of representative wetland types distributed throughout the Plan Area.

Objective NACO4.1: Protect 695 acres of emergent wetland that is spatially distributed within the Plan Area as indicated in Table 5–9. These acreage targets are inclusive of mitigation requirements that, along with geographic distribution requirements, are summarized in Table 5–11.

Objective NACO4.2: Restore 126 acres of emergent wetland, distributed within the Plan Area as indicated in Table 5–9, to achieve a CWHR habitat stage designation of 2D[2] within 10 years of initial restoration actions. Restored emergent wetland shall be supported by un-assisted hydrologic inputs, except when needed to maintain giant garter snake habitat functions.

Goal NACO5: Free-flowing perennial and intermittent streams.

Objective NACO5.1: Protect 242 acres of free-flowing perennial stream (equivalent to 20 miles of stream channel and both channel banks with a buffer except where one bank is located outside of the Plan Area) that are spatially distributed as indicated in Table 5–5.

Objective NACO5.2: Protect 73 acres in Table 5–5 of intermittent stream (equivalent to 12 miles of stream channel and both channel banks except where one bank is located outside of the Plan Area) that are spatially distributed as indicated in Table 5–5.

Goal NACO6: Agricultural land coverland cover types that have value for wildlife.

Objective NACO6.1: Protect and maintain 23,182 acres of land in rice production that are spatially distributed as indicated in Table 5–5. This acreage target is inclusive of mitigation requirements that, along with geographic distribution requirements, are summarized in Table 5–11.

Objective NACO6.2: Protect and maintain 3,780 acres of irrigated pasture and irrigated cropland that are spatially distributed as indicated in Table 5–5. This acreage target is inclusive of mitigation requirements that, along with geographic distribution requirements, are summarized in Table 5–11.

Objective NACO6.3: Maintain and enhance habitat conditions for covered species on BRCP protected agricultural lands by maintaining field borders that support habitat for native wildlife (e.g., rodents, songbirds) and trees for raptor nesting and perching.

[2] 2 = emergent vegetation greater than 12 inches in height; D = Dense cover, canopy closure 60–100 percent (Mayer and Laudenslayer 1988).

5.3.2.3 Species-Level Goals and Objectives

The following are species-specific biological goals and objectives. The process and considerations used to develop the extent of this land cover type to be protected for each of the covered species are described in Section 5.2.3.5 and Tables 5–1 and 5–2. All conservation targets for modeled habitat are inclusive of both conservation and mitigation obligations.

Species level objectives are written when the needs of a species cannot fully be met at the landscape or natural community level. Objectives are written for species whose natural community based modeled habitat for one or more life history requirements is in a specific distribution amongst CAZs and species with specific management requirements, occurrence targets or occupancy requirements. For a complete list of all landscape, natural community and species goals, objectives, and conservation measures that apply to each covered species, see Table 5–16.

Goal SPEC1: Maintain or increase the population of tricolored blackbird.

> **Objective SPEC1.1**: Protect up to three occupied tricolored blackbird nesting sites within 5 years of their discovery.

Goal SPEC2: Maintain or increase the population of yellow-breasted chat.

> **Objective SPEC2.1:** Protect 2,835 acres of modeled yellow-breasted chat nesting and foraging habitat, above 200 feet in elevation. These acreages are subsets of protected lands within the 5,650 acres of protected cottonwood-willow and valley oak riparian forest and 720 acres of willow scrub (see Table 5–5). These acres will be distributed according to Table 5–8.
>
> **Objective SPEC2.2:** Protect 185 acres of known yellow-breasted chat nesting and foraging habitat in the Cascade Foothills CAZ.

Goal SPEC3: Maintain or increase the population of bank swallow.

> **Objective SPEC3.1**: Protect 242 acres (equivalent to 20 miles) of stream channel with a buffer, of which at least 121 acres is bank swallow nesting habitat. Where one bank is located outside of the Plan area, protect the bank that is within the Plan Area. These acres will be distributed according to Table 5–8.
>
> **Objective SPEC3.2**: Protect all occupied bank swallow nesting colonies along tributaries to the Sacramento River within 5 years of their discovery.

Goal SPEC4: Maintain or increase the population of western burrowing owl.

> **Objective SPEC4.1**: Increase nest burrow availability for burrowing owls. Increases in nest burrow activity will be achieved through habitat protection, increasing ground

squirrel populations, use of artificial burrows, and managing for sufficient prey populations. Locations of these actions are described in Table 5–5, *Natural Communities Protection Targets*, and the schedule is described in Table 8–2, *BRCP Schedule for Conservation Component (i.e., Non-Mitigation) of Specified Biological Resources*.

Goal SPEC5: Maintain or increase the population of western yellow-billed cuckoo.

Objective SPEC5.1: Protect all new western yellow-billed cuckoo nest sites within 5 years of their discovery.

Goal SPEC6: Maintain or increase the distribution of the wintering population of greater sandhill crane.

Objective SPEC6.1: Protect 21,660 acres of unprotected modeled greater sandhill crane winter roosting and foraging habitat and 500 acres of traditional upland use area habitat in accordance with the distribution requirements in Table 5–8. This acreage target is inclusive of mitigation requirements that, along with geographic distribution requirements, are summarized in Table 5–12.

Objective SPEC6.2: Create and manage 160 acres of greater sandhill crane winter roosting habitat in the Basin CAZ.

Goal SPEC7: Maintain or increase the population of California black rail.

Objective SPEC7.1: Of the 10 protected seeps (Goal LAND4), protect at least five that are occupied by California black rail.

Goal SPEC8: Maintain or increase the population size and distribution of nesting American peregrine falcon.

Objective SPEC8.1: Of the 21,400 acres of grassland with vernal swale complex, 695 acres of emergent wetland, and 23,182 acres of rice that will be protected (Table 5–5), protect 29,157 acres of modeled American peregrine falcon seasonal and year-round foraging habitat, according to the distribution in Table 5–8. This acreage target is inclusive of mitigation requirements that, along with geographic distribution requirements, are summarized in Table 5–12.

Objective SPEC8.2: Protect 35 acres of American peregrine falcon habitat containing known nest sites, per Table 5–8.

Objective SPEC8.2: Protect all unprotected American peregrine falcon nest sites within 5 years of being discovered within the Plan Area over the term of the BRCP.

Goal SPEC9: Maintain or increase the abundance of Swainson's hawk.

Objective SPEC9.1: Protect 4,325 acres of modeled Swainson's hawk nesting habitat and 18,680 acres of unprotected modeled Swainson's hawk nesting and foraging habitat and modeled foraging habitat distributed within the Plan Area as indicated in Table 5–8. This acreage target is inclusive of mitigation requirements that, along with geographic distribution requirements, are summarized in Table 5–12.

Objective SPEC9.2: Restore 179 acres of Swainson's hawk nesting habitat distributed in the Plan Area as indicated in Table 5–8. This acreage target is inclusive of mitigation requirements that, along with geographic distribution requirements, are summarized in Table 5–12.

Goal SPEC10: Maintain or increase the abundance of white-tailed kite.

Objective SPEC10.1: Protect 5,725 acres of modeled white-tailed kite nesting habitat and 50,516 acres of unprotected modeled white-tailed kite year-round foraging habitat and modeled breeding season foraging habitat distributed within the Plan Area as indicated in Table 5–8. This acreage target is inclusive of mitigation requirements that, along with geographic distribution requirements, are summarized in Table 5–12.

Goal SPEC11: Maintain or increase the abundance of bald eagle.

Objective SPEC11.1: Of the protected 5,560 acres of cottonwood-willow and valley oak riparian forest and 11,756 acres of live oak woodland and mixed oak woodland (Table 5–5), include 4,435 acres of modeled bald eagle nesting habitat (within one mile of the Sacramento and Feather Rivers, Big Chico and Butte Creeks and Lake Oroville) according to the distribution in Table 5–8. This acreage target is inclusive of mitigation requirements that, along with geographic distribution requirements, are summarized in Table 5–12.

Objective SPEC11.2: Of the protected 21,400 acres of grassland with vernal swale complex, 242 acres of open water perennial stream channel and 23,182 acres of rice, include 21,195 acres of modeled bald eagle seasonally available foraging habitat, according to the distribution in Table 5–8. This acreage target is inclusive of mitigation requirements that, along with geographic distribution requirements, are summarized in Table 5–12.

Objective SPEC11.3: Protect two new (currently unknown and unprotected) bald eagle nest sites that have been occupied more than once within 5 years of being detected.

Objective SPEC11.4: Within 5 years of their discovery, protect four bald eagle winter roosts.

Goal SPEC12: Maintain or increase the giant garter snake population.

Objective SPEC12.1: Protect and maintain 27,547 acres of modeled giant garter snake breeding and movement habitat comprised of 23,182 acres of rice, 585 acres of emergent wetland and willow scrub, and 3,780 acres of adjoining cropland distributed in the Plan Area in accordance with Table 5–8. This acreage target is inclusive of mitigation requirements that, along with geographic distribution requirements, are summarized in Table 5–12.

Objective SPEC12.2: Restore 500 acres of giant garter snake habitat comprised of a mosaic of emergent vegetation, open water, and upland habitat primarily in the Basin CAZ[15].

Objective SPEC12.3: Establish a giant garter snake corridor at least 0.6 mile wide comprised of contiguous patches of riparian, wetland, and aquatic natural communities and agricultural lands that support giant garter snake movement habitat. The corridor shall connect the Llano Seco Unit of the Upper Butte Basin Wildlife Area in the Sacramento River CAZ to the Little Dry Creek Unit of the Upper Butte Basin Wildlife Area and to Gray Lodge Wildlife Area in the Basin CAZ (Figure 5–4).

Goal SPEC13: Maintain or increase the population of Blainville's horned lizard.

Objective SPEC13.1: Protect at least 400 acres in any combination of the following: (1) occupied sites or (2) grassland, blue oak woodland, blue oak savannah, or cottonwood willow valley oak riparian forest that are connected to occupied sites. Habitat will be protected within 5 years of the discovery of occupied habitat.

Goal SPEC14: Maintain or increase the population of western pond turtle.

Objective SPEC14.1: Protect and maintain 10,965 acres of unprotected modeled western pond turtle aquatic habitat: emergent wetland, nesting and movement habitat, and aquatic, nesting, and movement habitat distributed in the Plan Area in accordance with Table 5–8. This acreage target is inclusive of mitigation requirements that, along with geographic distribution requirements, are summarized in Table 5–12.

Objective SPEC14.2: Control bullfrog populations in protected ponds occupied by or adjacent to habitat occupied by western pond turtle to ensure sustainable populations of this Covered Species and other native species that utilize these ponds.

Goal SPEC15: Maintain or increase the population of foothill yellow-legged frog.

[15] All of the restoration is expected to be located in the Basin CAZ which supports the center of the Plan Area population. BCAG, however, may restore a portion of habitat in the adjoining Sacramento River, Northern Orchards, and/or Southern Orchard CAZs where such restoration meets giant garter snake habitat restoration requirements.

Objective SPEC15.1: Of the protected land cover types in the Sierra Foothills and Cascade Foothills CAZs (Table 5–5), include 2,025 acres of modeled foothill yellow-legged frog habitat within 130 feet of perennial or intermittent stream channels above 300 feet in elevation, according to the distribution in Table 5–8. These acreage targets are inclusive of mitigation requirements that, along with geographic distribution requirements, are summarized in Table 5–12.

Goal SPEC16: Maintain or increase the population of western spadefoot toad.

Objective SPEC16.1: Of the 495 acres of protected emergent wetland in the Sierra Foothills CAZ (Table 5–5), include 225 acres adjoining grassland, grassland with vernal swale complex, vernal pools, altered vernal pools, or blue oak savanna, according to the distribution in Table 5–8. This acreage target is inclusive of mitigation requirements that, along with geographic distribution requirements, are summarized in Table 5–12.

Objective SPEC 16.2: Of the 21,400 acres of protected grassland with vernal swale complex (Table 5–5), include least at 13,700 acres of western spadefoot toad breeding and foraging/movement/aestivation habitat within the Chico, Doe Mill, Honcut, Oroville, Vina Plains, Palermo, and/or Richvale Recovery Core Areas (Appendix A, Figure A.16-1) according to the distribution in Table 5–8. This acreage target is inclusive of mitigation requirements that, along with geographic distribution requirements, are summarized in Table 5–12.

Objective SPEC16.3: Control bullfrog and mosquitofish populations in protected ponds occupied by or adjacent to habitat occupied by western spadefoot toad to ensure sustainable populations of this Covered Species and other native species that utilize these ponds.

Goal SPEC17: Increase the extent of spawning habitat to support the survival of salmonids -- Central Valley steelhead, Central Valley spring-run Chinook salmon and Central Valley fall/late-fall run Chinook salmon.

Objective SPEC17.1: Distribute 30,000 cubic yards of spawning gravels of a suitable size for use by Chinook salmon and steelhead among suitable spawning locations within Big Chico Creek, Little Chico Creek, Butte Creek, Little Dry Creek, Rock Creek, and/or Mud Creek.

Goal SPEC18: Improve juvenile survivorship of salmonids -- Central Valley steelhead, Central Valley spring-run Chinook salmon and Central Valley fall/late-fall run Chinook salmon.

Objective SPEC18.1: Remove, modify, or screen up to 25 of the 42 currently unscreened diversions that pose a high risk for entrainment of juvenile salmonids on Big Chico Creek and Butte Creek in the Cascade Foothills, Northern Orchards, and Basin CAZs (Figure 5–5, *Location of Screened and Unscreened Diversions* [see separate file]).

Goal SPEC19: Improve habitat connectivity for Central Valley steelhead, Central Valley spring-run Chinook salmon, Central Valley fall/late-fall run Chinook salmon.

> **Objective SPEC19.1**: Remove at least five impediments, if present, to upstream and downstream passage for covered and other native fish in Pine Creek, Rock Creek, Mud Creek, Big Chico Creek, Lindo Channel, Little Chico Creek, Butte Creek, and/or Little Dry Creek.

Goal SPEC20: Improve habitat connectivity for green sturgeon.

> **Objective SPEC20.1**: Remove at least five impediments to upstream and downstream passage for covered and other native fish in Pine Creek, Rock Creek, Mud Creek, Big Chico Creek, Lindo Channel, Little Chico Creek, Butte Creek, and/or Little Dry Creek.

Goal SPEC21: Maintain or increase the distribution of occupied valley elderberry longhorn beetle habitat in the Plan Area.

> **Objective SPEC21.1**: Protect 8,282 acres of modeled valley elderberry longhorn beetle habitat (riparian land cover types plus grasslands within one quarter mile of riparian land cover types or perennial streams), according to the distribution in Table 5–8. This acreage target is inclusive of mitigation requirements that, along with geographic distribution requirements, are summarized in Table 5–12.

Goal SPEC22: Maintain or increase populations of vernal pool tadpole shrimp.

Goal SPEC23: Maintain or increase populations of Conservancy fairy shrimp

> **Objective SPEC23.1**: Of the total 21,400 acres of grassland with vernal swale complex protected (Table 5–5), include 150 acres that support the three known occurrences of Conservancy fairy shrimp habitat within the Vina Plains Recovery Core Area (Cascade Foothills CAZ) according to the distribution in Table 5–8. This acreage target is inclusive of mitigation requirements that, along with geographic distribution requirements, are summarized in Table 5–12.
>
> **Objective SPEC23.2**: Protect at least five new occurrences of Conservancy fairy shrimp within 5 years of their discovery.
>
> **Objective SPEC23.3**: Within the 21,400 acres of grassland with vernal swale complex protected (Table 5–5), reestablish Conservancy fairy shrimp in at least two vernal pools from which status surveys indicate the species has been extirpated.

Goal SPEC24: Maintain or increase populations of vernal pool fairy shrimp.

> This goal does not have specific objectives because acquiring necessary habitat (as described in Table 5–16) meets natural community goals NACO2.1, NACO2.2.

Goal SPEC25: Maintain or increase populations of Ferris' milkvetch.

Objective SPEC25.1: Of the total 21,400 acres of protected grassland with vernal swale complex (Table 5–5), include 650 acres of Ferris' milkvetch habitat according to the distribution in Table 5–8. This acreage target is inclusive of mitigation requirements that, along with geographic distribution requirements, are summarized in Table 5–12.

Objective SPEC25.2: Protect at least five new occurrences of Ferris' milkvetch, if present in the Plan Area, within 5 years of their discovery.

Goal SPEC26: Maintain or increase populations of lesser saltscale.

Objective SPEC26.1: Protect at least five new occurrences of lesser saltscale within 5 years of their discovery.

Goal SPEC27: Maintain or increase populations of Hoover's spurge.

Objective SPEC27.1: Of the 21,400 acres of protected grassland with vernal swale complex (Table 5–5), include least 13,675 acres Hoover's spurge habitat within the Oroville and Vina Plains Recovery Core Areas. This acreage target is inclusive of mitigation requirements that, along with geographic distribution requirements, are summarized in Table 5–12.

Objective SPEC27.2: Within the 21,400 acres of protected grassland with vernal swale complex (Table 5–5), include the one known occurrence of Hoover's spurge (see Table 5–17, *Known Covered Plant Species Occurrences and Protection Status*).

Objective SPEC27.3: Within the 21,400 acres of protected grassland with vernal swale complex (Table 5–5), protect at least five new occurrences of Hoover's spurge, if present in the Plan Area, within 5 years of their discovery.

Objective SPEC27.4: Within the 21,400 of protected grassland with vernal swale complex (Table 5–5), establish or reestablish Hoover's spurge in at least two extant vernal pools on soil types from which surveys indicate that the species has been extirpated.

Goal SPEC28: Maintain or increase populations of Ahart's dwarf rush.

Objective SPEC28.1: Of the 21,400 of protected grassland with vernal swale complex (Table 5–5), include least 465 acres Ahart's dwarf rush habitat within the Honcut Recovery Core Area. This acreage target is inclusive of mitigation requirements that, along with geographic distribution requirements, are summarized in Table 5–12.

Objective SPEC28.2: Within the 21,400 acres of protected grassland with vernal swale complex (Table 5–5), protect the 15 known occurrences of Ahart's dwarf rush (see Table 5–17).

Objective SPEC28.3: Within the 21,400 acres of protected grassland with vernal swale complex (Table 5–5), protect at least five new occurrences of Ahart's dwarf rush, if present within the Plan Area, within 5 years of their discovery.

Objective SPEC28.4: Within the 21,400 acres of protected grassland with vernal swale complex (Table 5–5), establish or reestablish Ahart's dwarf rush in at least two extant vernal pools on soil types from which surveys indicate that the species has been extirpated.

Goal SPEC29: Maintain or increase populations of Red Bluff dwarf rush.

Objective SPEC29.1: Within the 21,400 acres of protected grassland with vernal swale complex (Table 5–5), protect 10 known occurrences of Red Bluff dwarf rush (see Table 5–17).

Goal SPEC30: Maintain or increase populations of Butte County meadowfoam.

Objective SPEC30.1: Of the 21,400 acres of BRCP protected grassland with vernal swale complex (Table 5–5), include 6,002 acres of primary and 1,202 acres of secondary modeled Butte County meadowfoam habitat according to the distribution in Table 5–18, *Acreage of Modeled Butte County Meadowfoam Habitat that will be Protected by Population Grouping* and Figure 5–6. These acreage targets are inclusive of mitigation requirements that, along with geographic distribution requirements, are summarized in Table 5–12.

Objective SPEC30.2: Within the 6,002 acres of primary and 1,202 acres of secondary modeled Butte County meadowfoam habitat, establish the Chico Butte County Meadowfoam Preserve, consisting of 2,402 acres of primary and 310 acres of secondary modeled habitat according to the distribution in Table 5–18 and Figure 5–6. The Chico Butte County Meadowfoam Preserve will be acquired within 10 years of BRCP implementation.

Objective SPEC30.3: Within the 6,002 acres of primary and 1,202 acres of secondary modeled Butte County meadowfoam habitat, include 3,600 acres of modeled primary and 305 acres of secondary habitat in the Rock Creek, Chico D, Gold Run Creek, and Table Mountain population groupings according to the distribution in Table 5–18 such that all known occurrences of Butte County meadowfoam in these locations are protected.

Goal SPEC31: Maintain or increase populations of veiny monardella.

Objective SPEC31.1: Within the total 13,441 acres of protected grasslands (Table 5–5), protect the eight known occurrences that comprise the only known population of veiny monardella in the Plan Area (see Table 5–17) located in the Neal Road Drop-Off and Recycling Facility UPA (Cascade Foothills CAZ) according to the distribution in Table 5–8.

Objective SPEC31.2: Within the total 13,441 acres of protected grasslands (Table 5–5), protect at least four new occurrences of veiny monardella, if present in the Plan Area, within 5 years of their discovery.

Goal SPEC32: Maintain or increase populations of hairy Orcutt grass.

Objective SPEC32.1: Of the 21,400 acres of protected grassland with vernal swale complex (Table 5–5), include least 13,650 acres of hairy Orcutt grass habitat within the the Oroville and Vina Plains Recovery Core Areas. This acreage target is inclusive of mitigation requirements that, along with geographic distribution requirements, are summarized in Table 5–12.

Objective SPEC32.2: Within the 21,400 acres of protected grassland with vernal swale complex (Table 5–5), protect at least eight new occurrences of hairy Orcutt grass, if present within the Plan Area, within 5 years of their discovery.

Objective SPEC32.3: Within the 21,400 acres of protected grassland with vernal swale complex (Table 5–5), establish or reestablish hairy Orcutt grass in at least two extant vernal pools on soil types from which surveys indicate that the species has been extirpated.

Goal SPEC33: Maintain or increase populations of slender Orcutt grass.

Objective SPEC33.1: Of the 21,400 acres of protected grassland with vernal swale complex (Table 5–5), include least 7,035 acres of slender Orcutt grass habitat within the Vina Plains and/or Palermo Recovery Core Areas. This acreage target is inclusive of mitigation requirements that, along with geographic distribution requirements, are summarized in Table 5–12.

Objective SPEC33.2: Within the 21,400 acres of protected grassland with vernal swale complex (Table 5–5), protect the two known occurrences of slender Orcutt grass in the Plan Area (see Table 5–18).

Objective SPEC33.3: Within the 21,400 acres of protected grassland with vernal swale complex (Table 5–5), protect at least eight new occurrences of slender Orcutt grass if present in the Plan Area.

Objective SPEC33.4: Within the 21,400 acres of protected grassland with vernal swale complex (Table 5–5), establish or reestablish slender Orcutt grass in at least two extant vernal pools on soil types from which surveys indicate that the species has been extirpated.

Goal SPEC34: Maintain or increase populations of Ahart's paronychia.

Objective SPEC34.1: Within the 21,400 acres of protected grassland with vernal swale complex (Table 5–5), protect four known occurrences of Ahart's paronychia (Table 5–17).

Objective SPEC34.2: Within the 21,400 acres of protected grassland with vernal swale complex (Table 5–5), protect at least five new occurrences of Ahart's paronychia, if present within the Plan Area, within 5 years of their discovery.

Goal SPEC35: Maintain or increase populations of California beaked rush.

Objective SPEC34.1: Protect the seven known occurrences of California beaked-rush (Table 5–17) according to the distribution in Table 5–8.

Objective SPEC35.2: Protect at least five new occurrences of California beaked-rush, if present in the Plan Area, within 5 years of their discovery.

Goal SPEC36: Maintain or increase populations of Butte County checkerbloom.

Objective SPEC36.1: Within the 6,437 acres of protected oak woodland and savanna, 19,605 acres of grassland, and 1,730 acres of riparian land cover types in the Cascade Foothills CAZ (Table 5–5) and according to the distribution of protected Butte County checkerbloom habitat (Table 5–8), protect 65 known occurrences of Butte County checkerbloom.

Objective SPEC36.2: Within the 6,437 acres of protected oak woodland and savanna, 19,605 acres of grassland, and 1,730 acres of riparian land cover types in the Cascade Foothills CAZ (Table 5–5) and according to the distribution of protected Butte County checkerbloom habitat (Table 5–8), protect up to 20 new occurrences of Butte County checkerbloom north of the Big Chico Creek drainage within 5 years their discovery.

Goal SPEC37: Maintain or increase populations of Butte County golden clover.

Objective SPEC37.1: Of the 13,441 acres of protected grassland, 21,400 acres of protected grassland with vernal swale complex, and 2,862 acres protected blue oak savannah (Table 5–5), protect 3,700 acres of modeled Butte County golden clover habitat according to the distribution in Table 5–8. This acreage target is inclusive of mitigation requirements that, along with geographic distribution requirements, are summarized in Table 5–12.

Objective SPEC37.2: Within the 3,700 acres of protected modeled Butte County golden clover habitat (Table 5–8), protect three occurrences of Butte County golden clover (see Table 5–17).

Objective SPEC37.3: Protect at least five new occurrences of Butte County golden clover within 5 years of their discovery.

Goal SPEC38: Maintain or increase populations of Greene's tuctoria.

Objective SPEC38.1: Of the 21,400 acres of protected grassland with vernal swale complex (Table 5–5), include at least 13,700 acres of Greene's tuctoria habitat within the Oroville, Vina Plains, and/or Richvale Recovery Core Areas. This acreage target is inclusive of mitigation requirements that, along with geographic distribution requirements, are summarized in Table 5–12.

Objective SPEC38.2: Within the 21,400 acres of protected grassland with vernal swale complex (Table 5–5), protect two known occurrences of Greene's tuctoria in the Plan Area (see Table 5–17).

Objective SPEC38.3: Within the 21,400 of protected grassland with vernal swale complex (Table 5–5), protect at least four new occurrences of Greene's tuctoria, if present in the Plan Area, within 5 years of their discovery.

Objective SPEC38.4: Within the 21,400 acres of protected grassland with vernal swale complex (Table 5–5), establish or reestablish Greene's tuctoria in at least two extant vernal pools on soil types from which surveys indicate that the species has been extirpated.

5.4 CONSERVATION MEASURES

This section presents the BRCP conservation measures (CMs) that will be implemented by the BRCP Implementing Entity to protect, enhance, and restore natural communities and the covered species habitats they support; improve the ecological function of natural communities; and provide for the conservation of covered species in the Plan Area. Implementation of the conservation measures will collectively achieve the BRCP biological goals and objectives (Section 5.3). Conservation measures address the protection, enhancement, and restoration of physical habitats that support covered species and reduce the effect of environmental stressors on covered species. Conservation measures were developed to address the needs of covered and other native species at each of three ecological scales: landscape, natural community, and species-specific. Landscape-level conservation measures are presented in Section 5.4.1, natural community-level conservation measures are presented in Section 5.4.2, and species-specific conservation measures are presented in Section 5.4.3. A summary list of BRCP conservation measures and the biological objectives they address is provided in Table 5–16.

5.4.1 Landscape-Level Conservation Measures

5.4.1.1 CM1: Acquire Lands

BCAG will protect[16] natural communities and covered species habitat within the Plan Area to build the BRCP conservation lands system. The required acreage of protection of existing natural communities within each CAZ and in total is provided in Table 5–5. The required acreage of protection of covered species habitat types within each CAZ is provided in Table 5–8. Within these protected lands or on additional protected lands, sufficient lands will be protected as is necessary to restore the acreage of wetlands and riparian habitats within the CAZs indicated in Table 5–7.[17] Habitat restoration requirements are described in CM4: Develop and Implement Site Specific Wetland and Riparian Restoration Plans.

BCAG will protect lands using the acquisition mechanisms described in Section 5.4.1.1.3, *Approach to Land Acquisition*, to establish the BRCP conservation lands system. Conservation easements[18] will be used more frequently than other acquisition methods in the working landscape of agricultural lands and rangelands to maintain lands in current land uses that benefit covered species. In general, lands that are acquired through fee title will be those that have known occurrences of highly restricted covered species (e.g., Butte County meadowfoam) or that are intended for extensive changes in land use for habitat improvement such as habitat enhancement and restoration. Candidate lands for protection under voluntary permanent agricultural conservation easements include lands that support intact habitat for covered species and for which no substantial land use changes are required (e.g., no habitat enhancement or restoration needed) and lands needed mainly for ecological corridors. Use of permanent conservation easements is the preferred habitat protection method over fee title acquisition for rangelands and croplands for which the ongoing agricultural use is compatible with achieving the biological goals and objectives of the BRCP.

- This conservation measure provides the mechanism and guidance for the acquisition of lands and the establishment of the BRCP conservation lands system that will meet the natural community and covered species habitat protection biological objectives presented in Section 5.3. Protect and enhance areas of existing natural communities and covered species habitat;

[16] See the glossary for the definition of the term "protect/protection" as it is used in this document. All lands protected under the BRCP will have permanent conservation easements placed on them.

[17] Acreages presented in these tables (Tables 5–3, 5–5, and 5–7) represent the maximum acreage that will be protected and restored with full implementation of the BRCP covered activities (i.e., all protection and restoration for mitigation is implemented).

[18] See the glossary for the definition of the term "conservation easement" as it is used in this document and Appendix M, *Conservation Easement Template*, for a description of the minimum requirements for conservation easements under the BRCP.

- Protect and maintain occurrences of covered plant species with limited distributions and habitat areas occupied by specified covered wildlife species (see Section 5.4.3, *Species-Level Conservation Measures*);
- Provide sites for restoring natural communities and covered species habitat; and
- Provide habitat connectivity among the various land units within the conservation land system.

This conservation measure describes the land acquisition procedures, including pre-acquisition survey requirements, land acquisition methods, and land selection criteria that will be applied to ensure that the ecological attributes of the acquired lands will serve to achieve the biological goals and objectives.

5.4.1.1.1 Pre-Acquisition Surveys

BCAG (subject to USFWS, NMFS, and CDFW review and approval) will develop and implement protocols for assessing physical and biological resources and infrastructure present on lands being considered for acquisition to determine the degree to which they are suitable for achieving BRCP biological goals and objectives. In instances where land is being considered for acquisition to protect habitat occupied by a particular covered species, federal and state protocol-level surveys may be required to determine occupancy. Pre-acquisition surveys will be conducted by qualified biologists (see Appendix P, *Glossary*). Surveys will assess the following and any other relevant physical and biological attributes of the lands consistent with the conservation land assembly principles (see Section 5.2.3.4).

- The presence of covered species
- The extent and quality of existing covered species habitats
- Connectivity with other habitat areas
- Infrastructure supporting existing habitats or necessary to restore habitats
- Adjacent land uses and resources
- Potential constraints to long-term management and maintenance of habitats
- Other conservation-related opportunities and constraints

5.4.1.1.2 Site Selection Criteria

BCAG (subject to USFWS, NMFS, and CDFW review and approval, see Section 8.7.4) will apply, and revise when necessary, the following criteria, based on the conservation land assembly principles described in Section 5.2.3.4 for evaluating and prioritizing acquisition of natural communities (non-cultivated lands) for achieving habitat protection targets. The criteria are intended to be used as a set for assembling a conservation lands system rather than as a rank ordered list for acquiring any one parcel.

- Level of benefits the acquisition will provide for covered species.
- Presence and abundance of covered species and life history functions (e.g., presence of nesting Swainson's hawk, white-tailed kite, peregrine falcon, bald eagle, and western burrowing owl; greater sandhill crane and bald eagle roost sites; or other covered species).
- Presence of plant species of highly limited distribution (e.g., veiny monardella, hairy Orcutt grass, slender Orcutt grass, Butte County checkerbloom, Butte County golden clover).
- Presence of uncommon specialized ecological conditions (e.g., alkali soils, seeps, vernal pools larger than 0.01 acre) required by covered species with a narrow range of habitat requirements.
- Likely effects of adjacent land uses on the ability to maintain or improve desired ecological functions into the future.
- Habitat patch size relative to the minimum habitat patch size requirements of the covered species intended to benefit from the habitat.
- Opportunities for effectively implementing management actions to enhance ecological functions.
- Level of contribution for maintaining local and regional ecological processes.
- Level of connectivity provided between and among existing PEHL habitat areas.
- Level of contribution for protecting natural environmental gradients.
- Level of contribution towards establishment of large units of conserved lands.
- Likely effects of climate change on future ecological functions.
- Role in maintaining and complementing the habitat functions of adjoining natural communities for covered and other native species.
- Role in protecting watershed functions for a covered species (e.g acquisition of oak savanna and woodland and grassland natural communities that provide watershed protection for salmon and steelhead spawning habitat in Butte Creek and Big Chico Creek.)
- For achieving cottonwood-willow and valley oak riparian forest targets, areas that are, or have the potential to become, mature riparian forests over time, with priority given to patches along stream corridors that are 300 feet or more in width.
- Level of contribution towards protection of a heterogeneous mix of natural communities and native species, including native grasses and forbs.
- Effectiveness in contributing towards achieving multiple biological goals and objectives.

BCAG (subject to USFWS, NMFS, and CDFW approval, see Section 8.7.4) will apply, and revise when necessary, the following criteria for evaluating and prioritizing acquisition of agricultural habitats for achieving habitat protection targets.

- Proximity to active Swainson's hawk and white-tailed kite nesting territories.
- Proximity to greater sandhill crane roost sites.
- Occupancy by giant garter snake and western pond turtle and proximity to and connectivity with occupied giant garter snake habitat areas.
- Ability to support crops that provide high value Swainson's hawk and/or greater sandhill crane foraging habitat.
- Opportunities to preserve patches of other high value non-agricultural habitats (e.g., oak groves, wetlands, windrows, and hedgerows) that are located among farmed fields.
- Suitability for restoration of emergent wetland, greater sandhill crane roosting habitat, and giant garter snake habitat.

BCAG (subject to USFWS, NMFS, and CDFW review and approval, see Section 8.7.4) will apply, and revise when necessary, the following criteria for evaluating and prioritizing acquisition of lands for achieving natural communities and covered species habitat restoration targets.

- Ability to achieve biological goals and objectives (e.g., location relative to existing habitat occupied by target covered species; the ability to develop as habitat for target covered species).
- Suitability (e.g., soils, hydrology, topography) and cost effectiveness for restoring target habitats, including water sources for managed wetlands and restored emergent wetlands.
- Ability to meet the same patch size, shape, and connectivity criteria as identified for protection of existing habitats.
- Support the restored habitat over time.
- Level of management necessary to maintain desired ecological functions into the future.

Protection of vernal pools and other seasonal wetlands, natural emergent wetlands, riparian habitats, streams, and ponds must ensure sufficient watershed lands are present to support hydrologic requirements. Protection of managed wetland, some of the restored emergent wetland, and rice land cover types must also include securing (e.g., via water rights and/or contracts) the artificial water sources supporting these habitats.

To be credited as contributing towards achieving the biological goals and objectives, BRCP lands acquired for protection and restoration must be acquired within the CAZs indicated in Tables 5–3, 5–5, and 5–7, or as they may be amended in the future through the adaptive management process (see Section 7.3). The total existing extent of natural communities and

covered species habitats is presented in Tables 5–14 and 5–15, respectively, along with the extent found within existing protected lands (PEHL Category 1) and other PEHL (PEHL Category 2).

5.4.1.1.3 Approach to Land Acquisition

BCAG will establish a conservation lands system that encompasses all lands protected and restored under the BRCP. Land may be acquired through the following mechanisms:

- Purchase in fee title by Implementing Entity or a Permittee and put under a permanent conservation easement (see Appendix M, *Conservation Easement Template*).
- Acquisition of voluntary permanent agricultural conservation easements (hereafter referred to as conservation easements) on private lands that meet BRCP habitat protection requirements (see Appendix M).
- Acquisition by conservation organizations (e.g., land conservancies and land trusts) that protect and manage lands in conformance with BRCP requirements.
- Protection of lands by state agencies that provide designations for those lands that meet BRCP protection and management requirements (would not apply to mitigation requirements, only conservation component.)
- Purchase of mitigation credits from private mitigation or conservation banks approved by USFWS and CDFW or U.S. Army Corps of Engineers (USACE) and meeting the protection and management requirements of the BRCP (see Section 8.7.6).

The BRCP conservation lands system benefits from and builds on the existing protected lands within and adjacent to the Plan Area (Figure 5–2). In addition, other PEHL (PEHL Category 2) support natural communities and covered species habitats that contribute to the overall conservation of the covered species and natural communities in the Plan Area (Figure 5–2).

Procedures and requirements for conservation easements are described in Appendix M. BCAG may acquire conservation lands in partnership with other government entities or conservation organizations, or through grants of land from participating or other entities where such lands will serve to achieve the BRCP biological goals and objectives. The BRCP conservation lands system will be comprised of the following: 1) lands that are under direct ownership and management of BCAG; 2) private lands acquired through permanent conservation easements (these lands may be managed by other qualified entities); 3) lands owned and managed by other entities (state, local agencies and nongovernmental organizations such as land trusts and conservancies) that are enrolled into the BRCP and meet all BRCP protection and management requirements (see *Land Acquisition by Other Organizations or through Partnerships* below. It is anticipated that BRCP conservation lands will predominately be protected through use of conservation easements with fee title acquisitions being focused on protection of lands that would require substantial restrictions on existing land uses to provide the intended biological objectives (e.g., lands acquired for restoration of habitat).

It is anticipated that lands selected for habitat restoration and enhancement actions will primarily be acquired in fee title by BCAG because habitat restoration and enhancement actions would preclude other land uses, such as agriculture. Lands acquired for the protection and enhancement of existing habitat functions may be acquired through conservation easements that specify the range of permitted land uses and practices that will maintain the intended habitat functions of the acquired lands (Appendix M).

The BRCP natural community and covered species habitat species occurrence acquisition targets are presented in Tables 5–3 and 5–7, respectively. These targets represent the extent of natural communities and covered species habitats that will need to be acquired under the BRCP to achieve the biological goals and objectives for conservation of natural communities and covered species. These targets represent the minimum extent of land that will be acquired; the actual extent that will be acquired may be greater because acquired parcels may not be comprised wholly of habitat types that contribute towards achieving habitat target acreage (for example, many acquired properties may include developed and disturbed sites, that support little or no habitat function, along with intact natural communities and high-function habitat). Sites within acquired parcels where habitat has been removed or disturbed will often provide opportunities for habitat restoration (see CM4: Develop and Implement Site Specific Wetland and Riparian Restoration Plans).

Acquisition of Irrigated Agricultural Habitats

The Plan Area is dominated by agricultural land use practices with irrigated agriculture accounting for 250,587 acres or 44 percent of the total Plan Area.[19] Rice and orchards (mostly almonds and walnuts) dominate the irrigated agricultural land use. Orchards and vineyards do not provide important habitat for any of the covered species or for native wildlife in general, were not included in any covered species modeled habitat, and are not a focus of the conservation strategy. In contrast, rice lands and irrigated pasture and cropland provide habitat for many wildlife species, including several covered species. Actions to ensure the long-term conservation of rice land and irrigated cropland for both mitigation and conservation components of the BRCP are described in this section.

Rice Land. During BRCP implementation, a certain proportion of rice lands that provide habitat for giant garter snake and greater sandhill crane will be protected and maintained in rice production (Table 5–5) through the purchase of conservation easements from willing sellers. This includes maintaining a total of 23,182 acres of lands in rice production in the Northern Orchards, Basin, and Sacramento River CAZs to achieve the biological objectives for giant garter snake and greater sandhill crane habitat. The primary natural habitat of giant garter snake is comprised of permanent wetland[20], which typically supports substantially higher densities of

[19] In BRCP terminology non-irrigated agriculture are the rangelands that are mainly within the grassland and oak woodland and savanna natural communities. Conservation measures addressing these natural communities would affect the rangelands in the Plan Area.

[20] BRCP land cover types that support aquatic giant garter snake aquatic breeding and movement habitat includes emergent wetland, managed wetland, and willow scrub (see Appendix A, *Covered Species Accounts*).

giant garter snake than rice land (Appendix A). The rice land protection objective for giant garter snake habitat complements the conservation provided by restoration of giant garter snake habitat (i.e., permanent emergent wetland) under CM4: Develop and Implement Site Specific Wetland and Riparian Restoration Plans, and also serves to maintain hydrologic connectivity with occupied habitat areas that are designed and managed specifically as giant garter snake habitat.

Permanent Conservation Easements for Rice Lands Mitigation. BCAG will purchase permanent conservation easements with willing landowners to maintain 23,182, acres in rice production, including associated water conveyance and drainage infrastructure, as mitigation for impacts of the covered activities on giant garter snake and other affected covered species. Fee title acquisition to achieve rice land acreage targets would only be used if the biological objectives cannot be achieved using conservation easements or it is the desire of willing sellers.

Spatial and Management Requirements for Rice Lands. The minimum contiguous extent of rice land brought under easement with one or more landowners must, in its entirety or in combination with other contiguous BRCP protected lands, be sufficient to provide at least 160 acres of habitat to serve as greater sandhill crane habitat or 320 acres to serve as giant garter snake habitat (see Table 5–2). Smaller habitat patches may be protected with concurrence of USFWS and CDFW. Conservation easements will specify the range of rice farming and other land management practices (e.g., canal/drain maintenance activities) permitted on easement lands. The easement will allow only for changes in land use that resulted in restoration of a mosaic of open water, wetland, and upland habitat suitable for giant garter snake.

Fee Title Acquisition of Rice Lands for Habitat Restoration. BCAG will purchase rice lands in fee title from willing sellers including all water rights and contracts that run with those lands for the purpose of giant garter snake habitat restoration as described in the giant garter snake goals and objectives and CM4: Develop and Implement Site Specific Wetland and Riparian Restoration Plans. Rice lands owned in fee title by BCAG will either be managed as high function rice habitat or restored in whole or in part to a mosaic of open water, wetlands, and upland habitat suitable for giant garter snake and other covered species (Table 5–7).

Permanent Conservation Easements for Irrigated Pasture and Irrigated Crops Mitigation. BCAG will purchase permanent conservation easements with willing landowners to maintain 3,780 acres of irrigated pasture and irrigated crops (e.g., hay, row, grain crops) to mitigated impacts of the covered activities on covered species (Table 5–9). Maintaining the working landscape of irrigated pasture and irrigated crops (e.g., hay, row, grain crops) serves to achieve, in part, the biological goals and objectives for Swainson's hawk, greater sandhill crane, giant garter snake, white-tailed kite, and western burrowing owl. To maintain these agricultural habitats for covered and other native species, BCAG will purchase permanent conservation easements with willing landowners to keep their lands in hay, grain, or row crop production to provide habitat for covered species. The minimum contiguous extent of irrigated cropland brought under easement with one or more landowners (or contiguous with existing BRCP

reserves) must, in its entirety or in combination with other contiguous BRCP protected lands, be sufficient to provide 160-830 acres of habitat (depending on species) to serve as protected habitat for the targeted covered species (see Table 5–2). Smaller habitat patches may be protected with concurrence of USFWS and CDFW. Conservation easements will specify the range of crop types permitted on easement lands as well as any necessary restrictions on pesticide use and other land management practices.

Acquisition Land by Other Organizations or through Partnerships

It is anticipated that substantial amounts of land acquisition will be acquired by Permittees such as. In other instances, agencies and organizations who are not Permittees such as local and county parks or land trusts (e.g., The Nature Conservancy) will acquire land in the study area that will help meet the goals and objectives of this Habitat Plan. In these cases, it may be appropriate that BCAG receive credit toward BRCP requirements if the acquisitions are made in partnership with BCAG, they are consistent with BRCP goals, and the lands are enrolled into the BRCP through placement of a conservation easement. It is expected that BCAG will be involved in many of the land acquisitions in the permit area during the permit term. However, BCAG may own little or no land itself. For example, if BCAG partners with other groups and provides matching funds, larger land acquisitions will be possible than if BCAG were to purchase the land on its own. Land acquired through partnerships with non-Permittees can be counted toward the BRCP conservation requirements (i.e., contribution to recovery) only if the acquisition meets the criteria described above.

Credit will be determined based on the purpose and location of the acquisition, the management of the land acquired, and consistency with the conservation strategy of the BRCP. The BRCP budget assumes that BCAG will always fund management and monitoring on land in the Preserve System; actual funding will be determined on a case-by-case basis. Land acquired through partnerships could be managed and monitored by BCAG or by other groups or agencies as long as a contract or other binding agreement is in place to ensure that management and monitoring occurs according to the terms of the BRCP. All acquisitions credited toward the land acquisition requirements of the BRCP can be credited toward the Stay Ahead provision as discussed in Section 8.7.8 (Jump Start and Stay Ahead), regardless of who manages the property and regardless of the source of funding for acquisition or management.

5.4.1.1.4 Connectivity

In addition to the spatial distribution requirements among the CAZs for protection of natural communities, conservation lands will also need to be distributed within and among CAZs to protect elevation gradients and connectivity among natural communities and covered species habitats across the Plan Area. Four ecological corridors will be established within the locations shown in Figure 5–4 and described in landscape level objectives LAND3.3 through LAND3.6 (see Section 5.3.2.1, *Landscape-Level Goals and Objectives*).

Lands comprising each of the corridors may include agricultural lands, rural residential (no less than 10-acre lots), existing roads and utilities, and new roads and utilities that address movement of wildlife through design. It is expected that the corridors can be established through meeting the natural community conservation acreage protection targets presented in Table 5–5, but, depending on the availability of conservation lands, may require acquisition of additional land area. Conservation easements protecting corridor lands will specify the range of permissible land uses that are consistent with the ecological purpose of each corridor (e.g., allowable changes in crop types, etc). Land protection tools for habitat corridors are generally the same as for conservation lands described in Section 5.4.1.1.1, *Pre-Acquisition Surveys*; however, for agricultural lands that provide wildlife movement corridors, but not necessarily covered species habitat (e.g., orchards and vineyards), less restrictive agricultural easements (less restrictive to agricultural practices than conservation easements) may be used.

In addition to the criteria for the establishment of each of the ecological corridors described below, priority will be given to the acquisition of lands with no or minimal barriers to movement[21] of covered species and other native wildlife species and with high permeability for movement of wildlife through patches of non-habitat.[22] In assembling the ecological corridors, it is important to consider the permeability for safe movement of small mammals, amphibians and reptiles across linear anthropogenic structures (e.g., roads, railroads, and utilities) in BRCP established ecological corridors (Figure 5–4). Especially for giant garter snake and other snakes, roads pose a threat because snakes are attracted to roads for thermoregulation (i.e., basking). Research indicates that the combined ecological effects of roads may extend beyond 300 ft from the edge of the road, referred to as a "road-effect zone." Altered roadside habitats have been shown to modify amphibian and reptile behavior and movement patterns. Increased mortality and barriers to movement may influence species demography and gene flow, potentially resulting in impacts on overall population stability and persistence (see Jochimsen et al. 2004)

5.4.1.2 CM2: Develop an Invasive Species Control Program

BCAG will develop, with input and concurrence from USFWS and CDFW, a plan for the control of invasive animal and plant species. The comprehensive invasive species control plan will be implemented under CM5, Enhance Protected Natural Communities for Covered Species (see Section 5.4.2.2).

[21] Roads and highways represent one of the most important anthropogenic impacts on natural areas and contribute to habitat fragmentation because they are linear features that can inhibit animal movement along an ecological corridor (Forman and Alexander 1998; Trombulak and Frissell 2000; Forman et al. 2003). The road surface is a barrier for many species and central dividers and cement-lined road ditches create even stronger barriers for more species. Road traffic and vehicle strikes also create barriers, with higher traffic loads and greater speeds resulting in greater barriers to more species.

[22] If the ecological conditions of gaps between habitat patches are impermeable to species movement or do not sustain life history requirements of species, they effectively act as movement barriers or as population sink habitats (Debinski 2006; Fahrig 2003; Crooks 2002). The maximum inter-patch distance that an organism can traverse is inversely related to the habitat suitability of the gap; in locations with a high gap permeability and suitability, individual species may be able to traverse wider gaps than in locations where gap conditions are incompatible with the dispersing organism.

Elements of the plan will include the following:

- Protocols for periodically surveying for and assessing the abundance of nonnative predators and competitors on BRCP lands.
- Protocols for periodically surveying for and assessing the occurrence and abundance of invasive nonnative plants on BRCP lands.
- A brown-headed cowbird monitoring and control program (see discussion below).
- Methods for assessing degree of biological effect nonnative species have on covered and other native species within BRCP lands.
- Methods for assessing threats for establishment of nonnative animals and plants adjacent to lands onto BRCP lands.
- Methods for assessing threats for the spread of nonnative plants from BRCP lands onto adjacent lands.
- A decision-making process for determining the need for implementing management actions to control nonnative species.
- A description of potential nonnative species control methods.
- A process for developing and implementing monitoring necessary to assess the effectiveness of implemented control methods.

Monitoring and control requirements that may be developed for specific conservation lands will be incorporated into management plans (see Section 5.4.2.2, CM5, *Enhance Protected Natural Communities for Covered Species*).

Current nonnative invasive plant species of concern include:

- Waxy mannagrass
- Italian ryegrass
- Barbed goatgrass
- Medusahead grass
- Yellow starthistle
- Himalayan blackberry
- Giant reed
- Parrot feather

Animal species that could degrade the habitat functions for covered species include:

- Feral domesticated animals (e.g., feral cat predation on ground-nesting birds)
- Wild feral pigs

- Brown-headed cowbirds

The brown-headed cowbird is a native species that has expanded its range substantially with conversion of historical Central Valley natural communities to agriculture uses. The brown-headed cowbird is a frequent brood parasite of yellow-breasted chat and other native birds and can affect local reproduction of yellow-breasted chat. On BRCP conservation lands that support nesting yellow-breasted chats, surveys will be conducted to identify and monitor brown-headed cowbird populations, the extent of brood parasitism of yellow-breasted chats, and the reproductive trend of nesting yellow-breasted chats. If it is determined that cowbirds are substantially affecting nesting success of yellow-breasted chats such that local populations are or could decline, cowbird control measures will be implemented to reduce local cowbird populations.

5.4.1.3 CM3: Identify High Priority Locations for Wildlife Passage Structures and Secure Funding

BCAG will assess the permeability for movement of small mammals, amphibians and reptiles across linear anthropogenic structures (e.g., roads, railroads, and utilities) in BRCP established ecological corridors (Figure 5–4). To conduct the assessment, BCAG will review CDFW, Caltrans, California Roadkill Observation System, and other relevant wildlife roadkill records for roads within BRCP ecological corridors and will coordinate with USFWS and CDFW to identify locations within the corridors where movement and migration of covered and other native wildlife may be substantially impeded by roads and other anthropogenic barriers. Based on results of the assessment, BCAG will identify high priority areas for implementing actions to improve wildlife passage across structures. BCAG will coordinate with entities with jurisdiction over the high priority structures to identify and secure funding for appropriate and cost effective structural solutions for improving passage and reducing the risk for road-kill and other associated sources of native wildlife mortality.

Permeability of roadways can be enhanced by bridges, underpasses, and culverts, especially if substrate conditions are conducive to animal movement (e.g., natural soils, vegetation, and rocks or coarse woody debris). Crossing tubes, pipes, and small culverts with drift fences and other associated structures may be sufficient for successful movement of smaller animals as well as for reptiles and amphibians that tend to move over short distances. Mata et al. (2005) showed that structural characteristics of crossing structures most influenced the species that used the structures. Circular and adapted culverts were used selectively by small mustelids (mammals in the weasel family), amphibians, reptiles and other small mammals (Mata et al. 2005).

BCAG will evaluate BRCP conservation lands within ecological corridors to identify and prioritize inter-habitat patch gaps that are unsuitable for the movement of covered and other sensitive native wildlife species or that create conditions for elevated risk of mortality. Wildlife movement through and mortality risk associated with inter-habitat patch gaps can be improved through habitat enhancements. BCAG will enhance habitat in designated high priority inter-

habitat patches through implementation of CM5: Enhance Protected Natural Communities for Covered Species (see Section 5.4.2.2). Examples of actions to enhance gap permeability include growing of vegetation and ceasing or reducing mowing. It is also important to recognize that the distance between habitat patches that an organism can traverse is inversely related to the habitat suitability of the gap; in locations with a high gap permeability and suitability, individuals may be able to traverse wider gaps than in locations where gap conditions are incompatible with the dispersing organism's capabilities.

5.4.2 Natural Community-Level Conservation Measures

5.4.2.1 CM4: Develop and Implement Site Specific Wetland and Riparian Restoration Plans

Restoration of riparian vegetation, emergent wetland, and giant garter snake habitat will be conducted on BRCP conservation lands, will be designed to support habitat for covered species, and be dominated by native plant species that are typical of these riparian and wetland habitat types in the Plan Area.

BCAG will select restoration sites based on the following criteria:

- Historical presence of the natural community;
- Sufficiency of site soils and hydrology to support the restored natural community functions for covered species over the long term;
- Degree to which restoration at the site will improve connectivity among existing patches of the same and other natural community types;
- Proximity to habitat areas occupied by covered species associated with each of the restored land cover types;
- Degree to which restoration adjacent to existing patches of the natural community will increase the overall habitat functions of existing patches (e.g., increase interior and reduce edge; improve habitat mosaic of serial stages; habitat patch size relative to covered species habitat patch size requirements); and
- Ability to conduct the restoration with no or minimal impacts on existing natural communities and covered species habitat.

BCAG will develop and implement site specific restoration plans that may involve any of the following activities, depending on initial conditions on a site relative to success criteria defined in the restoration objective for a natural community.

5.4.2.1.1 Riparian Habitat

Cottonwood-willow riparian forest and valley oak riparian forest will be restored in patches of at least 25 acres and willow scrub in patch sizes of at 10 acres (Table 5–16), except where smaller patches are required to fill gaps to improve connectivity among existing patches of riparian habitat or will increase existing patches of riparian habitat to these patch sizes. In addition to supporting habitat for covered and other native species, priority will be given to restoring riparian habitat in locations that fill gaps between patches of existing riparian vegetation along stream channels. Cottonwood-willow riparian forest and valley oak riparian forest restoration projects will be designed to include sufficient plantings of elderberry shrubs to mitigate for impacts on elderberry shrubs that support valley elderberry longhorn beetle habitat (Table 5–12).

Activities necessary to restore riparian habitats may involve, depending on initial conditions on a site relative to success criteria defined in the restoration objective for a natural community, the following actions:

- Site clearing of debris and existing vegetation;
- Site grading to improve micro-habitat conditions, hydrology, and planting/seeding conditions;
- Planting and seeding of native plants;
- Irrigation of sufficient duration to establish riparian vegetation; and
- Control of weeds and herbivory of sufficient duration to establish riparian vegetation.

5.4.2.1.2 Vernal Pools and Swales

Restoration activities will establish vernal pool and interconnected swale systems within an intervening upland grassland matrix. The upland grassland matrix will provide sufficient micro-watershed conditions to support the vernal pools and swales and upland habitat for species important to vernal pool systems such as pollinators of vernal pool plants. Restored vernal pools and swales will be designed to support habitat for vernal pool-associated covered species. Restoration will be located on sites that historically supported vernal pools and that maintain soil and hydrologic characteristics such that the functions of vernal pool habitats can be restored and maintained over time. Restoration actions that include excavation or contouring will be conducted at sites where vernal pools were historically present and their characteristic visual signatures are still present to guide restoration efforts. Pool density, connectivity, and bathymetry of the restored pools will be based on best approximations of what was present on the site before the disturbance or modeled after an existing vernal pool terrain patterns on similar geomorphic positions. Restoration activities will only be conducted where the appropriate hydrology is present or can be restored with reasonable certainty. Propagule sources will be from the closest populations of covered vernal pool species without adversely affecting the source populations.

Activities necessary to restore vernal pool complex may involve, depending on initial conditions on a site relative to success criteria defined in the restoration objective for a natural community, the following actions:

- Site clearing of debris and existing vegetation;
- Site grading to improve micro-habitat conditions, hydrology, and planting/seeding conditions;
- Identification of propagule sources within the CAZ of impact that would not be adversely affected by the collection of seeds or soil containing seeds and vernal pool shrimp cysts;
- Collection of native vernal pool plant species seeds and soil containing seeds and vernal pool shrimp cysts for inoculating restored vernal pools;
- Planting and seeding of native plants in restored vernal pool complex uplands;
- Control of weeds and herbivory of sufficient duration to establish native vernal pool plant species;
- Recontouring of the upland component of a vernal pool or swale complex, if needed (e.g. site has been graded);
- Restoration of the grassland component of a vernal pool or swale complex, if needed (e.g. site has been cleared, fallowed, or abandoned) with a seed mixture that is representative of similar grasslands except for those species identified as invasive plants at CAL-IPC.org**:**

  Decompaction of soils in restored areas that have been subjected to earth moving, road building, scraping, or other severe soil disturbances.

5.4.2.1.3 Emergent Wetland

Restored emergent wetlands will be a minimum of 1 acre and larger if needed to meet the minimum habitat patch size or connectivity requirements to achieve habitat restoration objectives for target covered species. Restored emergent wetland will be designed to achieve a California Wildlife Habitat Relationships (CWHR) System habitat stage designation of 2D[23] at maturity. The 126 acres of restored emergent wetlands that address the mitigation of covered activities will be designed such that they are supported by un-assisted hydrologic inputs that maintain jurisdictional wetlands features.

Activities necessary to restore emergent wetland may involve, depending on site-specific conditions, the following actions:

[23] Under WHR: 2 = emergent vegetation greater than 12 inches in height; and D = dense cover, canopy closure 60-100 percent (Mayer and Laudenslayer 1988).

- Site clearing of debris and existing vegetation;
- Site grading to improve micro-habitat conditions, hydrology, and planting/seeding conditions;
- Erosion control measures;
- Collection of native emergent plant species rhizomes and other propagules for establishment in restoration sites;
- Planting and seeding of native emergent wetland and aquatic plants;
- Plant protection and ground cover manipulation.

5.4.2.2 CM5: Enhance Protected Natural Communities for Covered Species

BCAG will prepare and implement management plans with input from USFWS, NMFS, and CDFW for protected natural communities and covered species habitats supported by those communities. Management plans may be prepared for specific protected parcels or multiple protected parcels within a specified geographic area of the BRCP conservation lands. Management plans will provide the information necessary to guide habitat enhancement and management actions to achieve the biological objectives established for the conserved lands addressed by each plan. Within two years of acquisition of conserved parcels, BCAG will complete baseline ecological surveys to collect the information necessary to assess the level of ecological condition and function of conserved species habitats and supporting ecosystem processes, and the functional connectivity of conserved lands within and among habitats.[24] See Section 7.2 for more detail on baseline surveys. Within one year of completing the assessment of ecological condition and function, BCAG will identify habitat enhancement actions that will be implemented to enhance habitat functions for the target covered species and any subsequent ongoing management actions that are necessary to maintain habitat functions over time. The collected information will also establish the base ecological conditions from which the effectiveness of enhancement and management measures can be evaluated through subsequent effectiveness monitoring (see Section 7.2).

The content of management plans will include, but not be limited to, a description of the following:

- The biological goals and objectives to be achieved with the protection and management of the parcels.
- Base ecological conditions (e.g., habitat maps, assessment of covered species habitat functions, occurrence of covered and other native wildlife species, vegetation structure

[24] Note that pre-acquisition biological surveys are required for all properties that are brought into the BRCP conservation lands system, but such surveys serve a different purpose and are not necessarily of the same type or level of detail as baseline surveys.

and composition, occurrence and extent of nonnative species, assessment of nonnative species abundance and effect on habitat functions, habitat and landscape connectivity).

- Vegetation management actions that benefit covered communities, habitats, and species and reduce fuel loads as appropriate and are necessary for implementing species-specific conservation measures.
- Current and historical livestock grazing management practices.
- The incorporation of a fire management plan developed in coordination with the appropriate agencies and to the extent practicable, consistent with achieving the biological objectives of the BRCP.
- Infrastructure, hazards, and easements.
- Existing land uses and management practices and their relationship to covered species habitat functions.
- Allowable recreational access and uses.
- Applicable permit terms and conditions.
- Terms and conditions of conservation easements when applicable.
- Management actions and schedules, including mosquito abatement monitoring and treatment methods and restrictions.
- Monitoring requirements and schedules.
- Established data acquisition and analysis protocols.
- Established data and report preservation, indexing, and repository protocols.
- The adaptive management approach.
- Any other information relevant to management of the protected parcels.

Based on the assessment of existing site conditions (e.g., soils, hydrology, vegetation, occurrence of covered species) and site constraints (e.g., size, infrastructure, adjacent land uses), and depending on biological objectives of the conserved lands, management plans will specify measures for enhancing and maintaining habitat as appropriate, including applicable invasive control measures identified in the NHP invasive species control program (prepared under CM2, Develop an Invasive Species Control Program).

Management plans will be periodically updated to incorporate changes in maintenance, management, and monitoring requirements as they may occur over the term of the BRCP.

The following subsections provide examples of possible management actions to enhance protected natural communities for the benefit of multiple covered species.

5.4.2.2.1 Oak Woodland and Savanna

Protected oak woodland and savanna habitats will be managed to maintain and enhance functions for Swainson's hawk, white-tailed kite, and bald eagle (nesting habitat). Depending on site-specific conditions, appropriate management actions may include the following:

- Retaining snags and downed wood;
- Prohibiting tree harvest for firewood and other uses unless tree harvest is identified in the management plan as a method for achieving habitat enhancement objectives;
- Managing grazing to enhance tree survival and recruitment; and
- Protecting seedlings from herbivory.

5.4.2.2.2 Grassland Natural Community

Protected grassland will be managed to maintain and, where appropriate, increase the abundance of fossorial and other small mammals (e.g., ground squirrels) to increase the abundance of prey species of covered raptor species and other native predators and to increase burrow availability for western burrowing owl. Depending on site-specific conditions, appropriate management actions may include the following:

- Prohibiting rodent control activities on conservation lands, except where required for public safety or to protect key resource values or important infrastructure,
- Creating debris piles to create habitat for small mammals and birds, and
- Managing grazing to improve the abundance of fossorial mammals.

Other habitat enhancement and management actions to improve the functions of protected grassland land cover types as habitat for covered species, depending on site-specific conditions, could include the following actions:

- Installing artificial nesting burrows for western burrowing owl to facilitate use of unoccupied areas.
- Using fire, managed grazing, or other vegetation management techniques to influence vegetation structure or composition, or increase the absolute cover and diversity of native plant species and to control undesirable nonnative plant species.
- Applying herbicides to remove heavy infestations of nonnative plants.
- Reseeding native plant species.
- Managing livestock grazing to improve the function of vernal pools and grassland swale complex as habitat for covered vernal pool shrimp and plant species.

BCAG will enhance existing vernal pool and swale complex habitats that have been degraded through anthropogenic activities (e.g., disking, damage from vehicles) to improve their habitat function for covered species and other native vernal pool species. Enhancement actions for vernal pools could also include modifying or removing structures that artificially increase or decrease inundation period and removing supplemental sources of water that increase the inundation period relative to historical conditions.

5.4.2.2.3 Riparian Natural Community

Protected riparian habitats will be managed to maintain and enhance habitat functions for Swainson's hawk, white-tailed kite, yellow-breasted chat, western yellow-billed cuckoo, foothill yellow-legged frog, western pond turtle, and valley elderberry longhorn beetle. Depending on site-specific conditions, appropriate management practices may include the following:

- Managing livestock grazing to maintain favorable habitat conditions for covered species;
- Controlling nonnative predators and invasive plant species;
- Planting native species to improve habitat structure and species composition; and
- Installing or maintaining woody debris in stream channels to create pools to increase the diversity of micro-habitats.

5.4.2.2.4 Wetland Natural Community

Protected emergent wetlands will be managed to maintain and enhance wetland function and hydrogeomorphic processes through site-specific management practices. Depending on site-specific conditions, management practices could include the following activities:

- Controlling nonnative species;
- Managing livestock grazing to maintain favorable habitat conditions for covered species;
- Increasing extent of native vegetation;
- Controlling human access and activities;
- Managing water sources supporting wetlands;
- Increasing or decreasing ponding capacity;
- Controlling erosion; and
- Maintaining or enhancing adjacent upland habitats to support habitat transitions and ecotones and protect watersheds.

Wetlands will be managed specifically to promote the development of habitat for covered species with management actions designed to enhance habitat value, including the following:

- Maintaining appropriate water depth;
- Establishing emergent vegetation;
- Installing fencing to manage access by livestock; and
- Controlling nonnative predators.

Management for restored and natural emergent wetlands will focus on providing essential life history prerequisites for covered species, primarily giant garter snake, western pond turtle and tricolored blackbird. Management activities to benefit these species will entail:

- Maintaining sufficient water levels and water quality throughout the year to support emergent vegetation, aquatic food webs, and diverse aquatic habitat structure;
- Protecting upland basking and overwinter/hibernation sites, including rodent burrows;
- Managing exotic species that may compete with or prey upon covered species (e.g., bullfrogs, predatory fish);
- Regulating human recreational activities (e.g., fishing) to prevent disturbance; and
- Enhancing the habitat structure within the water column to provide underwater refugia, for prey species for giant garter snakes, and for western pond turtle juveniles.

Wetland seeps are small and of limited distribution in the Plan Area. To provide habitat for and increase populations of California black rail and California beaked-rush, occupied and suitable wetland seep habitat will be evaluated and managed within BRCP conservation lands. Management tools, such as the control of grazing, will be used to enhance the function of seeps as habitat.

5.4.2.2.5 Aquatic Natural Community

Stream channels and ponds within BRCP conservation lands will be managed to maintain and enhance habitat functions for covered fish, reptile, and amphibian species. Depending on site-specific conditions, habitat enhancement actions could include the following:

- Planting emergent vegetation along pond margins to increase habitat functions for the western pond turtle.
- Maintaining and improving pond water control structures and water supplies.
- Increasing or decreasing ponding (duration and frequency) to improve wetland functions.
- Controlling nonnative predators in ponds (e.g., bullfrog).
- Installing large woody debris along stream channels and channel banks to improve instream cover conditions for covered fish species.

- Coordinating with flood control entities to modify channel maintenance practices to maintain woody debris in channels supporting anadromous fisheries.

5.4.2.2.6 Agricultural Habitats

Cultivated agricultural lands within the BRCP conservation lands system will be managed to enhance habitat functions for covered species where such enhancements are consistent with achieving the primary objectives of the maintained agricultural habitats. Depending on site-specific conditions and the conditions of conservation easements on private lands, habitat enhancement and management actions could include the following:

- Reducing the use of herbicides and pesticides;
- Altering cultivation and harvest practices to increase forage and prey availability for covered and other native wildlife species;
- Planting hedgerows to provide rodent habitat to increase prey abundance for covered and other raptors; and
- Maintaining water in canals and ditches during the activity period (early spring through mid-fall) for the giant garter snake, western pond turtle, and other native wildlife species.

Management of rice lands supporting giant garter snake habitat may involve rotations with non-rice crop types or changes in agricultural practices. These activities are permissible provided that the following conditions are met:

- Conveyance channels customarily used for rice farming must be filled with water to provide habitat for giant garter snakes during the active season of the species (March through October);
- No more than 20 percent of the total rice conservation lands may be rotated to upland crops in any given year, contingent upon approval by BCAG;
- Parcels must be surveyed for evidence of reproducing giant garter snakes (e.g., presence of young of the year) in the year prior to the intended crop rotation. Parcels harboring young snakes are not eligible for crop rotation in the following year, (However, they may be fallowed according to customary agricultural practices without the approval of the Implementing entity);
- Except when necessary to allow for the cultivation of rice in the following season, berms, levees, and other potential hibernation habitat for giant garter snakes may not be removed, altered or otherwise compromised during the hibernation season (November through February) to avoid disturbance of hibernating snakes.
- Pesticide application must be approved by BCAG to ensure compatibility with giant garter snake conservation.

5.4.2.3 CM6: Maintain and Enhance Public and Easement Habitat Lands for Covered Species

Existing protected lands (Category 1 PEHL) and Category 2 PEHL within the Plan Area are not necessarily managed for the benefit of covered species, though they do provide natural community benefits (e.g., providing habitat for covered and other native species, maintaining habitat connectivity, and serving as ecological corridors) because they are protected from land conversion for development or agriculture. For example, the Gray Lodge Wildlife Area is managed by CDFW primarily for waterfowl use, but parts of the Wildlife Area could be managed to enhance habitat function for covered species such as giant garter snake. Under this conservation measure, BCAG will coordinate with federal, state, and local government agencies and other organizations and entities responsible for PEHL in the Plan Area that are identified in Figure 5–1 to attempt to implement actions that will maintain or enhance conservation provided for the following covered species:

- Active Swainson's hawk, white-tailed kite and peregrine falcon nest sites;
- Active bald eagle nest and roost sites;
- Active bank swallow nesting colonies;
- Occupied western burrowing owl nesting burrows;
- Giant garter snake and western pond turtle breeding and aquatic movement habitats; and
- Occurrences of Ferris' milkvetch,[25] Ahart's dwarf rush, Greene's tuctoria, Hoover's spurge, Butte County checkerbloom, California beaked-rush, Ahart's paronychia, Butte County meadowfoam, lesser saltscale, Butte County golden clover, and Red Bluff dwarf rush.

The following actions will be undertaken by BCAG.

- BCAG will coordinate and may enter into agreements (e.g., Memoranda of Agreement, Memoranda of Understanding, Cooperative Management Agreements) with federal and state agencies, land trusts, and other organizations and individuals that manage PEHL that support the covered species described above to implement additional or adjust existing management actions, if needed, to maintain or benefit these resources.
- BCAG will coordinate with and enter into agreements with Permittees (e.g., City and County agencies) to manage PEHL under their jurisdiction to similarly benefit these resources.
- Preparatory to entering into agreements, BCAG will coordinate with entities having jurisdiction over PEHL to (a) gather relevant available information and, if appropriate,

conduct surveys necessary to determine the presence and status of the covered species resources listed above on PEHL, and (b) gather information necessary to describe the range of land management practices that are permissible on the protected lands.

- Based on information collected under action 3, BCAG in coordination with the landowner/land manager will identify the need for adjustments in land management practices to maintain or improve the covered species resources listed above and, if needed, identify new or revised management actions that will be implemented.
- For lands that are protected under existing conservation easements and for which modifications to existing land use practices are proposed by BCAG, BCAG will coordinate with the easement holders and the landowners to seek modifications to the conservation easements necessary to implement any changes in land use practices.
- In certain instances BCAG may provide funding necessary to implement prescribed management actions.
- Approximately 26 percent of non-rice irrigated cropland in the Plan Area is currently in PEHL under state or federal ownership or through existing conservation easements with private landowners. These protected agricultural lands may or may not be currently maintained in cover types suitable for covered species, such as giant garter snake upland aestivation and movement habitat and greater sandhill crane roosting habitat. BCAG will coordinate with the applicable state or federal wildlife agencies or non-government organizations that own and manage these lands to assess land use practices and ensure that goals and objectives on these agricultural lands are oriented toward managing for covered species and achieving BRCP biological goals and objectives. As described in Section 8.7.4 conservation actions implemented under this conservation measure can only be credited towards achieving the conservation component of conservation acreage targets if the actions meet all BRCP protection, management, monitoring, and adaptive management requirements.

5.4.3 Species-Level Conservation Measures

5.4.3.1 CM7: Create and Maintain Greater Sandhill Crane Winter Roosting Habitat

BCAG will create and manage 160 acres of sandhill crane winter roosting habitat in proximity to traditional upland use areas. Winter roosting habitat will be designed and managed to maintain a wetted pool area of at least 20 acres with water depths averaging approximately 4 inches and a surrounding upland area extending at least 500 feet from the wetted surface that supports no or low vegetation. Roosting habitat will be annually flooded from October 1 through March 15 or before March 15 if cranes have abandoned use of a site. Management actions to implement this conservation measure are anticipated to include:

- Irrigation management to maintain the required wetted surface and water depths that support crane roosting;
- Construction of berms or other infrastructure as need to maintain suitable roost site conditions; and
- Farming and vegetation management practices that maintain upland vegetation adjacent to the wetted roosting area in an open condition that is suitable for supporting crane use of roost sites.

5.4.3.2 CM8: Restore Giant Garter Snake Habitat

Restored giant garter snake habitat will include a mosaic of emergent wetland, open water, and upland habitat. Restored emergent wetland will be designed to achieve a CWHR System habitat stage designation of 2D[26] at maturity. Restored giant garter snake habitat will be a minimum of 20 acres; where rice agricultural fields are converted to habitat for giant garter snake, minimum acreage and geometry of restored wetlands will be prescribed by the size of rice fields. All restored emergent wetland in giant garter snake habitat sites must have a secure source of water for maintaining the intended restored habitat functions - either natural hydrology, a dedicated source of irrigation water and delivery systems, or a combination of the two - that maintains ponding and soil saturation at a frequency and duration sufficient to support hydrophytic vegetation typical of permanent emergent wetlands in the Plan Area.

Where emergent wetlands are restored within the range of giant garter snake, additional artificial inputs of water to enhance the extent and duration of ponding to support giant garter snake habitat will be included, as practicable, in the restoration design and implementation and long-term management.

The 500 acres of giant garter snake habitat restoration is expected to be located in the Basin CAZ which supports the center of the snake population in the Plan Area, however, BCAG may restore a portion of the giant garter snake habitat in the adjoining Sacramento River, Northern Orchards, and Southern Orchard CAZs where such restoration meets giant garter snake habitat requirements. (Table 5–7). The primary natural habitat of giant garter snake is comprised of permanent wetland,[27] which typically supports substantially higher densities of giant garter snake than rice land (Wylie et al. 2010). Restored habitats will be located such that they are hydrologically connected to occupied giant garter snake habitats to provide habitat corridors to support movement among habitat areas. It is anticipated that giant garter snake habitat will be restored primarily on rice lands or managed wetlands that could be occupied by giant garter snake. To minimize the potential for injury or mortality of giant garter snake as a result of

[26] Under WHR: 2 = emergent vegetation greater than 12 inches in height; and D = dense cover, canopy closure 60-100 percent (Mayer and Laudenslayer 1988).

[27] BRCP land cover types that support aquatic giant garter snake aquatic breeding and movement habitat includes emergent wetland, managed wetland, and willow scrub (see Appendix A, *Covered Species Accounts*).

operating restoration-related equipment, habitat restoration activities will be conducted during the giant garter snake active period.

Restored giant garter snake habitat will be designed to support a mix of native emergent vegetation and open water and upland edge configuration that provide maximum function, within site constraints. These functions include:

- Adequate water during the snake's active season (early spring through mid-fall) to provide food and cover;
- Emergent, herbaceous wetland vegetation, such as cattails and bulrushes, for escape cover and foraging habitat during the active season;
- Basking habitat of grassy banks and openings in waterside vegetation; and
- Higher elevation uplands for cover and refuge from flood waters during the snake's dormant season in the winter (USFWS 2006d).

Restored giant garter snake habitat will be managed to provide water over the course of the giant garter snake's active season at suitable elevations and depths. Water levels will be managed to ensure that hibernacula burrows will not be flooded during winter. However, drawdown of water levels during winter will be managed adaptively to ensure residual habitat for prey species. In addition, bullfrog abundance will be monitored in restored wetlands and will be controlled if necessary to substantively improve juvenile giant garter snake survival rates by reducing the predation loss. Habitat restoration designs will incorporate upland habitat areas that support movement and aestivation habitat. Uplands near restored emergent wetlands will be managed to provide small mammal burrows and soil crevices located above prevailing flood elevations throughout its winter dormancy period (USFWS 2006d). Adequate burrows are typically located in sunny exposures along south and west facing slopes.

Activities necessary to restore emergent wetland for giant garter snake may involve, depending on site-specific conditions, the following actions:

- Site clearing of debris and existing vegetation;
- Site grading to improve micro-habitat conditions, hydrology, and planting/seeding conditions;
- Erosion control measures;
- Collection of native emergent plant species rhizomes and other propagules for establishment in restoration sites;
- Planting and seeding of native emergent wetland and aquatic plants;
- Plant protection and ground cover manipulation; and
- Installation or modification of water irrigation and drainage infrastructure, including wells, pumps, water control structures and irrigation ditches.

5.4.3.3 CM9: Replenish Spawning Gravels for Salmonids

BCAG will place 30,000 cubic yards of spawning gravels of a suitable size for use by Chinook salmon and steelhead in suitable spawning locations within Big Chico Creek, Little Chico Creek, Butte Creek, Little Dry Creek, Rock Creek, and/or Mud Creek to increase the extent of salmonid spawning habitat. Anticipated actions to implement this conservation measure include, but are not limited to the following:

- Mapping the location of existing salmonid spawning habitats;
- Assessing the condition of existing spawning habitat areas to determine if their function could be substantially increased with augmentation of gravels;
- Mapping these creeks for other suitable locations for new nearby salmonid spawning habitat where it currently does not exist;
- Conducting assessments to identify suitable locations for restoring (if existing) or creating (if new) spawning habitat with placement of spawning gravels;
- Prioritizing locations for spawning gravel replenishment based on the likely biological benefits and practicability (e.g., the potential for adverse effects on flood control); and
- Placement of spawning gravel in the highest priority channel locations.

BCAG will monitor enhanced and restored spawning habitat to determine if they support salmonid spawning and to determine if additional replenishment may be required to maintain the habitats over time (see Section 7.2). Because placed spawning gravels may be transported downstream over time in some locations, BCAG may choose to allocate a portion of the 30,000 cubic yards of spawning gravel to maintain previously enhanced and restored spawning habitats.

5.4.3.4 CM10: Remove Impediments to Upstream and Downstream Fish Passage

BCAG will conduct an assessment of Pine Creek, Rock Creek, Mud Creek, Big Chico Creek, Lindo Channel, Little Chico Creek, Butte Creek, and Little Dry Creek to identify locations where passage of covered fish species is physically impeded. Impediments could include, but are not limited to, debris build-up, large boulders that have shifted, and existing non-functional fish ladders. BCAG will coordinate with NMFS, USFWS, and DFW to prioritize each of the identified locations for implementing actions to improve fish passage based on the likely magnitude of benefits for the covered fish species. Based on priority, BCAG will contact landowners where the impediments are located to enter into cooperative agreements to implement actions necessary to modify stream channels to improve conditions for fish passage. Depending on the type of impediment to fish passage, anticipated actions to remove barriers to fish passage includes use of hand tools and machinery in stream channels (e.g., backhoes) to dislodge and remove debris. BCAG will also assist in the acquisition of funds to support, along with other sources of funding, reconstruction of the Iron Canyon Fish Ladder along Big Chico

Creek. The existing fish ladder is nonfunctional and impedes the upstream movement of adult salmonids.

5.4.3.5 CM11: Remove, Modify, or Screen Unscreened Diversions

To reduce entrainment loss of juvenile salmonids, existing diversions will be modified along Big Chico and Butte Creeks in the Cascade Foothills, Northern Orchards, and Basin CAZs. BCAG will install fish screens, move, consolidate, or otherwise modify diversions that do not have fish screens to reduce entrainment loss of juvenile salmonids along Big Chico Creek and Butte Creek (Figure 5–5 [see separate file]). As of 1997, there were 59 diversions, excluding diversions along the Sacramento and Feather Rivers that are not known to be fitted with fish screens in the Plan Area (Figure 5–5; DFG 2001). Seventeen of these diversions are located on Sanborn Slough, which does not support any covered or local concern fish species. As a result, these 17 diversions will not be modified under this conservation measure unless covered fish species are found to inhabit Sanborn Slough in the future.

BCAG, in coordination with NMFS, USFWS, and DFW, will update the inventory of diversions in the Plan Area and develop criteria for and evaluate each diversion to identify and prioritize those that pose a substantial entrainment risk for covered fish species and that can be feasibly modified to reduce entrainment risk. If results of the evaluation indicate that fewer than 25 diversions should or can be modified, remaining funds allocated to this conservation measure will be reallocated to implement other measures as determined through the adaptive management process that will benefit the covered fish species.

5.4.3.6 CM12: Conserve Butte County Meadowfoam

Butte County meadowfoam is endemic to the Plan Area. This conservation measure is designed to achieve the BRCP biological goal to protect in perpetuity self-sustaining populations of Butte County meadowfoam throughout its full ecological, geographical, and genetic range by ameliorating or eliminating the threats that caused it to be listed.[28]

5.4.3.6.1 Establish the Chico Butte County Meadowfoam Preserve

BCAG will establish the Chico Butte County Meadowfoam Preserve (CBCMP), with specifically identified boundaries, that protects Butte County meadowfoam (BCM) known occurrences, primary habitat, and secondary habitat within the Chico A, B, and C population groups and additional lands necessary to conserve these populations and habitat as indicated in Table 5–18 and Figure 5–6. The preserve will be established by Year 10 of BRCP implementation. Existing protected lands that support meadowfoam occurrences and its habitat

[28] Achieving this goal will achieve the recovery goal for the Butte County meadowfoam in the Vernal Pool Species Recovery Plan (USFWS 2005). The BRCP objectives and conservation measures for Butte County meadowfoam differ from the specific approaches identified in the Recovery Plan, but achieve the overall goal of recovery through these alternative conservation mechanisms.

(Figure 5–6) will be integrated into the CBCMP and all of these lands will be managed as a single conservation lands unit under the BRCP. Occurrences and primary habitat of Butte County meadowfoam in the Chico A, B, and C population groups (see Appendix A, Figure A-30.3) that may be removed by future projects covered under the BRCP (Chapter 2, *Covered Activities*) are identified in Figure 5–6.

The identification of the CBCMP boundary was guided by the following ecological goals:

- Protecting known occurrences;
- Protecting primary habitat;
- Protecting primary and secondary habitat adjacent to known occurrences that support the hydrological conditions to maintain the ecological functions necessary to support the habitat occupied by known occurrences of Butte County meadowfoam;
- Providing connectivity between preserved lands, including connections between new and existing preserves, that provides opportunities for the natural dispersal of Butte County meadowfoam seed and pollen; and
- Protecting sufficient extent of habitats and other lands for species (e.g., insect pollinators) and land management (e.g., livestock grazing management) necessary to support Butte County meadowfoam survival.

The boundary of the CBCMP was drawn mainly along parcel boundaries or along clearly identifiable features on the landscape such that the boundary will be easily identifiable for acquisition and management purposes while meeting the above ecological goals.

The extent of Butte County meadowfoam primary and secondary habitat within existing protected lands and outside existing protected lands in the Plan Area is provided in Table 5–19, *Acreage of Existing Protected and Unprotected Modeled Primary and Secondary Butte County Meadowfoam Habitat by Population Grouping* (see separate file).

In addition to the Butte County meadowfoam habitat protected within the CBCMP defined above, secondary habitat associated with the Chico A, B, and C population groupings will be protected by establishment of additional preserve areas that will expand the CBCMP during Plan implementation using the following design rules:

- Protect at least 40 acres of remaining unprotected Butte County meadowfoam secondary habitat associated with the Chico A population grouping outside the CBCMP (Table 5–18).
- Protect at least 149 acres of remaining unprotected Butte County meadowfoam secondary habitat associated with the Chico B, population grouping outside the CBCMP (Table 5–18).

- Protect at least 398 acres of remaining unprotected Butte County meadowfoam secondary habitat associated with the Chico C population grouping outside the CBCMP (Table 5–18).
- Give priority to the protection of Butte County meadowfoam secondary habitat that is contiguous with occupied, primary, and secondary habitat inside the CBCMP.
- Include ecological connectivity that is suitable for Butte County meadowfoam seed and pollen dispersal between and among protected Butte County meadowfoam secondary habitat patches and the CBCMP.
- Give priority to the protection of secondary habitat in patches larger than 40 acres.
- Implement protection of Butte County meadowfoam secondary habitat associated with the Chico A, B, and C population groupings in conjunction with and as design sub-criteria to the conservation lands assembly under the BRCP conservation lands site selection criteria in CM1: Acquire Lands.

5.4.3.6.2 Protect Butte County Meadowfoam Occurrences and Primary and Secondary Habitat in the Rock Creek, Chico D, Gold Run Creek, and Table Mountain Population Groupings

All known currently unprotected occurrences of Butte County meadowfoam in the Rock Creek, Gold Run Creek, and Table Mountain population groupings will be protected. Modeled primary and secondary habitat for Butte County meadowfoam in the Rock Creek, Chico D, Gold Run Creek, and Table Mountain population groupings will be protected in the quantities indicated in Table 5–18.

A system of Butte County meadowfoam preserves will be established within the Rock Creek, Chico D, Gold Run Creek, and Table Mountain population groupings using the following set of preserve design rules:

1. Protect all existing known unprotected occurrences of Butte County meadowfoam (See Appendix A.30, *Butte County Meadowfoam*).
2. Priority will be given to protecting newly located unprotected occurrences of Butte County meadowfoam that are important to survival and recovery of the species, as determined through current data and surveys conducted under measure described in Section 5.4.3.2.3, *Detect and Protect Previously Unknown and New Occurrences of Butte County Meadowfoam*.
3. Protect currently unprotected occurrences and primary and secondary habitat in the Rock Creek, Chico D, Gold Run Creek, and Table Mountain population groupings in the quantities indicated in Table 5–18.
4. Protected primary and secondary habitat areas will be no less than 40 acres in size and will be configured so that no portion of any unit is less than 250 feet wide at its narrowest point

(Figure 5–7, *Conceptual Depiction of the Hierarchical Butte County Meadowfoam Preserve Design Rules Described in Conservation Measure 10*, subfigure A [see separate file]).

5. Locate protected habitat areas to maximize genetic and dispersal connectivity among Butte County meadowfoam occurrences within and among population groupings.
6. Locate protected habitat areas to maximize connections to existing protected areas of Butte County meadowfoam habitat.
7. The configuration of protected primary and secondary habitat areas will be designed to maximize the area conserved relative to the perimeter boundary of the protected Butte County meadowfoam occurrences or where either surface drainage patterns or subsurface hydrological gradients indicate that the quality or function of the habitat will be substantially increased using a different configuration (Figure 5–7, subfigures A and C).
8. If the primary and secondary habitat fully or partially encloses Butte County meadowfoam occurrences, then the protected habitat will be distributed to maximize the average distance between the margin of the occurrence and the outer margin of primary habitat. This rule will be applied unless either surface drainage patterns or subsurface hydrological gradients indicate that the quality or function of the habitat will be substantially increased using a different configuration (Figure 5–7, subfigures B and C).
9. If either surface drainage patterns or subsurface hydrological gradient data indicate that the quality or function of the habitat will be substantially increased by considering the flow path of water, then the area to be protected will be designed using that data. For example, if surface drainage patterns entering an area under consideration crosses an area that is relatively short compared to the depth of the potential protected area (e.g., the short dimension of an oval), then the protected habitat area will be designed to capture as much of the depth as possible. Likewise, if surface drainage patterns entering an area under consideration cross an area that is relatively long compared to the depth of a potential protected area (e.g., the long dimension of an oval), then the protected habitat area will be designed to capture as much of the length as possible (Figure 5–7, subfigure C).
10. If either surface drainage patterns or subsurface hydrological gradients are considered in the design of protected habitat, the configuration of the protected habitat will be designed to ensure that both entering and exiting flows are accommodated so that areas of artificial ponding are not created at the lower end of the drainages or hydrological gradient (Figure 5–7, subfigures C and D).

The Butte County meadowfoam preserves within the Rock Creek, Chico D, Gold Run Creek, and Table Mountain population groupings will be established within the larger context of the establishment of the BRCP conservation lands system, particularly for the grassland and grassland with vernal swale complex natural communities, and will be established in the timeframe described in Chapter 8, *Plan Implementation*.

5.4.3.6.3 Detect and Protect Previously Unknown and New Occurrences of Butte County Meadowfoam

BCAG will conduct surveys of primary and secondary habitat in the Rock Creek, Chico A-D, Gold Run Creek and Table Mountain population groupings (see Appendix A.30) to detect previously unknown and newly established occurrences of BCM. BCAG will also review BCM survey information provided by other entities to detect previously unknown and newly established occurrences. Surveys will be conducted by BCAG as part of its pre-acquisition land surveys and post-acquisition land surveys (see conservation measures CM1: Acquire Lands and CM5: Enhance Protected Natural Communities for Covered Species) and where permission may be otherwise granted by landowners. Primary and secondary habitat will be surveyed for BCM during the BCM flowering season for three consecutive continuous seasons to determine presence and estimate the numbers of individuals in any detected Butte County meadowfoam occurrences.

Previously unknown and new occurrences will be evaluated to determine if they are important and necessary for the continued survival and recovery of BCM and therefore need to be protected to conserve the species. Science-based criteria for determining whether or not an occurrence is important and necessary for the continued survival and recovery of BCM will be developed and applied by BCAG in coordination with USFWS and CDFW. These criteria will be subject to independent science review prior to use in BRCP implementation. The following criteria, recommended by independent science advisors, will be included in this process:

- Newly discovered populations that are large or close to other populations should be high priority for protection
- Populations that may be genetically unique (i.e., far isolated from other populations) should be high priority for protection.
- New occurrences that may be removed could be those that are very small, not genetically unique, and redundant with more significant, already protected populations.
- The removal of newly discovered populations must proceed cautiously and should only be done if there is evidence that BCM populations elsewhere are increasing or stable over time (Appendix G).

5.4.3.6.4 Manage Protected Habitat to Maintain and Enhance Butte County Meadowfoam Habitat Functions

BCAG will evaluate the baseline ecological conditions of protected BCM occurrences and habitat and identify and implement management actions to maintain and improve BCM population and habitat conditions.

Within one year of acquisition of properties to be included in BRCP conservation lands that support BCM occurrences and habitat, BCAG will initiate surveys to determine existing

environmental conditions, including vegetation associations and cover, hydrology supporting BCM habitat, soil conditions, floristic composition, species identity and cover of invasive and ecosystem-altering plant species, swale extent as determined by indicator species, vernal pool surface area at estimated maximum ponding depth, general ponding duration of pools (short, medium, long), and factors (including grazing practices) that may affect pool function (water quality, hydrology, etc.). The assessment of factors influenced by hydrologic conditions (e.g., ponding duration, vegetation) will be conducted over a period of years sufficient to assess conditions in dry, normal, and wet water years. Ongoing grazing management and other land use practices will also be documented and evaluated for their effects on BCM habitat conditions. Results of analyses of survey data will be used to guide the development and implementation of habitat enhancement and management measures and to provide the basis for assessing the effectiveness of enhancement and management measures.

Grazing management could be a major factor driving the persistence and BCM population viability on a site. In cases where the meadowfoam population appears healthy, then documenting the past management history of the site in order to continue it into the future is critical. Similarly, a site with a population that appears to be suffering from poor management or lack of management should have that management history clearly documented as well. The default should be to maintain the current management regime if habitat conditions for the population are good (i.e., the burden of proof should fall on any proposal to change management that appears to be working).

Based on results of baseline condition surveys and other site evaluation information (e.g., historic management practices), BCAG will identify habitat management actions to be implemented to maintain and enhance BCM habitat functions and any subsequent ongoing management actions that are necessary to maintain habitat functions over time.

The content of management plans, developed with input from USFWS and CDFW, will include, but not be limited to, a description of the following:

- The biological goals and objectives to be achieved with the management of the parcels;
- The baseline ecological conditions;
- Existing land uses and management practices and their relationship to BCM habitat functions;
- Management actions (e.g., vegetation management) and schedules including appropriate grazing regime;
- Monitoring requirements and schedules;
- The adaptive management approach; and
- Any other information relevant to management of the protected parcels.

BCM management plans will be periodically updated with input from USFWS and CDFW to incorporate changes in maintenance, management, and monitoring requirements as they may occur over the term of the BRCP. Existing protected lands that have occurrences of BCM will be considered as fully contributing to the conservation of BCM if they meet the requirements of this conservation measure.

Management plans specific to BCM will be integrated with and incorporated into the larger management plans developed for all species and natural communities in BRCP conservation lands (CM5: Enhance Protected Natural Communities for Covered Species) and with the monitoring and adaptive management programs (see Chapter 7, *Monitoring and Adaptive Management*).

5.4.3.6.5 Mitigate Impacts on Butte County Meadowfoam Habitat and Occurrences

Covered activities will have direct and indirect effects on BCM habitat and occurrences (Tables 4–8, 4–9, 4–10). The goal of the BRCP is to provide for the recovery of BCM and this conservation measure CM12, Conserve Butte County Meadowfoam, is designed to achieve that goal with the impacts of covered activities assumed to occur. Although this conservation measure is comprehensive and holistic, minimum mitigation targets and requirements are set for BCM in Tables 5–9 and 5–11.

Primary Habitat

All impacts on BCM modeled primary habitat must be mitigated through the protection of an equal acreage of modeled primary habitat of equal or greater function, whether the effected habitat is occupied or not by BCM. If the effected primary habitat is occupied, then the additional mitigation, described below, for mitigation of impacts on occurrences is required. Note that the mitigation for BCM primary habitat may be encompassed within the mitigation of grassland with vernal swale complex and grassland through application of land acquisition assembly rules and prioritization (Section 5.2.3.4).

Occurrences

All impacts on BCM occurrences must be mitigated through the protection of one or more occurrences that support at least three times the number of individual plants as the occurrence(s) removed. Impacts on BCM occurrences are limited to those identified in Table 4–10, *Butte County Meadowfoam Impact Analysis by Occurrence* within the areas labeled in Figures 4–46 through 4–46d and to newly discovered occurrences as described in Table 4–6, *Take Limits for Covered Species*. Some of the protection of occupied primary habitat with large numbers of plants within the CBCMP and in population groupings outside the CBCMP will serve to achieve this mitigation requirement.

Secondary Habitat.

Impacts on BCM modeled secondary habitat do not require mitigation, unless an occurrence of BCM is present. In which case, the mitigation for occurrences, described above, is required.

5.4.3.7 CM13: Conduct Surveys to Locate and Protect New Occurrences of Butte County Checkerbloom

Butte County checkerbloom is endemic to Butte County and nearly endemic to the Plan Area. BCAG will conduct surveys to locate new occurrences of Butte County checkerbloom during the appropriate time of year in suitable habitat in the Plan Area north of upper Bidwell Park. While a large number of occurrences of Butte County Checkerbloom are known in the Cascade Foothill CAZ south of Upper Bidwell Park, apparently suitable habitat Cascade Foothill CAZ north of the Park has not been extensively surveyed (see Appendix A.36, *Butte County Checkerbloom*). Surveys will be conducted on public lands and on private lands with permission of land owners. BCAG will also seek out occurrences that have been previously identified but not reported (e.g., unpublished survey reports). Based on the results of the surveys, BCAG will distribute the acquisition of natural communities in the Cascade Foothills CAZ (see Section 5.4.1.1) to protect up to 20 newly discovered occurrences.

5.4.3.8 CM14: Translocate Conservancy Fairy Shrimp, Hoover's Spurge Ahart's Dwarf Rush, Hairy Orcutt Grass, Slender Orcutt Grass, and Greene's Tuctoria

BCAG will implement actions to establish or reestablish occurrences of Conservancy fairy shrimp, Ahart's dwarf rush, Hoover's spurge, hairy Orcutt grass, slender Orcutt grass, and Greene's tuctoria in at least two BRCP protected vernal pools for each species. One or more species may be established in the same vernal pool. To implement this measure, BCAG will do the following:

- Evaluate protected vernal pools to determine their suitability (e.g., hydrology and soil conditions) for establishing Conservancy fairy shrimp, Ahart's dwarf rush, Hoover's spurge, hairy Orcutt grass, slender Orcutt grass, and Greene's tuctoria;
- Adopt techniques for establishing Conservancy fairy shrimp, Ahart's dwarf rush, Hoover's spurge, hairy Orcutt grass, slender Orcutt grass, and Greene's tuctoria;
- Harvest seed of Ahart's dwarf rush, Hoover's spurge, hairy Orcutt grass, slender Orcutt grass, and Greene's tuctoria and cysts of Conservancy fairy shrimp, from extant occurrences within or adjacent to the Plan Area. Propagule sources will be from the closest populations of each species without adversely affecting the source populations;
- Manage established occurrences to ensure their persistence over time;

- Monitor the effectiveness of Ahart's dwarf rush, Hoover's spurge, hairy Orcutt grass, slender Orcutt grass, and Greene's tuctoria establishment and management techniques to gather information necessary to improve establishment of new occurrences over time; and
- Monitor propagule sources to ensure that occurrences from which fairy shrimp or plant material is harvested to ensure that the occurrences remain viable.

5.4.4 BCAG Activities to Improve Urban Stormwater Water Quality

The BCAG will support the cities of Chico, Oroville, Gridley and Biggs in obtaining funding through federal and state grants and other sources to implement programs to support compliance with National Pollutant Discharge Elimination System (NPDES) stormwater permits for municipal separate storm sewer systems (MS4s)[29]. Funding will support actions from and in addition to the respective stormwater management programs of these cities that reduce the load or concentrations of contaminants that are toxic to covered fish species and other native fish and amphibians in urban runoff entering Big Chico Creek, Lindo Channel, Little Chico Creek, Sycamore/Mud Creek, Butte Creek and the Feather River. Common toxicants found in stormwater runoff that could have adverse effects on these species include pesticides, fertilizers, sediment, polycyclic aromatic hydrocarbons (PAHs), and heavy metals. Effects of these toxicants on aquatic covered species include both lethal and sublethal effects. Sublethal effects include physiological effects, such as reductions in respiration ability; reproductive and developmental effects, such as reduced fecundity or delayed metamorphosis; and behavioral effects, such as the inability to migrate effectively. These toxicants and their effects on covered aquatic species will be reduced by this conservation measure. Actions, in addition to those in existing plans/programs, will be implemented if they are expected to benefit covered species.

Potential types of actions that could be funded under this measure include, but are not limited to the following:

- Construction of stormwater retention ponds for the capture of stormwater.
- Construction of stormwater retention irrigation holding ponds for the capture and irrigation use of stormwater.
- Design and establishment of vegetated buffer strips to slow runoff velocities and capture sediments and other pollutants.
- Design and construction of bioretention systems (grass buffer strips, sand bed, ponding area, mulch layer, planting soil, and plants) to slow runoff velocities and for removal of pollutants from stormwater.
- Construction of stormwater curb extensions adjacent to existing commercial businesses that are likely to contribute oil and grease runoff.

[29] See the EPA website: http://cfpub.epa.gov/npdes/stormwater/munic.cfm.

- Establishment of stormwater media filters to remove particulates and pollutants.
- Provisioning of funds for moisture monitors to be installed during construction of sprinkler systems at commercial sites that will eliminate watering when unnecessary.
- Providing support for establishment of on-site infiltration systems in lieu of new storm drain connections for new construction, such as pervious pavement in place of asphalt and concrete in parking lots and along roadways, and downspout disconnections to redirect roof water to cisterns on existing developed properties, including residential.

These actions would improve habitat conditions for aquatic covered species: Central Valley steelhead, Central Valley spring-run Chinook salmon, Central Valley fall/late fall-run Chinook salmon, Sacramento splittail, green sturgeon, river lamprey, yellow-legged frog, and western spadefoot by reducing the amount of toxic contaminants entering their habitat.

5.5 CONSERVATION PROVIDED FOR NATURAL COMMUNITIES

As an NCCP, the BRCP Conservation Strategy is designed to meet the NCCPA standard to contribute to the conservation of natural communities and covered species. This section describes how implementation of the Conservation Strategy contributes to the conservation of natural communities and the expected outcomes for each of the natural communities with implementation of the BRCP. The approach to conserving natural communities within the Plan Area focuses on protecting a sufficient portion of each natural community from future changes in land uses such that the extent, spatial distribution, and connectivity among existing and BRCP protected natural communities 1) contributes to the conservation of the covered species and 2) provides sufficient habitat to maintain the distribution, abundance, and provide for the movement and migration of native species dependent on natural communities of the Plan Area into the future. Furthermore, management of protected natural communities in combination with habitat enhancement actions are designed to maintain and improve the ecological functions and services of the natural communities that support the abundance and distribution of covered and other native species dependent of the communities.

Table 5–20a, *Expected Extent of Conserved Natural Communities in the Plan Area with BRCP Implementation* presents the overall Plan Area-wide conservation outcomes of implementing the BRCP covered activities and Conservation Strategy for each natural community and its associated land cover types. BRCP protection and restoration conservation outcomes for each natural community by CAZ are presented in Tables 5–20b to 5–20g. Figures O–1 to O–5 in Appendix O, *Conservation Outcome Figures* illustrates these outcomes for each natural community graphically in the form of pie charts.

Table 5–5 *Natural Community Protection Targets* presents the total protection targets for each natural community and its associated land cover type. Table 5–9 *Natural Community Conservation and Mitigation Targets for Protection and Restoration* distinguishes conservation from mitigation targets for both protection and restoration.

Table 5–16 presents all applicable biological objectives and conservation measures for each natural community.

5.5.1 Oak Woodland and Savannah

In California, oak woodland and savanna is one of the most biologically diverse communities. The oak woodland and savanna natural community is comprised primarily of mixed oak woodland (comprising about 48 percent of the community in the Plan Area), followed by blue oak woodland (comprising 38 percent of the community in the Plan Area; see Table 3–5, *Extent of Natural Communities and Other Land Cover Types in the Plan Area*). Blue oak-, the dominant oak species, are slow-growing and can live for several centuries.

Oak woodland and savanna in the Plan Area are predominantly found on private lands grazed by domestic livestock, thereby fostering and supporting working landscapes that harbor low-intensity agricultural uses such as ranching. Understory plant communities beneath oak canopies are often more productive relative to adjacent plant communities as a result of natural soil enhancement attributed in part to leaf fall and decomposition, greater carbon, nitrogen, and phosphorous reserves relative to adjacent open grassland sites. Additionally, oak woodland and savanna provides important watershed protection for Butte Creek and Big Chico Creek and other streams and water bodies in the Plan Area. Many important wildlife habitat elements occur in oak woodlands, including wetlands, riparian corridors, rock outcrops, dead and downed logs and other woody debris, brush piles, and snags. Oaks provide woody substrate for insect prey, important nesting and roosting habitat for birds, and buffered temperatures and cover from predators for bird, mammal, amphibian, and reptile species.

Several factors threaten the integrity of intact, functioning woodland and savanna communities. Oak woodlands and savannas are compromised by nonnative species, habitat fragmentation, poor sapling recruitment, and disruption of natural fire and grazing regimes. The lack of regeneration by oak species may pose a long-term challenge for maintaining the integrity and wildlife value of this habitat type (Swiecki and Bernhardt 1998). Tyler et al. (2006) reviewed published studies on the demography and recruitment of blue, valley and live oaks, but found little consistency among evidence for a decline in populations of these species. They suggest that the oak "regeneration problem" has largely been inferred from current stand structure and - when viewed over longer periods of time- the evidence for a regeneration problem in foothill oaks is mixed. Long term studies of blue oak do not suggest a decline in tree density, presumably because recruitment is sufficient to offset low rates of mortality of overstory trees. Evidence from the few available studies is more consistent in suggesting long-term declines in foothill populations of valley oak. Potential causes for low or lack of recruitment include acorn predation, browsing by deer and livestock, competition with nonnative annual grasses, and changes in fire regime, and climate conditions that are unfavorable for recruitment. Control of invasive species may be an important aspect of successful oak restoration. In addition, reducing fire frequencies, in particular fire suppression, may negatively affect oak regeneration.

5.5.1.1 Conservation Approach and Expected Outcomes

The conservation approach for the oak woodland and savanna natural community involves the protection of large patches of oak woodland and savanna that are connected with existing protected patches of woodland and savanna and the protection of the north-south foothill environmental gradient and the elevation gradient of conditions from the foothills to the Valley floor.

The outcome of implementing the BRCP for oak woodland and savannah is illustrated in Appendix O, Figure O–1, *Oak Woodland and Savanna Habitat in the Plan Area with full BRCP Implementation*. land cover

Implementation of BRCP actions to protect, enhance, and manage the oak woodland and savanna natural community are expected to maintain and improve the habitat function of the oak woodland and savanna natural community in support of conserving the abundance and distribution of associated covered and other native species in the Plan Area. Under the BRCP, the oak woodland and savanna natural community would be included within a larger conservation lands system that provides for a sufficient extent of protection, spatial distribution, and management of this natural community such that ecosystem functions and biodiversity would be conserved within the Plan Area.

5.5.2 Grassland

Grassland supports some of the most endangered species in the state, including the plants and vertebrate and invertebrate wildlife associated with vernal pools and vernal swales. The grassland natural community is comprised primarily of grassland land cover type, with only sparse occurrences of wetlands (comprising about 67 percent of the community in the Plan Area), and the remainder comprised of grassland with vernal swale complex land cover type.

Grassland in the Plan Area is predominantly found on private lands grazed by domestic livestock, supporting working landscapes that harbor low-intensity agricultural uses such as ranching. Valley grasslands are typically dominated by low-growing nonnative annual grasses interspersed with a diverse assemblage of native perennial grasses, nonnative forbs, and native forbs. Vernal pools and vernal swales found within the grassland matrix contain a unique and diverse vegetation community dominated by native species and distinct from valley grassland species composition. Organisms that thrive in this harsh habitat of winter ponding and summer desiccation co-evolved with the geologic and climatic conditions that formed vernal pools and vernal swales and, consequently, this habitat supports a high number of endemic and rare species of plants, animals, and invertebrates. Numerous native vernal pool plant species are associated with essential insect pollinators (mainly ground nesting bees) and protection of upland pollinator habitat in the grassland matrix maintains vernal pool plant populations. Native grasslands are typically found in isolated patches, smaller than the grassland mapping unit used for the BRCP, but contain higher resource values than nonnative grassland. Also included within grasslands are

streams with associated wetlands and riparian habitat and stock ponds that provide substantial wildlife benefits for species that require both the wetland and aquatic habitats and the adjacent terrestrial grasslands for their full lifecycle.

Several factors threaten the integrity of grassland communities. For example, the vast majority of native California grassland communities have been replaced by ones dominated by nonnative annual species. However, small areas that support high densities of native grasses and forbs can still be considered native California grasslands. Grassland in California has also been significantly modified as a result of agricultural conversion and loss and fragmentation from urbanization. Within the Central Valley, grasslands occur primarily around the perimeter of the valley at the interface between foothill oak woodland habitats and the agriculture dominated valley floor. These areas have been and continue to be subject to loss and fragmentation due to expanding urban and rural development and conversion to agriculture, most recently from the expansion of vineyards and olive orchards.

5.5.2.1 Conservation Approach *and Expected Outcomes*

The conservation approach for grassland is to protect large patches of grassland that are connected with existing protected patches of grassland and other natural communities (predominantly riparian and oak woodland natural communities) to protect the north-south foothill environmental gradients and the elevation gradient of conditions from the foothills to the valley floor.

The outcome of implementing the BRCP for Grassland is illustrated in Appendix O, Figure O–2, *Grassland and Grassland with Vernal Swale Complex Habitat in the Plan Area with full BRCP Implementation*. land cover

Implementation of BRCP actions to protect, enhance, and manage the grassland natural community and restore vernal pools and other seasonal wetlands embedded in grassland are expected to maintain and improve the habitat function of the grassland natural community in support of conserving the abundance and distribution of associated covered and other native species in the Plan Area. Under the BRCP, the grassland natural community would be included within a larger conservation lands system that provides for a sufficient extent of protection, spatial distribution, and management of this natural community such that ecosystem functions and biodiversity would be conserved within the Plan Area.

5.5.3 *Riparian*

Riparian communities are considered the most important habitats to land bird species in California (Manly and Davidson 1993, Davidson 1995) and provide habitat for an estimated 83 percent of amphibians and 40 percent of the reptiles in California (Brode and Bury 1984). In the Plan Area, the riparian natural community is comprised primarily of cottonwood-willow riparian forest (comprising about 34 percent of the community), followed by dredger tailings riparian

forest and scrub-stream associated (comprising about 25 percent of the community) and valley oak riparian forest (comprising about 20 percent of the community) (see Table 3–5).

The largest areas of the riparian natural community in the Plan Area are associated with the Sacramento and Feather river systems. Land use in the riparian natural community in the Plan Area is primarily for provisioning of wildlife habitat for hunting and non-consumptive use, with about 20 percent of the natural community in the Plan Area already under protection. Due to their structural and relational diversity to other habitats, riparian ecosystems provide disproportionately higher ecosystem services and wildlife habitat functions relative to other terrestrial natural communities. It is estimated that over 80 percent of all wildlife species in the Sacramento Valley use riparian areas during a part of their life cycle. Generally, the riparian community is characterized by a variety of overstory and understory species and significant vertical structure. A typical characteristic of riparian communities is their long linear patch configuration along drainages that transect other natural communities such as oak woodlands and grasslands and also agricultural lands. The community provides spatial and functional integration between a diverse array of terrestrial and aquatic ecosystem components. Riparian systems function as important wildlife movement corridors, providing some of the last remaining overstory cover habitat in parts of the Plan Area.

Riparian habitats have suffered a dramatic loss in extent due to conversion and removal. Existing riparian land cover represents a small proportion of the historical distribution in the Plan Area with losses of riparian vegetation throughout California estimated at between 85 percent and 98 percent removed for agricultural, mining, and urban development (RHJV 2004). Loss of riparian habitat is directly linked to population declines and range reduction of many dependent species (RHJV 2004). Current threats include loss of diversity due to a regulated hydrology, reduced groundwater levels and altered flooding regimes due to groundwater pumping and stream flow regulation, conversion to agriculture or urban land uses, and invasive species. Giant reed, considered the state's most invasive riparian weed, can grow in dense monocultures, crowding out native species and causing changes to hydrologic regimes. Salt cedar is another invasive found in the Plan Area. Both of these highly invasive plants can cause channel changes and increases in fire danger. The introduced bullfrog has had a major impact on native frog populations in Butte County. In addition, feral cats can impact many native bird species in the Plan Area and nest parasitism by brown-headed cowbirds may reduce reproduction by many riparian obligate passerines.

5.5.3.1 Conservation Approach and Expected Outcomes

The conservation approach for the riparian natural community is to protect and restore corridors of riparian that are connected with existing protected patches of riparian habitat, grassland, oak woodlands and other natural communities to protect ecotones between riparian and other natural communities and the elevation gradient of conditions from the foothills to the valley floor.

The outcome of implementing the BRCP for riparian is illustrated in Appendix O, Figure O–3, *Riparian Habitat in the Plan Area with full BRCP Implementation* . land cover

Implementation of BRCP actions to protect, restore, enhance, and manage the riparian natural community are expected to maintain and improve the habitat function of the riparian natural community in support of conserving the abundance and distribution of associated covered and other native species in the Plan Area. Under the BRCP, the riparian natural community would be included within a larger conservation lands system that provides for a sufficient extent of protection, spatial distribution, and management of this natural community such that ecosystem functions and biodiversity would be conserved within the Plan Area.

5.5.4 Wetlands

Wetlands support some of the highest concentrations of wildlife in the state. In the Plan Area, the wetlands natural community is comprised primarily of managed wetlands (about 80 percent of the community), followed by emergent wetland (about 14 percent of the community), and managed seasonal wetland (about 6 percent of the community); see Table 3–5. Note that vernal pools and other a seasonal wetlands are discussed under the grassland natural community.

Wetlands in the Plan Area are predominantly found on federal and state wildlife refuges in the western portion of the Plan Area, the vast majority of which is managed wetlands, though other wetlands are scattered in smaller patches throughout the Plan Area. Land use in these wetlands is primarily for the provisioning of wildlife habitat for hunting and non-consumptive use, such as recreational wildlife watching. Managed wetlands include delivery and drainage channels and pond areas that support a mix of open water aquatic, marsh, and riparian scrub and forest habitats. Water management typically involves winter flooding of most of the managed wetland landscape for migratory bird foraging and resting habitat followed by a slow drawdown of water to manage plant seed production. Emergent wetlands are in scattered locations throughout the Plan Area, generally near creeks, rivers, or areas that receive agricultural runoff. Wetlands perform a variety of ecosystem functions, including food web support, filtering of pollutants, carbon storage, water flow regulation (e.g., flood abatement), and groundwater recharge More waterfowl come to winter in the upper Sacramento Valley than anywhere else along the Pacific Flyway (Cowan 1999). Both natural and managed wetlands in the Plan Area provide valuable nesting, foraging, cover, and breeding habitat for many bird, reptile, amphibian, and mammal species.

Wetlands in California have been greatly reduced in quality and extent since the settlement of the region by European Americans. Approximately 90 percent of California wetlands that existed before European Americans settlement have been lost. Historically the most important threat to wetlands has been habitat loss and fragmentation due to human activities, especially agriculture, urbanization, and flood control projects. While current rates of wetland loss are much lower than in previous decades, wetlands continue to be threatened by development pressure. Invasive species such as the giant reed can also threaten wetlands by crowding out native species and

changing hydrological regimes, and feral cats prey on many native wildlife species, especially birds.

5.5.4.1 Conservation Approach and Expected Outcomes

The conservation approach for the wetland natural community is to protect and restore primarily emergent wetlands within the matrix of larger communities and particularly as habitat for giant garter snake.

The outcome of implementing the BRCP for wetlands is illustrated in Appendix O, Figure O–4, *Wetland Habitat in the Plan Area with full BRCP Implementation*.

Implementation of BRCP actions to protect, restore, enhance, and manage the wetland natural community are expected to maintain and improve the habitat function of the wetland natural community in support of conserving the abundance and distribution of associated covered and other native species in the Plan Area. Under the BRCP, the wetland natural community would be included within a larger conservation lands system that provides for a sufficient extent of protection, spatial distribution, and management of this natural community such that ecosystem functions and biodiversity would be conserved within the Plan Area.

5.5.5 Aquatic

Aquatic habitats are essential to maintaining the diversity of wildlife and fish in the Plan Area. Most wildlife species use aquatic habitats at least incidentally for drinking water, some to meet essential life requirements, and others to meet all of their life requirements of breeding, foraging, and cover. Aquatic community is comprised of the rivers, streams, agricultural channels, canals, ponds, and reservoirs in the Plan Area. Some of the more notable natural streams in the Plan Area are the Sacramento River, Feather River, Big Chico Creek, Little Chico Creek, Butte Creek, and Little Dry Creek. The Sacramento River borders a portion of the western edge of the Plan Area but activities (covered activities or conservation measures) effecting the aquatic habitat of the Sacramento River are not addressed in the BRCP. In the western portion of the Plan Area much of the aquatic habitat consists of agricultural drainage and irrigation channels, but natural creeks flowing from the northeast/east portion of the Plan Area also found there.

The major rivers in the Plan Area are managed by public agencies, while smaller streams and canals and ponds are mostly on private lands. Aquatic communities in the Plan Area are used for water storage for irrigation, recreation, and fish and wildlife habitat. While the aquatic natural community by definition has little or no emergent vegetation, it typically borders and forms ecotones with emergent wetlands. Low flow areas, such as agricultural channels support dense emergent vegetation. Organic material carried into streams by runoff or by receding overbank provides nutrients that support plankton, zooplankton, and invertebrate production important to the food web that supports fish and wildlife. This production directly supports all covered fish species as well as many wildlife species, especially covered amphibians and reptiles.

Historically the aquatic natural community in the Plan Area has and continues to be greatly modified from natural conditions. River and creek flows are controlled by the management of dams, reservoirs and diversions, which control the volume and timing of flow of water through aquatic habitats and so affect the organisms associated with them. Stream and river have been diked, channelized, and stabilized, which has drastically changed the natural erosional and flood processes that many organisms and natural communities depend on. Diversions reduce the volume of water carried in rivers and creeks, while drainage channels transport pesticides and other contaminants from agricultural and urban areas into rivers and creeks. Nonnative invasive species are present in aquatic natural communities, and can adversely affect native species through predation and competition. Introduced bass, sunfish, and bullfrogs are particularly voracious predators that strongly influence the successful use of ponds by native amphibian species and the use of creeks and rivers by native fish species.

5.5.5.1 Conservation Approach and Expected Outcomes

The conservation approach for the aquatic natural community is protected perennial and intermittent stream channels and ponds for both mitigation and conservation components of the BRCP.

Implementation of BRCP actions to protect, enhance, and manage the aquatic natural community are expected to maintain and improve the habitat function of the aquatic natural community in support of conserving the abundance and distribution of associated covered and other native species in the Plan Area. Under the BRCP, the aquatic natural community would be included within a larger conservation lands system that provides for a sufficient extent of protection, spatial distribution, and management of this natural community such that ecosystem functions and biodiversity would be conserved within the Plan Area.

5.5.6 Agriculture

Agriculture is the dominant land use throughout the Central Valley and the Central Valley portion of Butte County. The agriculture lands in the Plan Area produce rice, fruits, nuts, and other crops for the commercial market, and are comprised primarily of rice (comprising 48 percent of agriculture lands), orchard/vineyard (comprising 43 percent of agriculture lands), and irrigated pasture (comprising 8 percent of agriculture lands) (see Table 3–5).

Most agriculture within the Plan Area occurs where the soils and topography are most suitable for rice production and orchards. Rice production dominates the southwestern part of the Plan Area (Basin CAZ), while orchards and vineyards are concentrated in the northwest and south-central parts of the Plan Area (Northern Orchards and Southern Orchards CAZs). Agricultural lands in the Plan Area represent an extremely altered landscape that retains little resemblance to the historical (pre-European American settlement) condition. Formerly consisting of extensive wetlands, open grasslands, broad riparian systems, and oak woodlands, the conversion to agriculture has removed most of these native habitats. While generally supporting a less diverse

community of wildlife compared with most native habitats, some agricultural systems continue to support abundant wildlife and provide essential breeding, foraging, and roosting habitat for many resident and migrant wildlife species. Rice lands, for example, have become important "surrogate" wetland habitats for over 235 wildlife species in the Central Valley (Jones & Stokes 1995). Irrigated croplands support abundant rodent populations. Field edges, woodlots, and watercourses that support riparian habitat also provide breeding sites and refugia for prey species and other wildlife. Because of this abundance of food, the Central Valley supports one of the largest concentrations of raptors during the winter and breeding seasons. The primary ecological function of agricultural lands is to provide foraging habitat for agriculture-associated species and limited nesting, cover, and other habitat functions associated with habitats provided by riparian and other vegetation growing along ditch and field margins.

Rice, irrigated cropland, and irrigated pasture possess significant habitat value for many covered species, however, due to the types of species planted, structural uniformity, low species diversity, and disruptive management (application of chemicals, mechanized harvest, etc.) other types of agriculture in the Plan Area have little or no habitat value for covered species. Threats to agriculture, particularly agricultural types that provide important wildlife habitat values, include urbanization, which permanently removes agricultural land, and uncertain water availability, that can alter agricultural land use patterns and affect the distribution and abundance of agriculture-dependent wildlife species.

5.5.6.1 Conservation Approach and Expected Outcomes

The conservation approach for the agriculture is to protect and maintain the working landscape of rice, irrigated pasture, and irrigated crops, primarily through voluntary permanent agricultural conservation easements (hereafter referred to as conservation easements). Protected agriculture will be connected with protected large patches of grassland that are connected with existing protected patches of grassland and other natural communities (predominantly riparian and oak woodland natural communities) to protect the north-south foothill environmental gradients and the elevational gradient from the foothills to the valley floor.

The outcome of implementing the BRCP for agriculture is illustrated in Appendix O, Figure O–5, *Agriculture Habitat in the Plan Area with full BRCP Implementation*.

Implementation of BRCP actions to protect, enhance, and manage specific agriculture land cover types are expected to maintain and improve the habitat function of the agriculture lands in support of conserving the abundance and distribution of associated covered and other native species in the Plan Area. Under the BRCP, agriculture lands would be included within a larger conservation lands system that provides for a sufficient extent of protection, spatial distribution, and management of rice, irrigated cropland, and irrigated pasture such that ecosystem functions and biodiversity would be conserved within the Plan Area.

5.6 CONSERVATION PROVIDED FOR COVERED SPECIES

The Conservation Strategy is designed to meet the NCCPA standard to conserve covered species in the Plan Area in addition to the ESA section 10 standard to monitor, minimize, and mitigate the impacts of the covered activities on the covered species to the maximum extent practicable[30].

Table 5–21a, *Expected Extent of Conserved Covered Species Habitat Types in the Plan area with BRCP Implementation* presents the overall Plan Area-wide conservation outcomes of implementing the BRCP covered activities and Conservation Strategy for each covered species. BRCP protection and restoration conservation outcomes for each covered species are presented by CAZ in Tables 5–21b to 5–21g. Figures O-6 through o-31 in Appendix O illustrate these outcomes for each natural community graphically in the form of pie charts and maps.

Table 5–8, *BRCP Covered Species Modeled Habitat Protection Targets* presents the conservation targets for modeled habitat and occurrences for each covered species by CAZ. Table 5–10, *Covered Species Habitat and Mitigation Targets* distinguishes conservation from mitigation targets for both protection and restoration.

Table 5–16 presents all applicable biological objectives and conservation measures for each covered species.

5.6.1 Tricolored Blackbird

Tricolored blackbirds are nearly endemic to California. The overall range of the species is largely unchanged since the 1930s (Neff 1937, DeHaven et al. 1975, Beedy et al. 1991, Hamilton 1998). However, the number of tricolored blackbird nesting colonies in Butte County has declined substantially from 1931-1937 when over 30 colonies were reported supporting an estimated 159,000 adults (Neff 1937). Populations were dramatically reduced in subsequent decades – 52,500 by 1961 (Orians 1961); 25,000 by 1972 (DeHaven et al. 1975); and 6,500 by the mid-1990s (Hamilton 1998). Beedy et al. (1991) report only three extant colonies in Butte County by 1989. In 2001 only one active colony was located in Butte County along Lone Tree Road with an estimated 500 adult blackbirds (Humple and Churchwell 2002). Surveys of tricolored blackbird were conducted in 2008 in 35 California counties from San Diego County to Shasta County. At that time, a total of 395,321 birds were estimated statewide. A total of 2,541 tricolored blackbirds were observed in Butte County within the Plan Area during the 2008 survey, representing approximately 0.6 percent of the statewide total (University of California Davis 2008).

The primary threat to tricolored blackbird has been the historical loss of its wetland nesting habitat and associated stressors (e.g., increase vulnerability to nesting colonies from disturbances that cause nest or colony abandonment, increased predation in nesting colonies; Appendix A).

[30] 50 *Code of Federal Regulations* (CFR) § 17.22(b)(2)(B), 50 CFR § 222.307 (c)(2)ii).

The initial conversion of the Sacramento Valley from native landscapes to agriculture in the late nineteenth and early twentieth century removed vast wetland areas and caused initial declines in populations. The more recent conversion of agricultural lands that still supported some suitable nesting habitat to urban use has permanently removed breeding and foraging habitat for this species in those areas. As available habitat becomes increasingly limited and food resources become more concentrated, predation can have a substantially larger impact on nesting colonies. Nonnative predators, especially feral cats, can have a substantial impact on nesting colonies. Tricolored blackbird colonies are highly sensitive to human disturbances and close proximity to urban development can cause colonies to be permanently abandoned.

Tricolored blackbirds have three basic requirements for selecting their breeding colony sites: 1) open, accessible water; 2) a protected nesting substrate, including flooded or thorny/spiny vegetation; and 3) a suitable foraging space proving adequate insect prey within a few miles of the nesting colony. Tricolored blackbird foraging habitat includes annual grassland (preferably less than 15 cm [6 in] tall), vernal pools and other seasonal wetlands (both wet and dry phases), pastures, agricultural fields (primarily alfalfa and recently tilled fields), cattle feedlots, and dairies. They also forage occasionally in riparian scrub and marsh habitats. Proximity to suitable foraging habitat appears to be important for the establishment of nesting colonies because foraging occurs at least initially in the field containing the breeding colony.

5.6.1.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

The conservation approach for tricolored blackbird is based on protecting and maintaining suitable wetland and other breeding habitat that is located near suitable upland habitat for foraging. This approach is consistent with and helps achieve the recovery goals of the Draft Recovery Plan for Giant Garter Snake (USFWS 1999) which includes tricolored blackbird as a primary ancillary beneficiary with implementation of its recommended habitat conservation measures. Lastly, maintaining and enhancing the natural functions of habitats, restoring habitats and reducing stressors, such as the adverse effects of nonnative species on nesting success, all contribute to a sustainable protection of the species throughout the BRCP Area.

Appendix O, Figure O–6, *Tricolored Blackbird Habitat in the Plan Area with full BRCP Implementation* depicts the status of modeled tricolored blackbird habitat in the Plan Area with full BRCP implementation, and Appendix O, Figure O–6a, *Tricolored Blackbird: Conservation Strategy Overview* presents an overview of BRCP actions that will benefit tricolored blackbird.

Implementation of the BRCP conservation actions within the BRCP conservation lands system, which is configured to provide large and ecologically connected habitat areas, will conserve tricolored blackbird in the Plan Area and mitigate the direct and indirect impacts of the covered activities.

5.6.1.2 Ecological Uncertainty

The primary ecological uncertainty associated with implementation of the conservation measures is the current population status and distribution of tricolored blackbird in the Plan Area. Recently, only one breeding colony has been persistently recorded in the Plan Area. As BRCP conservation measures and covered activities are implemented, monitoring and surveys will provide a better understanding of the distribution of the species and will reduce the uncertainty associated with the lack of population data. This, in turn, will result in a more focused and tactical implementation of conservation actions to benefit current populations and the protection of vulnerable patches of habitat. An important stressor on tricolored blackbird is the disturbance of active breeding colonies by humans and nonnative predators (Beedy and Hamilton 1999). A primary uncertainty associated with this threat is the effectiveness of nonnative species control measures in protected nesting colonies where predation by nonnative predators has been demonstrated to substantially reduce nesting success. To address this uncertainty, BCAG will coordinate and monitor any implemented control activities with USFWS, CDFW, and tricolored blackbird experts.

5.6.2 Yellow-Breasted Chat

Formerly a common summer resident throughout the Central Valley (Grinnell and Miller 1944), the yellow-breasted chat is currently reported as an uncommon resident in riparian habitats in the Plan Area and appears to have been extirpated from the San Joaquin and Sacramento valleys. There is little historical or current information regarding the distribution of yellow-breasted chats in Butte County. While no occurrences are reported in the CNDDB, several detections have been made in the foothill canyons of the Plan Area, including Big Chico Creek, Little Chico Creek, and Butte Creek (see Appendix A). Consequently, the majority of modeled yellow-breasted chat habitat is likely unoccupied. The available information indicates that the species occurs in low densities in the Plan Area; however, complete surveys of the Plan Area have not been conducted

The primary threat to yellow-breasted chat has been the historical loss and degradation of its riparian habitat and associated stressors (e.g., lack of habitat patches large enough to support breeding activity, increased nest parasitism and depredation; see Appendix A) (Remsen 1978, Rosenberg et al. 1991). While the destruction of riparian woodland has likely played a significant role, the absence of chats from some areas that still retain intact riparian woodland habitat indicates that some other factor may be involved in the decline of yellow-breasted chat populations, such as cowbird parasitism. While data are limited on the extent of cowbird parasitism on yellow-breasted chats, it could have a significant impact on the local reproductive performance of chats.

5.6.2.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

The Conservation Strategy provides for the protection and enhancement of large patches of yellow-breasted chat nesting and foraging habitats that are spatially distributed to provide landscape-level connectivity among protected habitats, to provide for the movement and genetic interchange among populations of covered species, and to preserve native biodiversity. The focus of the Conservation Strategy is on protecting habitat to accommodate potential future expansion of chat populations and immigration, as population distributions respond to changed environmental conditions (e.g., effects of climate change).

Appendix O, Figure O–7, *Yellow-Breasted Chat Habitat in the Plan Area with full BRCP Implementation* depicts the status of modeled yellow-breasted chat habitat in the Plan Area with full BRCP implementation, and Appendix O, Figure O–7a, *Yellow-Breasted Chat: Conservation Strategy Overview* presents an overview of BRCP actions that will benefit yellow-breasted chat.

Implementation of the BRCP conservation actions within the BRCP conservation lands system, which is configured to provide large and ecologically connected habitat areas, will conserve the yellow-breasted chat in the Plan Area and mitigate the direct and indirect impacts of covered activities.

5.6.2.2 Ecological Uncertainty

The primary ecological uncertainty associated with implementation of the conservation measures is the current population status and distribution of yellow-breasted chat in the Plan Area. To date, it is not clear if the species is breeding within the Plan Area, and only singing males have been observed in the recent past (see Appendix A). BCAG will integrate protection, restoration and management of habitat with active control of nonnative species to evaluate hypotheses why the species is either not present or not nesting certain locales. As BRCP conservation measures and covered activities are implemented, monitoring and surveys will provide a better understanding of the distribution and population structure of the species and will reduce the uncertainty associated with the lack of population data. This, in turn, leads to a more focused and tactical implementation of conservation actions to benefit current populations and newly discovered occurrences and the protection of vulnerable patches of habitat. Since one of the most significant stressor of the yellow-breasted chat (aside from habitat loss) is the aggressive brood parasitism by brown-headed cowbirds (Kilgo and Moorman 2003), the primary uncertainty associated with this threat is the rate at which these brood parasites species invade restored habitat, and the effectiveness of control measures. To address this uncertainty, BCAG will coordinate experimental control activities that may be undertaken with USFWS, CDFW, and brown-headed cowbird experts. The effectiveness of controlling nonnative species in existing and restored habitats will be monitored and necessary changes to the methodology or control action frequency will be implemented in an adaptive decision framework.

5.6.3 Bank Swallow

Suitable bank swallow habitat within the Plan Area is defined as banks along unleveed and unchannelized portions of the Sacramento and Feather Rivers and Big Chico and Butte Creeks and set-back levees associated with broad basins. However, known occurrences are restricted to sites along the Sacramento and Feather Rivers. Reports have identified 17 bank swallow colonies along the Sacramento River within or immediately adjacent to the Plan Area (nine on the eastern bank and eight on the western bank. However, these colonies have since undergone significant declines. An additional 23 colonies along the Feather River between the confluence with the Sacramento River and Oroville have been reported. Several of these colonies occur within the Plan Area and are considered extant. Bank swallow along the Sacramento River have suffered an estimated 47 percent reduction in the number of colonies between 1986 and 1994, followed by a gradual increase through 1999 when the number was similar to that found in 1986. Other reports estimate a 27 percent decline in the number of burrows along this stretch between 1986 and 1999, indicating that while the number of colonies rebounded to near 1986 levels, the number of burrows per colony decreased. Despite an apparent continuing decline in local populations, the Butte County stretch of the Sacramento and Feather Rivers remains a key area for the bank swallow nesting population in Northern California. Available bank swallow nesting habitat was substantially reduced in California due to channelization of streams, which eliminated nesting habitat and prevented formation of new nesting habitat by preventing natural erosion processes. Along the Sacramento and Feather Rivers and other Sacramento Valley nesting areas, the most significant current threat is the direct loss of suitable colony sites due to continuing bank protection and flood control projects.

5.6.3.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

The focus of the BRCP long-term strategy for the bank swallow is protection of its habitat along Plan Area tributaries to the Sacramento and Feather Rivers. The Conservation Strategy provides for the protection and enhancement of large stretches of stream banks with natural erosion processes that are spatially distributed to provide landscape-level connectivity among protected habitats. Moreover, the criteria used to develop the bank swallow conservation approach are consistent with the goals of the California bank swallow recovery plan (DFG 1992), which include:

- Ensure that the remaining population does not suffer further declines in either range or abundance.
- Provide for the preservation of sufficient natural habitat to maintain a viable wild population in perpetuity.

Appendix O, Figure O–8, *Bank Swallow Habitat in the Plan Area with full BRCP Implementation* depicts the status of modeled bank swallow habitat in the Plan Area with full

BRCP implementation, and Appendix O, Figure O–85a, *Bank Swallow: Conservation Strategy Overview* presents an overview of BRCP actions that will benefit bank swallow.

Implementation of the BRCP will conserve the bank swallow in the Plan Area and mitigate the direct and indirect impacts of covered activities.

5.6.3.2 Ecological Uncertainty

Uncertainty about the existence of additional colonies, the size of existing known colonies, the location of potential additional unknown occurrences, and the efficacy of protecting habitat and managing protected habitat is addressed through the BRCP monitoring and adaptive management program. To minimize this uncertainty, BCAG will maintain regular communications with USFWS, CDFW, species researchers, and stakeholders regarding the discovery of new occurrences in the Plan Area. Monitoring activities carried out by BCAG and others will complement and expand the current knowledge of the species' status in the Plan area and will identify areas of potential increase. The adaptive management process implemented under the BRCP will provide the vehicle for addressing ecological change or uncertainty associated with implementation of conservation measures (e.g., the removal of rip-rap to increase function of natural stream bank processes).

5.6.4 Western Burrowing Owl

Overall population trend throughout the subspecies' North American range is declining. Western burrowing owls are resident in relatively low densities throughout Butte County; all are reported in the western portion of the county (see Appendix A, Figure A.4-1). The most recent breeding season record, reported in 2000, is along Nelson Road just east of State Route 99 and just north of Thermalito Afterbay. Additional historical breeding season records from 1992 and 1993 are reported between just south of Highway 162 on the south to north of Chico (Appendix A, Figure A.4-1).

The major threats and stressor of the species in Butte County are loss of habitat and mortality due to vehicle strikes and other accidental deaths. Habitat loss is primarily related to urbanization, including residential and commercial development and infrastructure development (roads and oil, water, gas, and electrical conveyance facilities) that permanently removes habitat. Field conversion to incompatible crop types, such as orchards, vineyards, and other crops reduce available foraging habitat and lead to abandonment of traditional nesting areas. Levee stability practices for flood control, including vegetation removal, grading, and reinforcing with rock can destroy burrowing owl nesting habitat. Rodent control, particularly along levees and roadsides, can decimate ground squirrel burrow abundance. Collisions with vehicles have been cited as a significant source of mortality by several researchers (see Haug et al. 1993). Although western burrowing owls are relatively tolerant of lower levels of human activity, human-related impacts such as shooting and burrow destruction adversely affect this species.

5.6.4.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

The Conservation Strategy provides for the protection and enhancement of large patches of suitable western burrowing owl habitat, that includes available rodent burrows at breeding sites and wintering habitats that are spatially distributed to provide landscape-level connectivity among protected habitats. Implementation of the conservation actions within the BRCP conservation lands system configured to provide large and ecologically connected habitat areas will mitigate the direct and indirect impacts of the covered activities on western burrowing owl and also contribute to the conservation of western burrowing owl.

The BRCP conservation measures integrate and implement the CDFW-recommended burrowing owl mitigation measures intended to offset the loss of habitat and slow or reverse further decline of this species (DFG 2012), including:

- Maintaining the size and distribution of BRCP Area burrowing owl populations.
- Increasing the distribution of burrowing owls into formerly occupied historical range where burrowing owl habitat still exists, or where it can be created or enhanced, and where the reason for its local disappearance is no longer of concern.
- Increasing size of existing populations where possible and appropriate.
- Protecting and restoring natural communities (e.g., fossorial rodents, grasslands) that support burrowing owls at a landscape scale requiring minimal long-term management.
- Minimizing unnatural causes of burrowing owl population declines (e.g., nest burrow destruction, chemical control of rodent hosts and prey).
- Augmenting or restoring natural dynamics of burrowing owl populations including movement and genetic exchange among populations.
- Engaging stakeholders, including ranchers; farmers; military; tribes; local, state, and federal agencies; non-governmental organizations; and scientific research and education communities involved in burrowing owl protection and habitat management.

Appendix O, Figure O–9, *Western Burrowing Owl Habitat in the Plan Area with full BRCP Implementation* depicts the status of modeled western burrowing owl habitat in the Plan Area with full BRCP implementation, and Appendix O, Figure O–9a, *Western Burrowing Owl: Conservation Strategy Overview* presents an overview of BRCP actions that will benefit western burrowing owl. Implementation of the BRCP conservation actions within the BRCP conservation lands system, which is configured to provide large and ecologically connected habitat areas, will conserve the western burrowing owl in the Plan Area and mitigate the direct and indirect impacts of covered activities.

5.6.4.2 Ecological Uncertainty

The primary ecological uncertainty associated with implementation of the conservation measures is the current status and distribution of western burrowing owl in the Plan Area. Data gaps regarding the distribution of the species, and the amount of actual occupied habitat could result in protecting large areas of unoccupied habitat. To minimize this uncertainty, BCAG will maintain regular communications with USFWS, CDFW, species researchers, and stakeholders regarding the discovery of new occurrences in the Plan Area. BCAG will also contribute to the existing knowledge about western burrowing owl distribution within the Plan Area through monitoring, pre-acquisition surveys, and other forms of collaborative monitoring (e.g., with Universities, local birders, ranchers and other landowners, and federal agency staff). The balance of habitat to be protected at the time new occurrences are discovered will be focused towards habitat supporting those occurrences. Uncertainty also exists regarding the effectiveness of practicable techniques (e.g., installation of artificial burrows, grazing management and protection of fossorial mammals) for improving habitat availability for western burrowing owl. To address this uncertainty, BCAG will evaluate effectiveness monitoring efforts and coordinate the design of such measures with USFWS, CDFW, and species experts.

5.6.5 Western Yellow-billed Cuckoo

Western yellow-billed cuckoo is a riparian obligate species; its primary habitat association being willow-cottonwood riparian forest. All studies indicate a highly significant association with relatively expansive stands of mature cottonwood-willow forests. There may be fewer than 50 breeding pairs of western yellow-billed cuckoo in California (Gaines 1977, Laymon and Halterman 1987, Halterman 1991, Laymon et al. 1997). The only locations in California known to currently sustain breeding populations include the Colorado River system, the South Fork Kern River, and isolated sites along the Sacramento River (Laymon and Halterman 1989, Laymon 1998). The largest portion of the current range of the western yellow-billed cuckoo along the Sacramento River as described by the CDFW California Wildlife Habitat Relationships Program occurs along the western border of the Plan Area. Breeding pairs have been reported the Sacramento River area long the western border of the Plan Area as well as the Feather River between Oroville and the Butte County border. At least four confirmed or probable breeding locations occur within this area along with numerous other detections. Breeding pairs have also been reported from portions of the Feather River between Oroville and the Butte County border. Historical declines have been due primarily to the removal of riparian forests for agricultural and urban expansion. The primary threat to western yellow-billed cuckoo has been the historical loss and degradation of its riparian habitat and associated stressors (e.g., lack of habitat patches large enough to support breeding activity, increased nest parasitism and depredation; see Appendix A) (Hughes 1999). Habitat loss continues as a result of bank stabilization and flood control projects, urbanization along edges of watercourses, agricultural activities, and river management that alter flow and sediment regimes. Nesting cuckoos are also sensitive to habitat fragmentation that reduces patches of otherwise suitable habitat to less than 325 feet by 1,000 feet. Predation is

a significant source of nest failure, and pesticides may pose a long term threat to western yellow-billed cuckoo.

5.6.5.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

The focus of the Conservation Strategy is on protecting habitat occupied or potentially suitable for western yellow-billed cuckoo to ensure sufficient availability of habitat to accommodate potential future expansion of its population and immigration from the south and west, as population distributions respond to changed environmental conditions (e.g., effects of climate change). Within the context of the overall BRCP Conservation Strategy, western yellow-billed cuckoo mature riparian habitat will be protected within a larger connected system of conservation lands that will ensure the availability of high-quality functioning habitat.

Appendix O, Figure O–10, *Western Yellow-Billed Cuckoo Habitat in the Plan Area with full BRCP Implementation* depicts the status of modeled western yellow-billed cuckoo habitat in the Plan Area with full BRCP implementation, and Appendix O, Figure O–10a, *Western Yellow-Billed Cuckoo: Conservation Strategy Overview* presents an overview of BRCP actions that will benefit western yellow-billed cuckoo.

Implementation of the BRCP will conserve the western yellow-billed cuckoo in the Plan Area and mitigate the direct and indirect impacts of covered activities.

5.6.5.2 Ecological Uncertainty

The primary ecological uncertainty associated with implementation of the conservation measures is the current status and distribution of western yellow-billed cuckoo in the Plan Area. Actions to protect habitat include protection of currently known occupied habitat and protecting newly discovered nest sites within 5 years following first detection throughout the duration of the BRCP. However, data gaps regarding the distribution of occupied habitat could result in protecting large areas of unoccupied habitat. To minimize this uncertainty, BCAG will maintain regular communications with USFWS, CDFW, species researchers, and stakeholders regarding the discovery of new occurrences in the Plan Area. The balance of habitat to be protected at the time new occurrences are discovered will be focused towards habitat supporting those occurrences. Uncertainty also exists regarding the effectiveness of practicable forest management techniques (e.g., the management of riparian forests to increase and maintain the availability of mature trees and canopy structure) for improving nesting site suitability for western yellow-billed cuckoo. To address this uncertainty, BCAG will coordinate the design of such structures with USFWS, CDFW, and western yellow-billed cuckoo experts.

5.6.6 Greater Sandhill Crane

An estimated 8,500 greater sandhill cranes belong to the Central Valley population (Littlefield and Ivey 2000). Although greater sandhill cranes do not breed in the Plan Area, the majority of

birds winter within the Sacramento Valley between Butte Sink and the Sacramento-San Joaquin River Delta (Delta). The Sacramento Valley (Chico/Butte Basin) greater sandhill crane wintering area extends from Chico to the Butte Sink between the Sacramento River and State Route 99 (Pogson and Lindstedt 1988). Littlefield (2002) estimates that the Butte Basin frequently supports up to 70 percent of the Central Valley crane population.

While declines in greater sandhill cranes are mainly associated with impacts on their breeding grounds, conditions on the wintering grounds may also be significant stressors on this population. Threats on the wintering grounds include changes in water availability; flooding fields for waterfowl, which reduces foraging habitat for cranes; conversion of cereal cropland to vineyards or other incompatible crop types; human disturbances; collision with power lines Tacha et al. 1978, Morkill and Anderson 1991, Brown and Drewien 1995, Janss 2000); and urban encroachment. Greater sandhill cranes are sensitive to the presence of humans and human activities, including low-level recreational disturbances (e.g., birding, photography; Lovvorn and Kirkpatrick 1981). Hunters accessing hunt areas during pre-dawn hours can keep cranes from roosting or foraging in an area (Littlefield and Ivey 2000, Ivey and Herziger 2003).

5.6.6.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

The Conservation Strategy provides for the protection and enhancement of large patches of greater sandhill crane roosting and foraging habitats of sufficient size and distance from sources of disturbance to allow cranes to forage effectively and shift among traditional and newly emerging foraging habitats, depending on crops, land use patterns and flooding. It also allows cranes to respond to localized temporary disturbances by shifting to less disturbed areas by selecting different roost or foraging sites.

Appendix O, Figure O–11, *Greater Sandhill Crane Habitat in the Plan Area with full BRCP Implementation* depicts the status of modeled greater sandhill crane habitat in the Plan Area with full BRCP implementation, and Appendix O, Figure O–11a, *Greater Sandhill Crane: Conservation Strategy Overview* presents an overview of BRCP actions that will benefit bank swallow.

Implementation of the BRCP will conserve the greater sandhill crane in the Plan Area and mitigate the direct and indirect impacts of covered activities.

5.6.6.2 Ecological Uncertainty

The primary ecological uncertainty associated with implementation of the conservation measures is the efficacy of implemented conservation measures on the use and function of greater sandhill crane habitat in the Plan Area. To minimize this uncertainty, BCAG will maintain regular communications with USFWS, CDFW, species researchers, and stakeholders regarding the distribution, seasonal use, best management practices and feasibility of crane conservation measures in the Plan Area.

5.6.7 California Black Rail

Up to 12 locations of black rails have been verified for Butte County (Richmond et al. 2008) Known populations within Butte County are located just north of La Porte Road southeast of Oroville (Appendix A, Figure A.7-1), but it is likely that additional subpopulations occur further north and possibly west into Butte County. Additional recent occurrences of California black rail are reported from seep spring sites in the eastern foothills of the Plan Area (P. Johnson and S. Huber pers. comm.), including sites at Upper Bidwell Park, Butte Creek Canyon, and at the Base of Table Mountain; in emergent marsh at the BCAG/Caltrans mitigation project site at the intersection of Highways 70 and 149; and a possible detection near the picnic grounds of Thermalito Forebay (J. Sterling pers. comm.).

The most significant historical threat was the draining of tidal marshes, which may be responsible for over 90 percent the population declines of this species, and which is still occurring in some areas, albeit at a slower rate. Throughout its range, the primary threat to the California black rail is the continuing loss and fragmentation of freshwater habitat from urbanization, flood control projects, agricultural practices, and hydrologic changes that affect water regimes. In the BRCP Area, California black rail is threatened by continued habitat loss, especially the reduction, drying and removal of shallow wetlands with dense emergent vegetation cover. This cover is essential, because the species is susceptible to predation by herons, egrets, northern harriers, short-eared owls, and several mammalian species. It has been suggested that the majority of black rail habitat within the Plan Area is likely created by leaky pipes, canals and seepage below bermed ponds used for livestock production (Richmond et al. 2010). Within the Plan Area, agricultural practices, improper livestock grazing, and urbanization may threaten individual subpopulations. Isolated subpopulations are also susceptible stochastic extinction events. Other potential threats include increased predation by domestic cats and by native predators; pollution and its effect on freshwater marshes; and collision with automobiles and utility lines.

5.6.7.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

The Conservation Strategy provides for the protection and enhancement all occupied and many potentially suitable patches of California black rail habitats that are spatially distributed to provide landscape-level connectivity among protected habitats. The focus is on protection of habitat occupied by California black rail and unoccupied habitat that is connected to occupied habitat to ensure sufficient availability of habitat to accommodate potential future expansion of its population. Within the context of the overall BRCP Conservation Strategy, California black rail habitat will be protected within a larger connected system of conservation lands that will ensure the availability of habitat to accommodate potential future shifts in its distribution in response to changed environmental conditions (e.g., effects of climate change on the future distribution of California black rail habitat).

Implementation of the BRCP will conserve the black rail in the Plan Area and mitigate the direct and indirect impacts of covered activities.

5.6.7.2 Ecological Uncertainty

The California black rail is a secretive species that is rarely observed directly and therefore difficult to survey. The primary ecological uncertainty associated with implementation of the conservation measures is the current status and distribution of California black rail in the Plan Area. As this species becomes better studied, and monitoring programs are implemented and conducted over time it is likely that new occurrences will be discovered within the Plan Area. To minimize this uncertainty, BCAG will maintain regular communications with USFWS, CDFW, species researchers, and stakeholders regarding the discovery of new occurrences in the Plan Area. Uncertainty also exists regarding the effectiveness of practicable techniques for improving habitat stability and patch persistence. In many cases, California black rail habitat is maintained by leakages of irrigation conveyances, and replacing these with deliberate and reliable water supply is crucial in ensuring habitat permanence. To address this uncertainty, BCAG will coordinate the design and operational parameters of such structures with USFWS, CDFW, and California black rail experts.

5.6.8 American Peregrine Falcon

The peregrine falcon and its subspecies is the world's most widespread raptor and one of the most widely found bird species. American peregrine falcons are known to occur along the eastern edge or just east of the eastern Plan Area boundary. Altacal Audubon Society reports a breeding pair in upper Butte Creek Canyon, as well as recent activity in the Upper Bidwell Park area and on a suspension bridge across Lake Oroville. CDFW reports a nest site along the southern bluffs of Upper Bidwell Park. CDFW also reports activity along the western bluffs of CDFW’s Table Mountain Ecological Reserve. The California Department of Water Resources (DWR) reports nest sites on three of the four bridges over Lake Oroville. These and other reports of peregrine falcon activity will be refined and updated through additional contact with local biologists.

Historically, organochloride pesticides presented the greatest threat to peregrine falcons. However, the risk is significantly reduced since the banning of dichlorodiphenyltrichloroethane, or DDT, and peregrine numbers have been increasing since the mid-1970s. Other potential threats to nesting peregrine falcons include urbanization resulting in the loss of foraging habitats and disturbance to nest sites; illegal shooting, egg collecting; and collision with vehicles, utility lines, and other structures. Urbanization of bluffs and ridges could alter available habitat or increase levels of human disturbance. Loss of wetland habitats within the Plan Area and any subsequent reduction of available water bird prey that may result could affect foraging opportunities for peregrine falcon.

5.6.8.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

The Conservation Strategy provides for the protection and enhancement of large patches of peregrine falcon habitats that are spatially distributed to provide landscape-level connectivity among protected habitats. This, also benefits the falcon's prey species, such as waterfowl.

Appendix O, Figure O–12, *American Peregrine Falcon Habitat in the Plan Area with full BRCP Implementation* depicts the status of modeled American peregrine falcon habitat in the Plan Area with full BRCP implementation, and Appendix O, Figure O–12a, *American Peregrine Falcon: Conservation Strategy Overview* presents an overview of BRCP actions that will benefit American peregrine falcon.

Implementation of the BRCP will conserve the American peregrine falcon in the Plan Area and mitigate the direct and indirect impacts of covered activities.

5.6.8.2 Ecological Uncertainty

The primary uncertainty associated with implementation of the conservation measures is the current distribution and nesting activity of the species in the Plan Area. To minimize this uncertainty, BCAG will maintain regular communications with USFWS, CDFW, species researchers, and stakeholders regarding the discovery of new occurrences in the Plan Area. To address any uncertainties that may be related to the management of specific areas (e.g., nesting sites on bridges or buildings) BCAG will coordinate the design or management of such structures with USFWS, CDFW, and species experts.

5.6.9 Swainson's Hawk

Swainson's hawks are sparsely distributed throughout the Plan Area and surrounding lands (see Appendix A). Within the Plan Area, nesting Swainson's hawks occur primarily west of State Routes 70 and 99. Available nesting habitat is more abundant in this area, which includes portions of the Sacramento River, Feather River, Butte Creek, and other riparian corridors. It is likely that nesting Swainson's hawks also occur east of State Route 99, particularly in the grassland habitats along the edge of the valley. Remnant riparian forests along drainages contain the majority of known nests in the Central Valley (Estep 1984, Schlorff and Bloom 1984, England et al. 1997); however, this is a function of nest tree availability rather than dependence on riparian forest.

Declines in Swainson's hawk populations have been reported across much of the species' range, particularly in the Canadian prairies (England et al. 1997), California (Bloom 1980), Oregon (Littlefield et al. 1984), and Nevada (Herron et al. 1985). In California, Swainson's hawks are currently absent from much of their historical breeding range in the central and southern portions of the state, and overall may have declined by as much as 90 percent (Bloom 1980). In the Butte Valley, the population has been stable at 65–80 pairs since the mid-1980s (Woodbridge 1998). Large numbers of Swainson's Hawks still occupy the Central Valley (estimated 420 to 1,000 pairs,

Woodbridge 1998), but annual losses of territories to residential development and riparian habitat removal, and agricultural intensification are reported (DFG 1988, Estep 1989).

In California, the primary causes of Swainson's hawk population decline are believed to be the loss of nesting habitat (Schlorff and Bloom 1984) and the loss of foraging habitat to urban development and to conversion to unsuitable agriculture, such as orchards and vineyards (England et al. 1995, 1997).

5.6.9.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

The conservation approach for Swainson's hawk is based on protecting and maintaining a mosaic of nesting and foraging habitat to ensure sufficient availability of habitat to maintain the current Plan Area population and to accommodate potential future expansion or distributional shifts of its population in response to changed environmental conditions (e.g., effects of climate change). Within the context of the overall Conservation Strategy, Swainson's hawk nesting and foraging habitat will be protected within a larger connected system of conservation lands that will ensure the availability of high-quality functioning habitat.

The Conservation Strategy provides for the protection and enhancement of large patches of peregrine falcon habitats that are spatially distributed to provide landscape-level connectivity among protected habitats. This, also benefits the falcon's prey species, such as waterfowl.

Appendix O, Figure O–13, *Swainson's Hawk Habitat in the Plan Area with full BRCP Implementation* depicts the status of modeled Swainson's hawk habitat in the Plan Area with full BRCP implementation, and Appendix O, Figure O–13a, *Swainson's Hawk: Conservation Strategy Overview* presents an overview of BRCP actions that will benefit Swainson's hawk.

Implementation of the BRCP will conserve the Swainson's hawk in the Plan Area and mitigate the direct and indirect impacts of covered activities.

5.6.9.2 Ecological Uncertainty

The effectiveness of conservation actions that benefit Swainson's hawk is well understood (e.g., ecological requirements, techniques for managing habitat to increase foraging accessibility).

5.6.10 White-Tailed Kite

California is currently considered the stronghold for white-tailed kite in North America, with nearly all areas up to the western Sierra Nevada foothills and southeast deserts occupied (Small 1994, Dunk 1995). In the Sacramento Valley, kite populations have predominantly increased in irrigated agricultural areas where the California vole (*Microtus californicus*) often occurs (Warner and Rudd 1975). Observations of white-tailed kites in Butte County occur predominantly along the Sacramento River, Feather River, Butte Creek, Big Chico Creek, and at Gray Lodge Wildlife Area.

Factors influencing population trends directly or indirectly include: 1) conversion of natural or agricultural lands to urban sprawl or commercial properties, 2) clean farming techniques that leave few residual vegetation areas for prey, 3) increased competition for nest sites with other raptors and corvids, 4) drought, 5) increased disturbance at nests, and 6) removal of suitable nesting habitat (Dunk 1995). Within the Plan Area, the main threats include reductions in prey abundance and availability with changing agricultural practices such as the conversion of alfalfa, hay and irrigated pastures to row crops, orchards or vineyards.

5.6.10.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

The BRCP conservation strategy focuses on protecting habitat occupied or potentially suitable for white-tailed kite to ensure sufficient availability of habitat to accommodate potential future expansion of its population as population distributions respond to changed environmental conditions (e.g., effects of climate change). Within the context of the overall BRCP Conservation Strategy, white-tailed kite nesting and foraging habitat will be protected within a larger connected system of conservation lands that will ensure the availability of high-quality functioning habitat.

The Conservation Strategy provides for the protection and enhancement of large patches of peregrine falcon habitats that are spatially distributed to provide landscape-level connectivity among protected habitats. This, also benefits the falcon's prey species, such as waterfowl.

Appendix O, Figure O–14, *White-Tailed Kite Habitat in the Plan Area with full BRCP Implementation* depicts the status of modeled white-tailed kite habitat in the Plan Area with full BRCP implementation, and Appendix O, Figure O–14a, *White-Tailed Kite: Conservation Strategy Overview* presents an overview of BRCP actions that will benefit white-tailed kite.

Implementation of the BRCP will conserve the white-tailed kite in the Plan Area and mitigate the direct and indirect impacts of covered activities.

5.6.10.2 Ecological Uncertainty

The primary ecological uncertainty associated with implementation of the conservation measures is the current status and distribution of white-tailed kite in the Plan Area, especially the number of nesting pairs in the Plan Area. Actions to protect habitat include protection of currently known occupied habitat and protecting newly discovered nest sites within 5 years following first detection throughout the duration of the BRCP. BCAG will maintain regular communications with USFWS, CDFW, species researchers, and stakeholders regarding the discovery of newly occupied nest sites in the Plan Area. Uncertainty also exists regarding the effectiveness of practicable management techniques (e.g., the management of riparian forests to increase and maintain the availability of mature trees and canopy structure) for improving nesting site suitability for white-tailed kite. To address this uncertainty, BCAG will coordinate the design of such structures with USFWS, CDFW, and white-tailed kite experts.

5.6.11 Bald Eagle

Currently, there are at least five documented breeding sites in Butte County that are outside the Plan Area, and two nesting territories within the Plan Area, one along the edge of the Diversion Pool approximately 1 mile downstream of the Oroville Dam and the other along the Feather River near the southeast end of the CDFW Oroville Wildlife Area (Appendix A, Figure A.11-1) (David Bogener, DWR pers. comm.). California Department of Water Resources also reports a recently discovered winter roost site near Lake Oroville that has been occupied by at least 60 individuals. All Pacific Recovery Plan goals (number of breeding pairs and production/active nests) have been met in Recovery Zone 27 (which includes Butte County) during the last two nesting seasons. Bald eagles regularly winter around the Plan Area, including at Lake Oroville, Thermalito Forebay and Afterbay, along the Feather and Sacramento Rivers, and in the wetlands associated with Llano Seco and the Gray Lodge Wildlife Area (Appendix A, Figure A.11-1).

The main threats identified in the Pacific Recovery Plan (USFWS 1986) for the Butte County area include disturbance to nest territories; loss of anadromous fishery, loss of riparian habitat, disturbance of forage areas, and shooting (Sacramento Valley and Foothills); and disturbance of wintering grounds, loss of potential nest habitat to logging, and development (Sierra-Nevada Mountains). Historically, the decline of the bald eagle coincided with the introduction of the pesticide DDT in 1947. Eagles contaminated with DDT were either unable to lay eggs or produced eggs with thin shells that broke during incubation. Shooting, egg collection, and trapping were other causes of decline.

5.6.11.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

The BRCP conservation strategy focuses on protecting occupied habitat or potentially suitable habitat for bald eagle to ensure sufficient nesting and foraging habitat availability to ensure that the existing population is maintained, and to accommodate potential future expansion of the population, or shifts in distribution as the species responds to changed environmental conditions (e.g., effects of climate change). Within the context of the overall BRCP Conservation Strategy, bald eagle nesting and foraging habitat will be protected within a larger, connected system of conservation lands that will ensure the availability of high-quality functioning habitat.

The Conservation Strategy provides for the protection and enhancement of large patches of peregrine falcon habitats that are spatially distributed to provide landscape-level connectivity among protected habitats. This, also benefits the falcon's prey species, such as waterfowl.

Appendix O, Figure O–15, *Bald Eagle Habitat in the Plan Area with full BRCP Implementation* depicts the status of modeled bald eagle habitat in the Plan Area with full BRCP implementation, and Appendix O, Figure O–15a, *Bald Eagle: Conservation Strategy Overview* presents an overview of BRCP actions that will benefit bald eagle.

Implementation of the BRCP will conserve the bald eagle in the Plan Area and mitigate the direct and indirect impacts of covered activities.

5.6.11.2 Ecological Uncertainty

The primary ecological uncertainty associated with implementation of the conservation measures is the current status and distribution of bald eagle in the Plan Area, especially the number of nesting pairs in the Plan Area. To minimize this uncertainty, BCAG will maintain regular communications with USFWS, CDFW, species researchers, and stakeholders regarding the discovery of newly occupied nest sites in the Plan Area. The balance of habitat to be protected at the time new occurrences are discovered will be focused towards habitat supporting those occurrences. Uncertainty also exists regarding the effectiveness of practicable management techniques (e.g., the management of riparian forests to increase and maintain the availability of mature trees, large snags for perching and shallow gravel banks for foraging). To address this uncertainty, BCAG will coordinate the enhancement techniques of such structures with USFWS, CDFW, and bald eagle experts.

5.6.12 Giant Garter Snake

In the Plan Area, giant garter snake is restricted to the rice lands and wetlands within the Basin and Sacramento River CAZs, although it is occasionally found in natural streams, wetlands and water conveyance channels associated with other land uses. All reported occurrences are west of State Route 99, and the majority of occurrences are associated with the Butte Basin habitats in the southwest part of the Plan Area. Other recorded occurrences are scattered in the Llano Seco area. Reports of giant garter snake occurrences near Chico are from irrigation ditches near the water treatment plant (Appendix G.2, *Review of Conservation Strategy for Butte Regional Conservation Plan by the Independent Science Advisors*). Wylie et al. (2011) provide the most current and best available landscape level estimates of giant garter snake density in rice-dominated agricultural areas, based on captures and recaptures at 44 transects along linear canals within rice fields and in managed wetlands in Butte and Glenn County from 2008 through 2010.

Habitat loss and fragmentation, flood control activities, changes in agricultural and land management practices, predation from introduced species, parasites, and water pollution are the main causes for the decline of this species (USFWS 1999, Wylie et al. 1997, Hansen and Brode 1993, USFWS 1999, Wylie et al. 2004). Paved roads may pose the threat of traffic mortalities (Hansen and Brode 1993). Bullfrogs prey on juvenile giant garter snakes throughout their range (Treanor 1983, Dickert 2003, Wylie et al. 2003).

5.6.12.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

The Conservation Strategy provides for the protection, restoration and enhancement of large patches of giant garter snake breeding, foraging and movement habitats that are spatially distributed to provide landscape-level connectivity among protected habitats. The extent of giant

garter snake habitat that will be protected in the Plan Area and the conservation approach for the species are illustrated in Appendix O, Figures O-16, *Giant Garter Snake Habitat in the Plan Area with full BRCP Implementation* and O-16a, *Giant Garter Snake: Conservation Strategy Overview* (see separate files). The focus of the conservation approach is on protection and restoration of habitat occupied by giant garter snake and unoccupied habitat that is connected to occupied habitat to ensure sufficient availability of habitat to accommodate potential future expansion of its population. Giant garter snake habitat will be protected within a larger connected system of conservation lands that will ensure the availability of habitat to accommodate potential future shifts in its distribution in response to changed environmental conditions (e.g., effects of climate change on the future distribution of giant garter snake habitat).

The biological goals and objectives used to develop the BRCP conservation measures for giant garter snake (Section 5..3.2.3) are consistent with the objectives of the USFWS Draft Giant Garter Snake Recovery Plan (USFWS 1999): (1) stabilizing and protecting existing populations, and (2) conducting research necessary to further refine recovery criteria. Both recovery objectives will be supported through the Conservation Strategy, especially the protection and restoration of habitat, and active monitoring and surveys to detect and quantify giant garter snake populations in the Plan Area, and to determine status and trends over the duration of the BRCP. The Plan Area is part of one of four USFWS giant garter snake recovery units (i.e., the Sacramento Valley Unit, extending from the vicinity of Red Bluff south to the confluence of the Sacramento and Feather Rivers). Criteria for delisting that are specific to the Sacramento Valley Recovery Unit are:

- Monitoring shows that in 17 out of 20 years, 90 percent of the subpopulations in the recovery unit contain both adults and young.
- The three existing populations within the recovery unit are protected from threats that limit populations.
- Supporting habitat within the recovery unit is adaptively managed and monitored (USFWS 1999).

The conservation measures that contribute to the recovery of giant garter snake include provisions that are applicable to each of these three delisting criteria; and the monitoring and adaptive management plan implemented under the BRCP ensures that progress towards delisting is adequately tracked and adjustments are made adaptively as necessary. This approach to conservation reduces the ecological stressors and threats to the species associated with habitat loss, excessive predation by nonnative predators, and habitat and population fragmentation.

Figure O–16 depicts the status of giant garter snake habitat in the Plan Area with full BRCP implementation, and Figure O–16a presents an overview of BRCP actions that will benefit giant garter snake.

Implementation of the BRCP will conserve the giant garter snake in the Plan Area and mitigate the direct and indirect impacts of covered activities.

5.6.12.2 Ecological Uncertainty

The primary ecological uncertainty associated with implementation of the conservation measures is the current distribution of giant garter snake in the Plan Area. Significant data gaps exist regarding the Plan Area status and spatial distribution of the species, and the dynamics of its metapopulation. To minimize this uncertainty, BCAG will maintain regular communications with USFWS, CDFW, and species researchers regarding the discovery of new occurrences in the Plan Area, and will collaborate with ongoing efforts to characterize and measure the giant garter snake population within the Plan Area.

As indicated above, uncertainty also exists regarding the effectiveness of practicable techniques for managing and restoring emergent wetlands, and the maturation process of wetlands. Recent experiences in the Natomas Basin (ICF 2011) and elsewhere in the Central Valley (Wylie et al. 2002) suggest that restored wetlands do not rapidly develop the characteristics of suitable garter snake habitat. To address this uncertainty, BCAG will coordinate the design of restored wetlands with individuals experienced with the restoration and management of giant garter snake habitat and giant garter snake experts. Monitoring of the over 500 acres of wetlands restored under the BRCP will provide crucial data and understanding of wetland maturation and giant garter snake habitat development.

5.6.13 Blainville's Horned Lizard

Blainville's horned lizard occurs primarily in the south Coast Ranges and is rare in the Central Valley and in Northern California. There is only one known location within the Plan Area north of Oroville, on North Table Mountain, just east of Coal Canyon (see Appendix A, Figure A.13-1). Historically, this taxon was identified as most abundant in relict lake sand dunes and old alluvial fans bordering the San Joaquin Valley (DFG 2007). The conversion of alluvial fans and relict lake sand dunes to agriculture has resulted in the disappearance of this lizard in many areas. Primary threats to the species include the ongoing fragmentation and loss of habitat. Additional threats to the species include increased human presence in rural areas (which results in a direct loss of habitat), as well as the occurrence of domestic cats and other nonnative predators, increased use of pesticides which reduces available food supply, and introduction of Argentine ants that replace the native ant food base (Jennings and Hayes 1994, SDNHM 2007).

5.6.13.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

The conservation approach for Blainville's horned lizard involves protecting at least 400 acres of suitable Blainville's horned lizard habitat through achieving conservation land protection targets for natural communities that support patches of this species' habitat along the eastern side of the Plan Area, where it is most likely to occur. Protection and enhancement of grasslands, oak woodland and savanna, and riparian natural communities is expected to maintain the existing

distribution and abundance of Blainville's horned lizard in the Plan Area and provide the opportunity for its future expansion.

Implementation of the BRCP will conserve the Blainville's horned lizard in the Plan Area and mitigate the direct and indirect impacts of covered activities.

5.6.13.2 Ecological Uncertainty

The primary ecological uncertainty associated with implementation of the conservation measures is the current distribution of Blainville's horned lizard in the Plan Area and the potential for discovering additional occurrences. To minimize this uncertainty, BCAG will maintain regular communications with USFWS, CDFW, species researchers, and stakeholders regarding the discovery of new occurrences in the Plan Area. The balance of habitat to be protected at the time new occurrences are discovered will be focused towards protecting habitat supporting those occurrences.

5.6.14 Western Pond Turtle

The western pond turtle has been reported from several locations in the Plan Area including drainages and ponds along the eastern side of the Plan Area, Big Chico Creek, and the Upper Butte Wildlife Area. The species likely occurs in most perennial streams in the Plan Area and in large ponds and other water bodies. However, the species is likely underreported, and probably occurs throughout the Plan Area in suitable aquatic and adjacent upland habitats. The main factors contributing to the decline of the western pond turtle population include loss of aquatic and nesting habitat from urban development and conversion of native habitats to agricultural lands; the increase of introduced nonnative predators (i.e., bull frogs, nonnative rats and wading birds). In addition, there is concern over competition for food and basking sites and disease transmission from liberated pet turtles and nonnative turtle species (predominantly red-eared sliders and painted turtles, see Appendix A).

5.6.14.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

The Conservation Strategy provides for the protection, restoration and enhancement of large patches of western pond turtle aquatic and upland habitats that are spatially distributed to provide landscape-level connectivity among protected habitats. The focus is on protection and restoration of habitat occupied by western pond turtle and unoccupied habitat that is connected to occupied habitat to ensure sufficient availability of habitat to accommodate potential future expansion of its population. Western pond turtle will be protected within a larger connected system of conservation lands that will ensure the availability of habitat to accommodate potential future shifts in its distribution in response to changed environmental conditions (e.g., effects of climate change on the future distribution of western pond turtle habitat). In addition, criteria used to develop the giant garter snake conservation approach following the USFWS Draft Giant Garter Snake Recovery Plan (USFWS 1999) also apply to western pond turtle, since the giant

garter snake shares habitat with the western pond turtle. Thus, both species will benefit from the BRCP conservation approach, especially the protection and restoration of habitat, and active monitoring and surveys to detect and quantify populations in the Plan Area, and to determine their status and trend over the duration of the BRCP.

Appendix O, Figure O–17, *Western Pond Turtle Habitat in the Plan Area with full BRCP Implementation* depicts the status of modeled western pond turtle habitat in the Plan Area with full BRCP implementation, and Appendix O, Figure O–17a, *Western Pond Turtle: Conservation Strategy Overview* presents an overview of BRCP actions that will benefit western pond turtle.

Implementation of the BRCP will conserve the western pond turtle in the Plan Area and mitigate the direct and indirect impacts of covered activities.

5.6.14.2 Ecological Uncertainty

The primary ecological uncertainty associated with implementation of the conservation measures is the current distribution of western pond turtle in the Plan Area and the fact that the species may be more widely distributed and abundant than reported. Significant data gaps exist regarding the status and spatial distribution of the species, and the dynamics of its metapopulation in the Plan Area and beyond. Actions to protect habitat include protection of currently known occupied habitat, however, the distribution of occupied habitat could result in protecting large areas of unoccupied habitat, especially in the rice-dominated Basin CAZ. To minimize this uncertainty, BCAG will maintain regular communications with USFWS, CDFW, species researchers, and stakeholders regarding the discovery of new occurrences in the Plan Area. As indicated above, uncertainty also exists regarding the effectiveness of practicable techniques for managing and restoring emergent wetlands, and the maturation process of wetlands. Current experiences in the Natomas Basin (ICF 2011) and elsewhere in the Central Valley (Wylie et al. 2002) suggest that restored wetlands do not rapidly develop the characteristics of suitable garter snake and/or western pond turtle habitat. To address this uncertainty, BCAG will coordinate the design of restored wetlands with USFWS, CDFW, and western pond turtle experts. Monitoring of wetlands restored under the BRCP will provide crucial data and understanding of wetland maturation and habitat development.

5.6.15 Foothill Yellow-Legged Frog

Foothill yellow-legged frogs within the Plan Area have been observed in Big Chico Creek along the upper reaches of Upper Bidwell Park, and in Mud Creek and Rock Creek. At least one occurrence has been detected along Butte Creek. CDFW snorkel surveys have also identified juvenile, larval and breeding adults in Big Chico Creek, Butte Creek, and Feather River in almost every year of survey report from 2001 to 2006 (see Appendix A).

The primary factor in the decline of foothill yellow-legged frog in the Sierra Nevada is the introduction of nonnative predators (Hayes and Jennings 1996). Competition and predation by introduced bullfrogs and fish have greatly contributed to the decline of the species. Nonnative

centrarchid fishes readily eat frog eggs (Werschkul and Christensen 1977), and where introduced into foothill streams, could also contribute to the elimination of the species. Bullfrog populations that have invaded stock-ponds and other human-made ponds are a considerable threat to native amphibians (Moyle 1973) and bullfrog control is needed to maintain the benefits of these artificial habitats for foothill yellow-legged frogs and other native amphibians. Habitat loss and degradation, particularly in the Sierra Nevada foothills, have also been major factors in declining foothill yellow-legged frog populations. Habitat alterations have occurred as a result of dam and canal construction, agriculture, urbanization, mining, and grazing practices. Besides eliminating habitat, these alterations have resulted in reduced riparian habitat, decreases in suitable stream substrates, habitat fragmentation, elimination of travel corridors, and detrimental flow regimes. Low flows, in combination with loss of riparian habitat, tend to warm the water and foster nonnative predators. Prolonged droughts may have also impacted populations of these frogs.

5.6.15.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

The Conservation Strategy provides for the protection, restoration and enhancement of a sustainable population of foothill yellow-legged frog within the Plan Area through the protection of modeled foothill yellow-legged frog perennial stream habitat and intermittent stream habitat. The habitat protection and enhancement actions are expected to be sufficient to maintain the current Plan Area population and provide opportunities for its future expansion.

Appendix O, Figure O–18, *Foothill Yellow-Legged Frog Habitat in the Plan Area with full BRCP Implementation* depicts the status of modeled foothill yellow-legged frog habitat in the Plan Area with full BRCP implementation, and Appendix O, Figure O–18a, *Foothill Yellow-Legged Frog: Conservation Strategy Overview* presents an overview of BRCP actions that will benefit foothill yellow-legged frog.

Implementation of the BRCP will conserve the foothill yellow-legged frog in the Plan Area and mitigate the direct and indirect impacts of covered activities.

5.6.15.2 Ecological Uncertainty

The primary ecological uncertainty associated with implementation of the conservation measures is the current distribution of foothill yellow-legged frog in the Plan Area and the small disjunct distribution in the Plan Area. Significant data gaps exist regarding the status and spatial distribution of the species, and the dynamics of its metapopulation in the Plan Area and beyond. To minimize this uncertainty, BCAG will maintain regular communications with USFWS, CDFW, species researchers, and stakeholders regarding the discovery of new occurrences in the Plan Area. As indicated above, uncertainty also exists regarding the effectiveness of practicable techniques for managing foothill yellow-legged frog habitat. To address this uncertainty, BCAG will coordinate the design of restored wetlands with USFWS, CDFW, and species experts. effectiveness (see Chapter 7, *Monitoring and Adaptive Management*).

5.6.16 Western Spadefoot Toad

The western spadefoot toad historically ranged from Redding in Shasta County, California, to northwestern Baja California, Mexico. The western spadefoot toad has been extirpated throughout most of the lowlands of Southern California (and from many historical locations within the Central Valley. Within the Plan Area, western spadefoot toad has been recorded in two locations: a small cluster of observations along Intermittent Creek within the Chico city limits and a single record from Wyandotte Creek south of Oroville (CNDDB 2011; Jackson Shedd, pers. comm. 2007).

The main factors contributing to the decline of the western spadefoot toad population include loss of habitat from urban development and conversion of native habitats to agricultural lands, the increase of nonnative predators (e.g., mosquitofish and bullfrogs which consume western spadefoot toad eggs and larvae), and stochastic events that particularly impact small, isolated populations.

5.6.16.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

The Conservation Strategy provides for the protection, restoration and enhancement of large patches of western spadefoot toad aquatic and upland habitats that are spatially distributed to provide landscape-level connectivity among protected habitats.

Appendix O, Figure O–19, *Western Spadefoot Toad Habitat in the Plan Area with full BRCP Implementation* depicts the status of modeled western spadefoot toad habitat in the Plan Area with full BRCP implementation, and Appendix O, Figure O–19a, *Western Spadefoot Toad: Conservation Strategy Overview* presents an overview of BRCP actions that will benefit western spadefoot toad.

Implementation of the BRCP will conserve the western spadefoot toad in the Plan Area and mitigate the direct and indirect impacts of covered activities.

5.6.16.2 Ecological Uncertainty

The primary ecological uncertainty associated with implementation of the conservation measures is the current distribution of western spadefoot toad in the Plan Area and the fact that the species may be distributed in small, disjunct populations, where environmental variability can threaten population persistence. Significant data gaps exist regarding the status and spatial distribution of the species, and the dynamics of its metapopulation in the Plan Area and beyond. Actions to protect habitat include protection of currently known occupied habitat, however, the distribution of occupied habitat could result in protecting large areas of unoccupied habitat, especially in the rice-dominated Basin CAZ. To minimize this uncertainty, BCAG will maintain regular communications with USFWS, CDFW, species researchers, and stakeholders regarding the discovery of new occurrences in the Plan Area. As indicated above, uncertainty also exists regarding the effectiveness of practicable techniques for managing and restoring vernal pool

habitats, and the maturation process of these habitats. To address this uncertainty, BCAG will coordinate the design of restored vernal pool complex with USFWS, CDFW, and western spadefoot toad experts. Monitoring of vernal pool complex restored under the BRCP will provide crucial data and understanding of vernal pool maturation and habitat development.

5.6.17 Central Valley Steelhead

Central Valley steelhead have been observed in the Feather River, Little Dry Creek, Butte Creek, Little Chico Creek, Big Chico Creek, Lindo Channel, Mud Creek, and Rock Creek. Spawning occurs in all of these waterways except Lindo Channel and Rock Creek. Adults migrate through Lindo Channel but, despite vast amounts of suitable gravel, do not spawn within the channel. Rock Creek is used by steelhead as a juvenile rearing location only. Critical habitat for the Central Valley steelhead was designated throughout the Central Valley in 2005.[31] Critical habitat was further characterized in the Federal Register Final Rule for steelhead in 2006.[32] Critical habitat for the species is divided into 22 hydrologic units by watersheds. Of these, two occur in Butte County and include the Marshville and Butte Creek Hydrologic Units. These units include the Feather River through Oroville and Little Chico, Butte, Little Butte, and Little Dry creeks near Paradise.

There are many factors believed to limit the population of steelhead in the Plan Area. The construction of dams, such as Oroville Dam on the Feather River, has eliminated access to historical upstream spawning habitat. Smaller diversion dams, (e.g., at stream mile 18 in Rock Creek and between Ponderosa Way and Higgins Hole) prevent upstream movement of steelhead under lower flow conditions. Passage impediments, including debris and gravel build-up (e.g., Five Mile area just upstream of Big Chico Weir in Big Chico Creek), shifting of massive boulders (e.g., at Salmon Hole in Upper Bidwell Park in Big Chico Creek), and non-functioning fish ladders (e.g., in Iron Canyon on Big Chico Creek), prohibit upstream migration of steelhead individuals to suitable spawning habitat at low flows. Land-use activities associated with logging, road construction, urban development, mining, livestock grazing, and recreation have caused a decline in quantity and quality of fish habitat by changing streambank and channel morphology, altering water temperatures, degrading water quality, and blocking access to spawning areas (McEwan and Jackson 1996). Steelhead are affected adversely by elevated water temperatures that can occur in the Feather River during late summer and early fall as a result of inadequate carryover storage from Oroville Reservoir and warm agricultural runoff (McEwan and Jackson 1996).

[31] 70 FR 52488, September 2, 2005.
[32] 71 FR 834, January 5, 2006.

5.6.17.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

The Conservation Strategy provides for the multi-pronged protection, restoration and enhancement of large stretches of suitable stream habitats (e.g., spawning gravels, natural banks, riparian vegetation) and the systematic reduction of localized stressors and threats of Central Valley steelhead in the Plan Area.

Appendix O, Figure O–20, *Central Valley Steelhead Habitat in the Plan Area with full BRCP Implementation* depicts the status of modeled Central Valley steelhead habitat in the Plan Area with full BRCP implementation, and Appendix O, Figure O–20a, *Central Valley Steelhead: Conservation Strategy Overview* presents an overview of BRCP actions that will benefit Central Valley steelhead.

Implementation of the BRCP will conserve the Central Valley steelhead in the Plan Area and mitigate the direct and indirect impacts of covered activities.

5.6.17.2 Ecological Uncertainty

The primary ecological uncertainty associated with implementation of the conservation measures is the effectiveness of conservation measures in addressing current threats and stressors of Central Valley steelhead in the Plan Area. Actions to protect habitat include increasing the habitat functions and amount of suitable habitat accessible to the species. However, the rate at which Central Valley steelhead will use areas that were previously inaccessible for spawning is not clear. Furthermore, natural bank dynamics and spawning gravel availability may develop slower than anticipated, especially under changing flows in response to climate change. To minimize this uncertainty, BCAG will maintain regular communications with NMFS and CDFW, species researchers, and stakeholders regarding the expansion and effectiveness of passage and habitat enhancements in the Plan Area.

5.6.18 Central Valley Spring-run Chinook Salmon

Central Valley spring-run Chinook salmon spawn and hold in Butte Creek, Big Chico Creek, Lindo Creek, and the Feather River. Adults and juveniles migrate through these waterways, as well as through the Sacramento River. Juveniles rear in all of these waterways and in Big Chico Creek, Mud, Rock, Pine, and Singer creeks. Preliminary 2011 Butte Creek snorkel survey data indicate that there were 2,130 adult spring-run Chinook salmon in Butte Creek (DFG 2012). Prior to 2011, population size estimates had declined every year since 2005, in which 10,625 adults were observed in snorkel surveys.

There are many factors believed to limit the population of spring-run Chinook salmon in the Plan Area. The construction of dams, such as Oroville Dam on the Feather River, has eliminated access to historical upstream spawning habitat. Smaller diversion dams, (e.g., at stream mile 18 in Rock Creek and between Ponderosa Way and Higgins Hole) prevent upstream movement of

spring-run Chinook salmon under lower flow conditions. Although uncommon, passage impediments, including debris and gravel build-up (e.g., Five Mile area just upstream of Big Chico Weir in Big Chico Creek), shifting of massive boulders (e.g., at Salmon Hole in Upper Bidwell Park in Big Chico Creek), and non-functioning fish ladders (e.g., in Iron Canyon on Big Chico Creek), can prohibit upstream migration of spring-run Chinook salmon individuals to suitable spawning habitat during low flows.

5.6.18.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

The Conservation Strategy combines habitat protection, restoration and enhancement of large stretches of suitable stream habitats (e.g., spawning gravels, natural banks, riparian vegetation) to maintain and improve natural habitats for Central Valley spring-run Chinook salmon. This will provide a systematic reduction of localized stressors and threats of Central Valley spring-run Chinook salmon in the Plan Area.

Appendix O, Figure O–21, *Central Valley Spring-Run Chinook Salmon Habitat in the Plan Area with full BRCP Implementation* depicts the status of spring-run Chinook salmon habitat in the Plan Area with full BRCP implementation, and Appendix O, Figure O–21a, *Central Valley Spring-Run Chinook Salmon: Conservation Strategy Overview* presents an overview of BRCP actions that will benefit spring-run Chinook salmon.

Implementation of the BRCP will conserve the spring-run Chinook salmon in the Plan Area and mitigate the direct and indirect impacts of covered activities.

5.6.18.2 Ecological Uncertainty

Central Valley spring-run Chinook in the Plan area have been declining rapidly in the past decade, despite efforts to reduce threats and stressors. Thus, a major ecological uncertainty exists regarding the effectiveness of past enhancement and conservation measures in addressing current threats and stressors of salmon in the Plan Area. The BRCP conservation approach is focused on increasing the habitat functions and amount of suitable habitat accessible to the species. However, the degree to which habitat availability is limiting Central Valley spring-run Chinook salmon compared to other factors prevailing outside the Plan area (e.g., mortality during outmigration of juveniles, ocean conditions, genetic dilution from hatchery stock, entrainment in downstream water diversions) is not clear. Furthermore, natural bank dynamics and spawning gravel availability may develop slower than anticipated, especially under changing flows in response to climate change. To minimize this uncertainty, BCAG will maintain regular communications with NMFS and CDFW, species researchers, and stakeholders regarding the expansion and effectiveness of passage and habitat enhancements in the Plan Area.

5.6.19 Central Valley Fall-/Late Fall-Run Chinook Salmon

Fall-run Chinook salmon are the most abundant run in the Central Valley (Moyle 2002). Central Valley fall-/late fall-run Chinook salmon adults spawn in and migrate through Rock Creek, Mud Creek, Big Chico Creek, Little Chico Creek, Butte Creek, and the Feather River. Juveniles migrate through and rear in these waterways. Adults and juveniles also migrate through the Sacramento River on the western boundary of the Plan Area. Further, juveniles rear in non-natal creeks of Big Chico Creek and Mud Creek.

There are many factors believed to limit the population of fall-/late fall-run Chinook salmon in the Plan Area. The construction of dams, such as Oroville Dam on the Feather River, has eliminated access to historical upstream spawning habitat. Smaller diversion dams, (e.g., at stream mile 18 in Rock Creek and between Ponderosa Way and Higgins Hole) prevent upstream movement of fall/late fall-run Chinook salmon under lower flow conditions. Passage impediments, including debris and gravel build-up (e.g., Five Mile area just upstream of Big Chico Weir in Big Chico Creek) prohibit upstream migration of fall-/late fall-run Chinook salmon individuals to suitable spawning habitat during low flows.

5.6.19.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

The approach to conservation of Central Valley fall-/late fall-run Chinook salmon focuses on improving access to and quality of spawning and rearing habitat within the Plan Area by increasing natural physical processes, reducing passage barriers, and restoring natural habitat characteristics.

Appendix O, Figure O–22, *Central Valley Fall/Late Fall-RunChinook Salmon Habitat in the Plan Area with full BRCP Implementation* depicts the status of modeled Central Valley fall-/late fall-run Chinook salmon habitat in the Plan Area with full BRCP implementation, and Appendix O, Figure O–22a, *Central Valley Fall/Late Fall-Run Chinook Salmon: Conservation Strategy Overview* presents an overview of BRCP actions that will benefit bald eagle.

Implementation of the BRCP will conserve the Central Valley fall-/late fall-run Chinook salmon in the Plan Area and mitigate the direct and indirect impacts of covered activities.

5.6.19.2 Ecological Uncertainty

The primary ecological uncertainty associated with implementation of the conservation measures is the effectiveness of conservation measures in addressing current threats and stressors of Central Valley fall-/late fall-run Chinook salmon in the Plan Area. Actions to protect habitat include increasing the habitat functions and amount of suitable habitat accessible to the species. However, the rate at which Central Valley fall-/late fall-run Chinook salmon will use areas that were previously inaccessible for spawning is not clear. Furthermore, natural bank dynamics and spawning gravel availability may develop slower than anticipated, especially under changing

flows in response to climate change. To minimize this uncertainty, BCAG will maintain regular communications with NMFS and CDFW, species researchers, and stakeholders regarding the expansion and effectiveness of passage and habitat enhancements in the Plan Area.

5.6.20 Green Sturgeon

Green sturgeon use the Sacramento River along the western boundary of Butte County, and several have been recorded in the Feather River up to the Thermalito Afterbay. Green sturgeon are large in size, mature late, have a low productivity and long life span, and are anadromous. All these characteristics make them vulnerable to habitat degradation and overexploitation. The primary threat to the southern DPS of green sturgeon is the reduction of the spawning area to one population in the Sacramento River. This reduction in range makes green sturgeon vulnerable to catastrophic events.

5.6.20.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

There are no conservation measures proposed for implementation in waterways currently known to be inhabited by green sturgeon. If present in waters enhanced by BRCP conservation measures, however, green sturgeon will benefit.

Appendix O, Figure O–23, *Green Sturgeon Habitat in the Plan Area with full BRCP Implementation* depicts the status of modeled green sturgeon habitat in the Plan Area with full BRCP implementation, and Appendix O, Figure O–23a, *Green Sturgeon: Conservation Strategy Overview* presents an overview of BRCP actions that will benefit green sturgeon. .

Implementation of the applicable measures in Chapter 6, *Conditions on Covered Activities* will avoid and minimize impacts of the covered activities on green sturgeon and implementation of conservation measures will benefit the green sturgeon should they occur in waters enhanced by the BRCP. As indicated in the green sturgeon impact assessment (Section 4.4.20, *Green Sturgeon*), implementation of the covered activities is not expected to result in adverse population-level effects on green sturgeon or adversely affect its distribution or abundance in the Plan Area.

5.6.20.2 Ecological Uncertainty

The primary ecological uncertainty associated with implementation of the conservation measures is the presence of green sturgeon in the Plan Area. To minimize this uncertainty, BCAG will maintain regular communications with NMFS and CDFW, species researchers, and stakeholders regarding the distribution of the species in the Plan Area.

5.6.21 Valley Elderberry Longhorn Beetle

Valley elderberry longhorn beetle has been recorded from several locations within the Plan Area. Most occurrences are along the Sacramento River with a few along Big Chico Creek, Butte Creek, and the Feather River. Occurrences, however, do not sufficiently represent the distribution of the species due to its life history and infrequent emergence of adults. Its host plant, the elderberry shrub, is a common species in riparian habitats throughout much of the Plan Area, and so the species may be more widespread. Adult beetles have been observed, along with numerous accounts of old and new exit holes from the stems of elderberry. No CNDDB recorded observations have been made (see Appendix A, Figure A.21-1).

Valley elderberry longhorn beetle is in long-term decline caused by human activities that have resulted in widespread alteration and fragmentation of riparian habitats, and, to a lesser extent, upland habitats, which support the beetle. The primary threats to survival of the beetle include: loss and alteration of habitat by agricultural conversion; inappropriate grazing; levee construction; stream and river channelization; removal of riparian vegetation; rip-rapping of shorelines; nonnative invasive species such as the Argentine ant, a predator of the early phases of the beetle; and recreational, industrial, and urban development. The beetle's distribution may be limited by the use of insecticide and herbicide in agricultural areas and along roadways. Declining quality and maturity of elderberry shrubs/trees as individuals and stands may be another cause of the beetle's limited distribution.

5.6.21.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

The Conservation Strategy provides for the protection and enhancement of patches of valley elderberry longhorn beetle habitats that are spatially distributed to provide landscape-level connectivity among protected habitats, to provide for the movement and genetic interchange among populations, and to preserve native biodiversity.

Appendix O, Figure O–24, *Valley Elderberry Longhorn Beetle Habitat in the Plan Area with full BRCP Implementation* depicts the status of modeled valley elderberry longhorn beetle habitat in the Plan Area with full BRCP implementation, and Appendix O, Figure O–24a, *Valley Elderberry Longhorn Beetle: Conservation Strategy Overview* presents an overview of BRCP actions that will benefit valley elderberry longhorn beetle.

Implementation of the BRCP will conserve the valley elderberry longhorn beetle in the Plan Area and mitigate the direct and indirect impacts of covered activities.

5.6.21.2 Ecological Uncertainty

The primary ecological uncertainty associated with implementation of the conservation measures is the current population status and distribution of valley elderberry longhorn beetle in the Plan Area. To date, it is not clear how abundant and widespread the species is within the Plan Area,

(see Appendix A). BCAG will integrate protection, restoration and management of habitat with active control of nonnative species to evaluate hypotheses why the species is not present in certain locales. As BRCP conservation measures and covered activities are implemented, monitoring and surveys will provide a better understanding of the distribution and population structure of the species and will reduce the uncertainty associated with the lack of population data. This, in turn, leads to a more focused and tactical implementation of conservation actions to benefit current populations and newly discovered occurrences and the protection of vulnerable patches of habitat. Since one of the most significant stressor of the valley elderberry longhorn beetle (aside from habitat loss) is the aggressive invasion of argentine ants and European earwigs, the primary uncertainty associated with this threat is the rate at which these species invade restored habitat, and the effectiveness of control measures. To address this uncertainty, BCAG will coordinate experimental control activities with USFWS, CDFW, and other experts. The effectiveness of controlling nonnative species in existing and restored habitats will be monitored and necessary changes to the methodology or control action frequency will be implemented in an adaptive decision framework.

5.6.22 Vernal Pool Tadpole Shrimp

Vernal pool tadpole shrimp is distributed throughout the Central Valley of California and from one occurrence in the San Francisco Bay area (USFWS 2005). There are 17 known extant occurrences of vernal pool tadpole shrimp in Butte County (Table 4–8, *Maximum Extent of Permanent Direct Impacts on Modeled Covered Species Habitat Types and Known Occurrences within the Plan Area*). The main factors contributing to the decline of vernal pool tadpole shrimp populations have been the historical loss of its habitat, adverse effects of invasive species, and the alteration of the hydrology supporting its habitat (USFWS 2005).

5.6.22.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

The Conservation Strategy provides for the protection, restoration and enhancement of large patches of vernal pool tadpole shrimp habitat that are spatially distributed to provide landscape-level connectivity among areas of protected habitat.

Appendix O, Figure O–25, *Vernal Pool Tadpole Shrimp and Vernal Pool Fairy Shrimp Habitat in the Plan Area with full BRCP Implementation* depicts the status of modeled vernal pool tadpole shrimp habitat in the Plan Area with full BRCP implementation, and Appendix O, Figure O–25a, *Vernal Pool Tadpole and Vernal Pool Fairy Shrimp: Conservation Strategy Overview* presents an overview of BRCP actions that will benefit vernal pool tadpole shrimp.

Implementation of the BRCP will conserve the vernal pool tadpole shrimp in the Plan Area and mitigate the direct and indirect impacts of covered activities.

5.6.22.2 Ecological Uncertainty

The primary ecological uncertainties associated with implementation of the conservation measures include the current distribution of vernal pool tadpole shrimp in unsurveyed habitat of the Plan Area and the effectiveness of management measures. To address these uncertainties, BCAG will coordinate the management actions with USFWS, CDFW, and vernal pool tadpole shrimp experts. Additionally, the monitoring requirements of CMs listed above will provide crucial data and understanding regarding the extent, sizes and fluctuations of its populations.

5.6.25 Conservancy Fairy Shrimp

Conservancy fairy shrimp is distributed in vernal pools as disjunct populations in Butte, Glenn, Merced, Sacramento, Solano, Stanislaus, Tehama, Ventura, Yolo, and Yuba counties (USFWS 2005, 2006e). There are three known occurrences of Conservancy fairy shrimp in Butte County (Table 4–8; Appendix A, Figure A.23-1). The main factors contributing to the decline of Conservancy fairy shrimp populations have been the historical loss of its habitat, adverse effects of invasive species, and the alteration of the hydrology supporting its habitat (USFWS 2005).

5.6.22.3 Conservation Approach and Expected Outcomes of the Conservation Strategy

The Conservation Strategy provides for the protection of grassland with vernal pools in the Vina Plains Recovery Core Area (Objective SPEC16.2). The protection of this grassland with vernal pools in this area will have the highest probability of protecting occupied Conservancy fairy shrimp habitat as the species is present there as well as immediately north of the Plan Area border in Tehama County.

Table 5–21a, *Expected Extent of Conserved Covered Species Habitat Types in the Plan area with BRCP Implementation* presents the overall Plan Area-wide acreage outcomes of implementing the BRCP covered activities and Conservation Strategy for each covered species.

Implementation of the BRCP will conserve Conservancy fairy shrimp in the Plan Area and mitigate the direct and indirect impacts of covered activities.

5.6.22.4 Ecological Uncertainty

The primary ecological uncertainties associated with implementation of the conservation measures include the current distribution of Conservancy fairy shrimp in unsurveyed habitat of the Plan Area; estimating population sizes for this species that is distributed in small, disjunct populations, that experience significant annual population fluctuations; and identifying and implementing effective management measures. To address these uncertainties, BCAG will coordinate the management actions with USFWS, CDFW, and Conservancy fairy shrimp experts. Additionally, the monitoring requirements of CMs listed above will provide crucial data and understanding regarding the extent, sizes and fluctuations of its populations.

5.6.23 Vernal Pool Fairy Shrimp

Vernal pool fairy shrimp is distributed in vernal pools from southern Oregon southward throughout California's Central Valley and Central and South Coastal areas (USFWS 2005). There are 29 extant occurrences of vernal pool fairy shrimp in Butte County (Table 4–8). The main factors contributing to the decline of vernal pool fairy shrimp populations have been the historical loss of its habitat, adverse effects of invasive species, and the alteration of the hydrology supporting its habitat (USFWS 2005).

5.6.23.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

The Conservation Strategy provides for the protection, restoration, and enhancement of large patches of vernal pool fairy shrimp vernal pool habitat that are spatially distributed to provide landscape-level connectivity among areas of protected habitat.

Figure O–25 depicts the status of modeled vernal pool fairy shrimp habitat in the Plan Area with full BRCP implementation, and Figure O–25a presents an overview of BRCP actions that will benefit vernal pool fairy shrimp.

Implementation of the BRCP will conserve the vernal pool fairy shrimp in the Plan Area and mitigate the direct and indirect impacts of covered activities.

5.6.23.2 Ecological Uncertainty

The primary ecological uncertainties associated with implementation of the conservation measures include the current distribution of vernal pool fairy shrimp in unsurveyed habitat of the Plan Area and the effectiveness of management measures. To address these uncertainties, BCAG will coordinate the management actions with USFWS, CDFW, and vernal pool fairy shrimp experts. Additionally, the monitoring requirements of CMs listed above will provide crucial data and understanding regarding the extent, sizes and fluctuations of its populations.

5.6.24 Ferris' Milkvetch

Historically, Ferris' milkvetch was known to occur in and adjacent to the Northeastern Sacramento County Vernal Pool Region in Butte, Colusa, Glenn, and Sutter counties and in the Solano-Colusa Vernal Pool Region in Solano and Yolo (USFWS 2005). Eight historical occurrences of Ferris' milkvetch have been recorded in Butte County, but all are extirpated (see Appendix O, Figure O–26, *Ferris' Milkvetch Habitat in the Plan Area with full BRCP Implementation* and Appendix O, Figure O–26a, *Ferris' Milkvetch: Conservation Strategy Overview* [separate files]). The main factors contributing to the decline of Ferris' milkvetch populations have been the historical loss of its habitat, adverse effects of invasive species, and the alteration of the hydrology supporting its habitat (USFWS 2005).

5.6.24.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

The Conservation Strategy provides for the protection, restoration and enhancement of large patches of Ferris' milkvetch vernal pool habitat that are spatially distributed to provide landscape-level connectivity among areas of protected habitat.

Figure O–26 depicts the status of modeled Ferris' milkvetch habitat in the Plan Area with full BRCP implementation, and Figure O–26a presents an overview of BRCP actions that will benefit Ferris' milkvetch.

Implementation of the BRCP will conserve the Ferris' milkvetch in the Plan Area and mitigate the direct and indirect impacts of covered activities.

5.6.24.2 Ecological Uncertainty

The primary ecological uncertainties associated with implementation of the conservation measures include the current distribution of Ferris' milkvetch in unsurveyed habitat of the Plan Area; estimating population sizes for this annual species that is distributed in small, disjunct populations that experience significant annual population fluctuations; and identifying and implementing effective management measures. To address these uncertainties, BCAG will coordinate the management actions with USFWS, CDFW, and Ferris' milkvetch experts. Additionally, the monitoring requirements of CMs listed above will provide crucial data and understanding regarding the extent, sizes and fluctuations of its populations.

5.6.25 Lesser Saltscale

Lesser saltscale, a California endemic, is known from 27 documented occurrences, primarily in the southern San Joaquin Valley. The occurrences in the Plan Area are the most northern, and are about100 miles from the next most northern documented occurrence in Stanislaus County. Lesser saltscale is found in two occurrences in the Plan Area both of which are on the CDFW Gray Lodge Wildlife Area, which is managed for waterfowl and upland game hunting. One occurrence is located just east of the headquarters buildings, and the other near Rutherford and Levee roads. The former was visited in 1993 and the habitat was reported in good condition (no census data was reported). The latter occurrence was visited in 1993 and 1998 and habitat was reported to be in good condition but there were only 20 plants observed in 1993 (see Appendix A).

Little has been reported on specific habitat requirements for lesser saltscale and its habitat was not modeled for the BRCP. Generally, it is found in intermittently inundated, alkaline soils at low elevations (less than100 meters), typically in slough systems and river floodplains, and occasionally bordering vernal pools. Vegetation communities associated with the species include valley sink scrub, valley sacaton grassland, and nonnative annual grassland.

Threats to lesser saltscale include the conversion of alkali sinks to agriculture; active wetland management for waterfowl; construction of flood control structures, such as levees and other water barriers; and changes in runoff, such as irrigation or construction of roads and culverts that result in changes in hydrology; and competition from invasive species. The occurrences in the Plan Area are reported from weedy fields.

5.6.25.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

Current distribution of lesser saltscale within the Plan Area is limited and all known occurrences are protected in the Gray Lodge Wildlife Management Area. Protected lesser saltscale habitat will be managed to maintain its habitat functions for lesser saltscale over time.

Implementation of the BRCP will conserve the lesser saltscale in the Plan Area.

5.6.26 Hoover's Spurge

Historically, Hoover's spurge was known to occur in the Northeastern Sacramento Valley, San Joaquin Valley, Solano-Colusa, and Southern Sierra Foothills Vernal Pool Regions (USFWS 2005). Of the 26 occurrences presumed to be extant, 14 occur in the Vina Plains area of Tehama and Butte counties within the Northeastern Sacramento Valley Vernal Pool Region, with the majority of these (12) in Tehama County. The remaining 12 occurrences are in Tulare, Glenn County, Stanislaus County, and Merced counties (USFWS 2005). Four occurrences of Hoover's spurge have been recorded in Butte County (see Appendix A, Figure A.27-1). The main factor contributing to the decline of Hoover's spurge populations has been the historical loss of its habitat (USFWS 2005).

5.6.26.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

The Conservation Strategy provides for the protection, restoration and enhancement of large patches of Hoover's spurge vernal pool habitat that are spatially distributed to provide landscape-level connectivity among areas of protected habitat.

Appendix O, Figure O–27, *Vernal Pool Plant Species Habitat in the Plan Area with full BRCP Implementation* depicts the status of modeled Hoover's spurge habitat in the Plan Area with full BRCP implementation, and Appendix O, Figure O–27a, *Vernal Pool Plant Species: Conservation Strategy Overview* presents an overview of BRCP actions that will benefit Hoover's spurge.

Implementation of the BRCP will conserve the Hoover's spurge in the Plan Area and mitigate the direct and indirect impacts of covered activities.

5.6.26.2 Ecological Uncertainty

The primary ecological uncertainties associated with implementation of the conservation measures include the current distribution of Hoover's spurge in unsurveyed habitat of the Plan Area and the effectiveness of management measures. To address these uncertainties, BCAG will coordinate the management actions with USFWS, CDFW, and Hoover's spurge experts. Additionally, the monitoring requirements of CMs listed above will provide crucial data and understanding regarding the extent, sizes and fluctuations of its populations.

5.6.27 Ahart's Dwarf Rush

Ahart's dwarf rush is known to occur in Butte, Calaveras, Placer, Sacramento, Tehama, and Yuba counties (CNDDB 2012). Seventeen occurrences of Ahart's dwarf rush have been recorded in Butte County (Table 5–8; Appendix A, Figure A.28-1).

The main factors contributing to the decline of Ahart's dwarf rush populations have been the historical loss of its habitat, adverse effects of invasive species, and the alteration of the hydrology supporting its habitat (USFWS 2005).

5.6.27.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

The Conservation Strategy provides for the protection, restoration and enhancement of large patches of Ahart's dwarf rush vernal pool habitat that are spatially distributed to provide landscape-level connectivity among areas of protected habitat.

Appendix O, Figure O–27depicts the status of modeled Ahart's dwarf rush habitat in the Plan Area with full BRCP implementation, and Appendix O, Figure O–27a presents an overview of BRCP actions that will benefit Ahart's dwarf rush.

Implementation of the BRCP will conserve the Ahart's dwart rush in the Plan Area and mitigate the direct and indirect impacts of covered activities.

5.6.27.2 Ecological Uncertainty

The primary ecological uncertainties associated with implementation of the conservation measures include the current distribution of Ahart's dwarf rush in unsurveyed habitat of the Plan Area and the effectiveness of management measures. To address these uncertainties, BCAG will coordinate the management actions with USFWS, CDFW, and Ahart's dwarf rush experts. Additionally, the monitoring requirements of CMs listed above will provide crucial data and understanding regarding the extent, sizes and fluctuations of its populations..

5.6.28 Red Bluff Dwarf Rush

Red Bluff dwarf rush is known to occur in Butte, Placer, Shasta, and Tehama counties (CNDDB 2012). Thirty-two occurrences of Red Bluff dwarf rush have been recorded in Butte County (Table 5–8 Appendix A, Figure A.29-1). The main factors contributing to the decline of Red Bluff dwarf rush populations are development, grazing, vehicles, industrial forestry, and agriculture (CNPS 2012).

5.6.28.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

The Conservation Strategy provides for the protection, restoration and enhancement of large patches of Red Bluff dwarf rush vernal pool habitat that are spatially distributed to provide landscape-level connectivity among areas of protected habitat.

Appendix O, Figure O–27 depicts the status of modeled Red Bluff dwarf rush habitat in the Plan Area with full BRCP implementation, and Appendix O, Figure O–27a presents an overview of BRCP actions that will benefit Red Bluff dwarf rush.

Implementation of the BRCP will conserve the Red Bluff dwarf rush in the Plan Area and mitigate the direct and indirect impacts of covered activities.

5.6.28.2 Ecological Uncertainty

The primary ecological uncertainties associated with implementation of the conservation measures include the current distribution of Red Bluff dwarf rush in unsurveyed habitat of the Plan Area; estimating population sizes for this annual species that is distributed in small, disjunct populations, that experience significant annual population fluctuations; and identifying and implementing effective management measures. To address these uncertainties, BCAG will coordinate the management actions with USFWS, CDFW, and Red Bluff dwarf rush experts. Additionally, the monitoring requirements of CMs listed above will provide crucial data and understanding regarding the extent, sizes, and fluctuations of its populations.

5.6.29 Butte County Meadowfoam

BCM is endemic to Butte County and its distribution is fragmented with the largest populations clustered in central Butte County near the City of Chico (Appendix O, Figure O–28, *Butte County Meadowfoam Habitat in the Plan Area with full BRCP Implementation* [see separate file] and Appendix A, Figure A.30-2). Although never extensive in range, BCM populations have been substantially reduced in number and fragmented by development in the Chico area (USFWS 2006c, Keeler-Wolf et al. 1998). The USFWS has compiled BCM known population information from CNDDB data, available data from botanical surveys, and USFWS file data (USFWS 2011). The USFWS data are correlated with CNDDB occurrence data in Appendix A, Table A.30-1 and depicted in Appendix A, Figures A.30-1, A.30-2, and A.30-3. The compiled

USFWS occurrence data indicates that BCM occurs almost exclusively on three geological formations. Based on landscape characteristics that would tend to isolate genetic exchange between the occurrences (see Life History section of Appendix A.30), BCM occurs as seven discrete population groupings (Appendix A, Figures A.30-2, and A.30-3).

The main factors contributing to the decline of BCM include loss of habitat (from land development and conversion of native habitat to agricultural use), the negative effects of nonnative annual grasses, and incompatible grazing regimes (USFWS 2005).

5.6.29.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

The Conservation Strategy is designed to achieve recovery of BCM. The Conservation Strategy is designed to achieve recovery of BCM and provides for the protection of 2,402 and 310 acres of primary and secondary, respectively, modeled habitat within specifically identified preserve lands east of the City of Chico (the Chico Butte County Meadowfoam Preserve [CBCMP]) and the protection of additional lands, 3,600 acres primary and 892 acres secondary modeled habitat, in the northern and southern portions of its range (Table 5–18; Figure 5–6 and Appendix O, Figure O–28a, *Butte County Meadowfoam: Conservation Strategy Overview* [see separate files]). Additionally, the conservation outcomes of each known population is described in Table 5–22, *Butte County Meadowfoam Conservation Outcomes by Occurrence* [see separate file]) and specific avoidance requirements are provided for Occurrences #22 and #25 (see Figure 4–46d and Appendix O, Figure O–28b, *Butte County Meadowfoam Avoidance Requirement for Occurrence #22* [separate files]).

Implementation of the BRCP will conserve and achieve recovery of the Butte County meadowfoarm in the Plan Area and mitigate the direct and indirect impacts of covered activities.

5.6.29.2 Ecological Uncertainty

The primary ecological uncertainties associated with implementation of the conservation measures include the current distribution of BCM in the Rock Creek, Chico D, Gold Run Creek, and Table Mountain population groupings of the Plan Area; estimating population sizes for this annual species that is distributed in small populations that experience significant annual population fluctuations; and identifying and implementing effective management measures. Significant data gaps exist regarding the status and spatial distribution of the species outside of the Chico A, B, and C population groupings. To address these uncertainties, BCAG will coordinate the management actions with USFWS, CDFW, and BCM experts. Additionally, the monitoring requirements of CMs listed above will provide crucial data and understanding regarding the extent, sizes and fluctuations of its populations.

5.6.30 Veiny Monardella

Veiny monardella has been recorded from a relatively small area of Butte County and from Tuolumne County (CNDDB 2012). There are eight extant occurrences in the Plan Area (Table 5–8; Appendix A, Figure A.31-1). The main threats to veiny monardella are development, habitat fragmentation, and possibly competition with invasive plant species (Castro pers. comm.).

5.6.30.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

The Conservation Strategy provides for the protection of the entirety of known veiny monardella occurrences and occupied habitat in the Plan Area (Table 5–8).

Implementation of the BRCP will conserve the veiny monardella in the Plan Area.

5.6.30.2 Ecological Uncertainty

The primary ecological uncertainties associated with implementation of the conservation measures include the current distribution of veiny monardella in unsurveyed habitat of the Plan Area; estimating population sizes for this annual species that is distributed in small, disjunct populations, that experience significant annual population fluctuations; and identifying and implementing effective management measures. To address these uncertainties, BCAG will coordinate the management actions with USFWS, CDFW, and veiny monardella experts. Additionally, the monitoring requirements of CMs listed above will provide crucial data and understanding regarding the extent, sizes, and fluctuations of its populations.

5.6.31 Hairy Orcutt Grass

Historically, hairy Orcutt grass was known to occur along the eastern margin of the San Joaquin and Sacramento valleys from Tehama County south to Madera County but many of those occurrences have been extirpated (USFWS 2005). There is one known occurrence of hairy Orcutt grass in Butte County (Table 5–8; Appendix A, Figure A.32-1). The main factors contributing to the decline of hairy Orcutt grass populations have been the historical loss of its habitat, adverse effects of invasive species, and the alteration of the hydrology supporting its habitat (USFWS 2005).

5.6.31.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

The Conservation Strategy provides for the protection, restoration and enhancement of large patches of hairy Orcutt grass vernal pool habitat that are spatially distributed to provide landscape-level connectivity among areas of protected habitat.

Appendix O, Figure O–27 depicts the status of modeled hairy Orcutt grass habitat in the Plan Area with full BRCP implementation, and Appendix O, Figure O–27 a presents an overview of BRCP actions that will benefit hairy Orcutt grass.

Implementation of the BRCP will conserve the hairy Orcutt grass in the Plan Area and mitigate the direct and indirect impacts of covered activities.

5.6.31.2 Ecological Uncertainty

The primary ecological uncertainties associated with implementation of the conservation measures include the current distribution of hairy Orcutt grass in unsurveyed habitat of the Plan Area; estimating population sizes for this annual species that is distributed in small, disjunct populations, that experience significant annual population fluctuations; and identifying and implementing effective management measures. To address these uncertainties, BCAG will coordinate the management actions with USFWS, CDFW, and hairy Orcutt grass experts. Additionally, the monitoring requirements of CMs listed above will provide crucial data and understanding regarding the extent, sizes, and fluctuations of its populations.

Implementation of the conservation measures are not expected to pose a risk to hairy Orcutt grass because they are directed at protecting and enhancing its habitat and will be implemented to avoid impacts on habitat and individuals.

5.6.32 Slender Orcutt Grass

Slender Orcutt grass has been reported from Butte, Lake, Lassen, Modoc, Plumas, Sacramento, Shasta, Siskiyou, and Tehama counties (USFWS 2005). There are two occurrences of slender Orcutt grass in Butte County and two vernal pools were casually seeded in 1978 but there are no follow-up data on the success of the seeding (USFWS 2005) (Table 5–8; Appendix A, Figure A.33-1). The main factors contributing to the decline of slender Orcutt grass populations have been the historical loss of its habitat, adverse effects of invasive species, and the alteration of the hydrology supporting its habitat (USFWS 2005).

5.6.32.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

The Conservation Strategy provides for the protection, restoration and enhancement of large patches of slender Orcutt grass vernal pool habitat that are spatially distributed to provide landscape-level connectivity among areas of protected habitat.

Appendix O, Figure O–27 depicts the status of modeled slender Orcutt grass habitat in the Plan Area with full BRCP implementation, and Appendix O, Figure O–27a presents an overview of BRCP actions that will benefit slender Orcutt grass.

Implementation of the BRCP will conserve the slender Orcutt grass in the Plan Area and mitigate the direct and indirect impacts of covered activities.

5.6.32.2 Ecological Uncertainty

The primary ecological uncertainties associated with implementation of the conservation measures include the current distribution of slender Orcutt grass in unsurveyed habitat of the Plan Area; estimating population sizes for this annual species that is distributed in small, disjunct populations, that experience significant annual population fluctuations; and identifying and implementing effective management measures. To address these uncertainties, BCAG will coordinate the management actions with USFWS, CDFW, and slender Orcutt grass experts. Additionally, the monitoring requirements of CMs listed above will provide crucial data and understanding regarding the extent, sizes, and fluctuations of its populations.

5.6.33 Ahart's Paronychia

Ahart's paronychia is known to occur in Butte, Shasta, and Tehama counties (CNDDB 2012). Five occurrences of Ahart's paronychia have been recorded in Butte County (Table 5–8; Appendix A, Figure A.34-1). The main factors contributing to the decline of Ahart's paronychia populations are development, and possibly grazing, vehicles, and agriculture (CNPS 2012).

5.6.33.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

The Conservation Strategy provides for the protection, restoration and enhancement of large patches of Ahart's paronychia vernal pool habitat that are spatially distributed to provide landscape-level connectivity among areas of protected habitat.

Appendix O, Figure O–27 depicts the status of modeled Ahart's paronychia habitat in the Plan Area with full BRCP implementation, and Appendix O, Figure O–27a presents an overview of BRCP actions that will benefit Ahart's paronychia.

Implementation of the BRCP will conserve the Ahart's paronychia in the Plan Area and mitigate the direct and indirect impacts of covered activities.

5.6.33.2 Ecological Uncertainty

The primary ecological uncertainties associated with implementation of the conservation measures include the current distribution of Ahart's paronychia in unsurveyed habitat of the Plan Area; estimating population sizes for this annual species that is distributed in small, disjunct populations and that experiences significant annual population fluctuations; and identifying and implementing effective management measures. To address these uncertainties, BCAG will coordinate the management actions with USFWS, CDFW, and Ahart's paronychia experts.

Additionally, the monitoring requirements of CMs listed above will provide crucial data and understanding regarding the extent, sizes and fluctuations of its populations.

5.6.34 California Beaked Rush

California beaked-rush has been recorded from Butte, Marin, Napa, and Sonoma counties (CNDDB 2012). There are seven extant occurrences in the Plan Area (Table 5–8; Appendix A, Figure A.35-1). The main threats to California beaked-rush in Butte County are reported to be development and heavy cattle grazing (CNDDB 2012).

5.6.34.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

The Conservation Strategy provides for the protection of the entirety of California beaked-rush occurrences and occupied habitat in the Plan Area (Table 5–8).

Implementation of the BRCP will conserve the California beaked-rush in the Plan Area.

5.6.34.2 Ecological Uncertainty

The primary ecological uncertainties associated with implementation of the conservation measures include the current distribution of California beaked-rush in unsurveyed habitat of the Plan Area; estimating population sizes for this annual species that is distributed in small, disjunct populations that experience significant annual population fluctuations; and identifying and implementing effective management measures. To address these uncertainties, BCAG will coordinate the management actions with USFWS, CDFW, and California beaked-rush experts. Additionally, the monitoring requirements of CMs listed above will provide crucial data and understanding regarding the extent, sizes and fluctuations of its populations.

5.6.35 Butte County Checkerbloom

Butte County checkerbloom is endemic to Butte County (CNDDB 2012) where it is known from 127 occurrences in and just outside of the Plan Area (Table 5–8; Appendix A, Figure A.36-1). The main factors threatening Butte County checkerbloom populations are nonnative plants and possibly residential development and fire suppression (CNPS 2012).

5.6.35.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

The Conservation Strategy provides for the protection, restoration and enhancement of large patches of Butte County checkerbloom modeled habitat that are spatially distributed to provide landscape-level connectivity among areas of protected habitat.

Appendix O, Figure O–29, *Butte County Checkerbloom Habitat in the Plan Area with full BRCP Implementation* depicts the status of modeled Butte County checkerbloom habitat in the Plan Area with full BRCP implementation, and Appendix O, Figure O–29a, *Butte County Checkerbloom: Conservation Strategy Overview* presents an overview of BRCP actions that will benefit Butte County checkerbloom.

Implementation of the BRCP will conserve the Butte County checkerbloom in the Plan Area and mitigate the direct and indirect impacts of covered activities.

5.6.35.2 Ecological Uncertainty

The primary ecological uncertainties associated with implementation of the conservation measures include the current distribution of Butte County checkerbloom in unsurveyed habitat of the Plan Area; estimating population sizes for this annual species that is distributed in small, disjunct populations that experience significant annual population fluctuations; and identifying and implementing effective management measures. To address these uncertainties, BCAG will coordinate the management actions with USFWS, CDFW, and Butte County checkerbloom experts. Additionally, the monitoring requirements of CMs listed above will provide crucial data and understanding regarding the extent, sizes and fluctuations of its populations.

5.6.36 Butte County Golden Clover

Butte County golden clover is endemic to a relatively small part of the Plan Area where 18 occurrences of have been recorded (Table 5–8; Appendix O, Figure O-30, *Butte County Golden Clover Habitat in the Plan Area with full BRCP Implementation* and Figure O-30a, *Butte County Golden Clover: Conservation Strategy Overview*). There are no specific threats to Butte County golden clover as it appears to always have been a rare species of very limited distribution, though highway expansion could affect some area of potential habitat.

5.6.36.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

The Conservation Strategy provides for the protection, restoration and enhancement of large patches of Butte County golden clover habitat that are spatially distributed to provide landscape-level connectivity among areas of protected habitat.

Figure O-30 depicts the status of modeled Butte County golden clover habitat in the Plan Area with full BRCP implementation, and Figure O-30a presents an overview of BRCP actions that will benefit Butte County golden clover.

Implementation of the BRCP will conserve the Butte County golden clover in the Plan Area and mitigate the direct and indirect impacts of covered activities.

5.6.36.2 Ecological Uncertainty

The primary ecological uncertainties associated with implementation of the conservation measures include the current distribution of Butte County golden clover in unsurveyed habitat of the Plan Area; estimating population sizes for this annual species that is distributed in small populations that experience significant annual fluctuations; and identifying and implementing effective management measures. To address these uncertainties, BCAG will coordinate the management actions with USFWS, CDFW, and Butte County golden clover experts. Additionally, the monitoring requirements of CMs listed above will provide crucial data and understanding regarding the extent, sizes and fluctuations of its populations.

5.6.37 Greene's Tuctoria

Historically, Greene's tuctoria occurred from Shasta County south to Tulare County but has been extirpated from Fresno, Madera, San Joaquin, Stanislaus, and Tulare counties (USFWS 2005). There are four extant occurrences of Greene's tuctoria in Butte County and one extirpated occurrence (USFWS 2005) (Table 5–8; Appendix A, Figure A.38-1). The main factors contributing to the decline of Greene's tuctoria populations have been the historical loss of its habitat, adverse effects of invasive species, and the alteration of the hydrology supporting its habitat (USFWS 2005).

5.6.37.1 Conservation Approach and Expected Outcomes of the Conservation Strategy

The Conservation Strategy provides for the protection, restoration and enhancement of large patches of Greene's tuctoria vernal pool habitat that are spatially distributed to provide landscape-level connectivity among areas of protected habitat.

Appendix O, Figure O-27 depicts the status of modeled Greene's tuctoria habitat in the Plan Area with full BRCP implementation, and Appendix O, Figure O-27a presents an overview of BRCP actions that will benefit Greene's tuctoria.

Implementation of the BRCP will conserve the Greene's tuctoria in the Plan Area and mitigate the direct and indirect impacts of covered activities.

5.6.37.2 Ecological Uncertainty

The primary ecological uncertainties associated with implementation of the conservation measures include the current distribution of Greene's tuctoria in unsurveyed habitat of the Plan Area; estimating population sizes for this annual species that is distributed in small, disjunct populations that experience significant annual population fluctuations; and identifying and implementing effective management measures. To address these uncertainties, BCAG will coordinate the management actions with USFWS, CDFW, and Greene's tuctoria experts.

Additionally, the monitoring requirements of CMs listed above will provide crucial data and understanding regarding the extent, sizes and fluctuations of its populations.

5.7 Conservation Provided for Jurisdictional Wetlands and Other Waters

The conservation outcomes under the BRCP for wetlands and other waters of the United States (regulated under Clean Water Act [CWA] section 404) and streams and riparian habitats (regulated under California Fish and Game Code section 1602) are described in this section. BRCP impact avoidance and minimization measures, compensatory mitigation measures, and measures contributing to the conservation of streams, ponds, wetlands, and riparian habitats are identified for each wetland and aquatic resource.

The various types of jurisdictional wetlands in the Plan Area are described in Section 3.4.5, *Potential Jurisdictional Wetlands and Other Waters* and Tables 3–16, 3–17, 3–18, and 3–19. The Plan Area includes natural and non-natural wetland types. Natural wetlands are those wetlands that are dominated by native plant species and receive water predominately from runoff and groundwater not assisted by irrigation water. Natural wetlands include vernal pools and other seasonal wetlands (though some of these that are dominated by nonnative invasive plants are considered non-natural), permanent emergent wetlands, and riparian forest and scrub (see exception for non-stream-associated dredger tailings riparian forest and scrub, described below). Non-natural wetlands are those wetlands that are dominated by nonnative plant species or receive water predominately from irrigation systems. Non-natural wetland types in the Plan Area include wetlands within agricultural fields, managed wetlands, managed seasonal wetlands, and wetlands dominated by nonnative invasive plants. Riparian forest and scrub on dredger tailings, though resulting from secondary succession in an intensely modified substrate, is treated as a natural habitat where its origins are likely in the geographic location of historical riparian habitat areas. Riparian forest and scrub on dredger tailings not in the geographic location of historical riparian habitat, that was likely created by the excavation of abandoned stream beds and is no longer associated with an active stream, is treated as a non-natural habitat.

The goals of the BRCP for jurisdictional wetlands in the Plan Area are to:

- Increase the ecological functions provided by each of the natural wetland types.
- Maintain the ecological functions provided by non-natural wetland types, but not necessarily in-kind (i.e. mitigate impacts on non-natural wetlands with restoration of natural wetland types).

Avoidance of direct and indirect impacts on jurisdictional wetlands is the preferred conservation action where practicable (see Chapter 6, *Conditions on Covered Activities*). Following efforts to avoid and minimize impacts on jurisdictional wetlands in the planning stages of projects (see Section 8.7, *Process for BRCP Implementation*), the impacts of the project will be compensated through protection and restoration of like or similar wetland types of equal or higher function at

the ratios described in Table 5–10. Where non-natural wetlands are filled, compensatory mitigation is provided through protection and restoration of natural wetlands types. For example, the removal of wetlands within agricultural fields is compensated through the restoration of natural emergent wetland, and the removal of managed seasonal wetlands is compensated through the restoration of natural vernal pool and swale complex. Table 5–10 details the compensatory mitigation requirements for wetland and riparian habitats.

The existing extents of wetlands and other waters of the United States in the Plan Area are presented in Section 3.9, *Extent of Potential Jurisdictional Wetlands and Other Waters in the Plan Area,* using the methods to estimate existing acreage described in Section 3.4.5. Table 4–11, *Impacts Estimated for Potential Jurisdictional Wetlands and Other Waters in the Plan Area by Watershed Unit* provides a breakdown of the estimated impacts on jurisdictional wetlands and other waters by HUC 10 watersheds in the Plan Area. Table 4–12, *Impacts Estimated for Potential Jurisdictional Wetlands and Other Waters in the Plan Area by CAZ* provides a breakdown of the estimated impacts on jurisdictional wetlands and other waters by CAZ. The impact acreages in these tables are estimates for the purpose of assessing the regional impacts on and conservation of wetlands and other waters with full implementation of the BRCP over its 50-year development. The BRCP requires jurisdictional delineation of all proposed projects to assess actual impacts (see Section 6.2 and Section 8.7), and actual impacts will be calculated during BRCP implementation when specific projects are proposed. The BRCP includes measures that go beyond the mitigation of impacts on wetlands and riparian habitats and contribute to the conservation of these natural communities. These conservation measures include the protection of existing wetland and riparian habitats in excess of compensatory protection mitigation ratios; and for riparian forest, additional restoration acreage in excess of the restoration mitigation ratio (see Table 5–10). These measures that contribute to the conservation of wetlands and riparian habitats are required elements of the BRCP and must be achieved on a specified time table (see Tables 6–1 and 6–2).

Conservation outcomes for each of the wetland, riparian, and other waters habitat types are discussed below.

5.7.1 Vernal Pools and Other Seasonal Wetlands

Vernal pools and other seasonal wetlands are found predominantly in grasslands with vernal swale complex land cover type (Figure 3–14, *Distribution of Grassland Natural Community in the Plan Area*). Grasslands land cover type away from streams support scattered vernal pools and other seasonal wetlands, mainly other seasonal wetlands (Section 3.4.5.1, *Vernal Pools and Other Seasonal Wetlands*). Grasslands land cover type associated with streams support a higher density of seasonal wetlands, also very few of which are vernal pools (Section 3.4.5.1). A rough estimate of the total extent of vernal pools and other seasonal wetlands in the Plan Area is 4,003 acres, with approximately 605 acres of these wetlands classified as vernal pools (see Section 3.9 and Table 3–19, *Acreage of Vernal pools and Other Seasonal Wetlands within CAZs and UPAs* [see separate file]). The estimated permanent direct impacts on vernal pools and other seasonal

wetlands with implementation of covered activities in the Plan Area is 302 acres with approximately 38 acres of these wetlands expected to be classified as vernal pools (see Table 4-13, *Impacts on Vernal Pools and Other Seasonal Wetlands*), amounting to approximately 8 percent of vernal pools and other seasonal wetlands and 6 percent of vernal pools in the Plan Area. Most of the impacts on vernal pools and other seasonal wetlands would result from fill for the construction of residential, commercial, and industrial developments.

The potential impacts on vernal pools and other seasonal wetlands are minimized by strict impact limits set in the BRCP for each UPA and CAZ (Table 4–4, *Maximum Extent of Natural Communities and Land Cover Types Removed (Permanent Direct Effects) with Implementation of the Covered Activities in CAZs and UPAs*). The BRCP sets a limit on impacts on grassland with vernal swale complex and grassland land cover types based on the proposed future development under the county and cities' general plans and other regional plans. The GIS analysis estimated impacts based on development footprints of general plans and other regional plans of 1,923 acres for grassland with vernal swale complex (approximately 88 acres of vernal pools and other seasonal wetlands), however, the BRCP requires that these impacts be limited to 1,391 acres (approximately 63 acres of vernal pools and other seasonal wetlands) through avoidance planning in implementation of development under the general plans and other regional plans. In addition, the BRCP includes avoidance and minimization measures in Chapter 6, *Conditions on Covered Activities* to eliminate or reduce physical and water quality impacts on vernal pools and other seasonal wetlands, see specifically:

- AMM1, Conduct Planning Surveys (including delineation of wetlands)
- AMM4, Avoid and Minimize Impacts on Sensitive Wetland and Riparian Habitats
- AMM5, Avoid Siting of Construction Staging Areas and Temporary Work Areas in Occupied Covered Species Habitat
- AMM16, Install Erosion Control Barriers
- AMM19, Implement Wet Weather Erosion Control Plan
- AMM20, Implement Stormwater Pollution Prevention Plan
- AMM21, Implement Additional Avoidance and Minimization Measures and Best Management Practices

The BRCP includes specific conservation measures to ensure the mitigation of impacts on all vernal pools and other season wetlands and additional measures to conserve these wetlands types within the Plan Area, specifically through implementation of the following conservation measures:

- CM1: Acquire Lands
- CM4: Develop and Implement Site Specific Wetland and Riparian Restoration Plans

- CM5: Enhance Protected Natural Communities for Covered Species

Impacts on vernal pools and other seasonal wetlands will be compensated through the acquisition and protection by conservation easement of three times the acreage of wetlands permanently removed (3:1 ratio or approximately 906 acres) and restoration of an equal amount of acres of vernal pool and swale habitat for each acre of vernal pool and other seasonal wetland permanently removed (1:1 ratio or approximately 302 acres). Restoration of vernal pool and swale complex as mitigation for other seasonal wetlands will result in higher ecological functions for covered species and biodiversity. For future projects in which new development causes the isolation of existing vernal pools and other seasonal wetlands the same mitigation requirements apply. Protected and restored vernal pools and swales must be of equal or greater function for covered species habitat and biodiversity than those removed by covered activities. Mitigation must be in the same CAZ as impacts with the following exceptions: impact in the Northern Orchards CAZ may also be mitigated in the Cascade Foothills CAZ, impacts in the Sacramento River CAZ may be mitigated in any CAZ, and impacts in the Basin CAZ may also be mitigated in Cascade Foothills CAZ. Mitigation requirements for vernal pools and other seasonal wetlands are summarized in Table 5–10.

In addition to the mitigation of impacts on vernal pools and other seasonal wetlands, BCAG is responsible for bringing under protection 17,229 acres of grassland with vernal swale complex (21,400 acres total protected – 4,171 acres for mitigation = 17,220 acres for conservation) that should protect an additional 782 acres of vernal pools and other seasonal wetlands (including about 191 acres of vernal pools). This additional protection would bring the impact to protection ratio to approximately 5.6:1. The protection of vernal pools and other seasonal wetlands within the required 5,747 acres of grassland land cover type (supporting a lower density of wetlands) protected for conservation would protect at least an additional 51 acres of vernal pools and other seasonal wetlands – and likely much more, since and the higher density stream associated wetlands (not estimated here) will be within these grasslands.

Overall, the BRCP will result in landscape-level conservation of large and interconnected areas of complexes of vernal pools and swales and other seasonal wetlands with a grassland matrix across 34,841 acres of land distributed on various geomorphic surfaces in the foothills of both the Cascades and Sierra Nevada. At completion of the BRCP conservation lands system, in combination with existing protected lands, 75 percent of the existing grasslands with vernal swale complex will be protected and managed for the highest level of ecological function of vernal pools and other seasonal wetlands (Table 5–26a). In addition to this protection of existing grasslands with vernal swale complex, 3,070 acres of grasslands with vernal swale complex will be restored for a combined protection and restoration of 84% of the baseline acreage (Table 5–26a).

5.7.2 Riparian Habitats

Riparian forest and scrub and herbaceous habitats are found across the Plan Area associated with perennial and intermittent streams and dredger tailings totaling 22,148 acres (Figure 3–16,

Distribution of the Riparian Natural Community in the Plan Area, Table 3–5). An estimate of the total extent of riparian forest and scrub habitats in the Plan Area is 20,491 acres (Table 3–5). See Section 3.5.3, *Riparian*, for a description of riparian natural community in the Plan Area. Riparian forest and scrub in the Plan Area include cottonwood-willow riparian forest, valley oak riparian forest, willow scrub, dredger tailings with riparian forest and scrub (stream associated and non-stream associated) land cover types (see Section 3.4.4, *Land Cover Type Descriptions*). Only portions of these riparian land cover types are expected to meet the USACE criteria for jurisdictional wetlands. All of these land cover types, except the dredger tailings with riparian forest and scrub not associated with streams, are expected to meet CDFW jurisdictional standards under section 1602 of the California Fish and Game Code. The estimated permanent direct impacts on riparian forest and scrub land cover types with implementation of covered activities in the Plan Area is 346 acres with 190 acres of this impact on CDFW jurisdictional riparian habitat (Table 4–12). Most of the impacts on riparian habitats would be on dredger tailings with riparian forest and scrub (242 acres, Table 4–12) with most of those impacts on non-stream associated forest and scrub (136 acres, Table 4–12). Impacts on cottonwood-willow riparian forest (27 acres) and valley oak riparian forest (46 acres) amount to less than 1 percent and about 1 percent of these habitats, respectively, in the Plan Area.

The potential impacts on riparian habitats are minimized by strict impact limits set in the BRCP for each UPA and CAZ (Table 4–4). The BRCP sets a limit on impacts on riparian forest and scrub based on the proposed future development under the county and cities' general plans and other regional plans. The GIS footprint of permanent direct effects on cottonwood willow riparian forest is 313 acres, but the allowable permanent direct effects are 27 acres. The GIS footprint of permanent direct effects on valley oak riparian forest is 212 acres, but the allowable permanent direct effects are 46 acres. The GIS footprint of permanent direct effects on willow scrub is 144 acres, but the allowable permanent direct effects are 11 acres. The GIS footprint of permanent direct effects on herbaceous riparian river bar is 31 acres, but the allowable permanent direct effects are 20 acres. The GIS footprint of permanent direct effects on dredger tailings with riparian forest and scrub is 713 acres, but the allowable permanent direct effects are 242 acres. See shaded grey cell in Table 4–4 for UPAs in which this avoidance of riparian habitats is required. In addition, the BRCP includes avoidance and minimization measures in Chapter 6, *Conditions on Covered Activities* to eliminate or reduce physical and water quality impacts on riparian habitats, see specifically:

- AMM1, Conduct Planning Surveys (including delineation of wetlands and riparian habitats)
- AMM4, Avoid and Minimize Impacts on Sensitive Wetland and Riparian Habitats
- AMM5, Avoid Siting of Construction Staging Areas and Temporary Work Areas in Occupied Covered Species Habitat
- AMM16, Install Erosion Control Barriers
- AMM19, Implement Wet Weather Erosion Control Plan

- AMM20, Implement Stormwater Pollution Prevention Plan
- AMM21, Implement Additional Avoidance and Minimization Measures and Best Management Practices

The BRCP includes specific conservation measures to ensure the mitigation of impacts on all riparian forest and scrub habitats and additional measures to conserve riparian forest and scrub habitats within the Plan Area, specifically through implementation of the following conservation measures:

- CM1: Acquire Lands
- CM4: Develop and Implement Site Specific Wetland and Riparian Restoration Plans
- CM5: Enhance Protected Natural Communities for Covered Species

Impacts on cottonwood-willow riparian forest, valley oak riparian forest, willow scrub, and stream associated dredger tailings with riparian forest and scrub will be compensated through the acquisition and protection by conservation easement of two acres of these riparian habitats for every acre of riparian forest and scrub permanently removed (2:1 ratio or approximately 379 acres) and restoration of one acre of riparian forest and scrub for every acre of riparian forest and scrub permanently removed (1:1 ratio or approximately 189 acres). Protected and restored riparian forest and scrub must be of equal or greater function for covered species habitat and biodiversity than those removed by covered activities. Mitigation must be in the same CAZ as impacts. Impacts on non-stream associated dredger tailings with riparian forest and scrub will be compensated through the acquisition and protection by conservation easement of one acre of riparian forest and scrub habitat[33] for every acre that is permanently removed (1:1 ratio or approximately 136 acres).

In addition to the mitigation of impacts on riparian forest and scrub, BCAG is responsible for bringing under protection 5,157 acres of existing cottonwood-willow and valley oak riparian forest land cover types and protecting 697 acres of existing willow scrub land cover type to contribute to the conservation of covered species and the riparian natural community in the Plan Area (Table 5–8).

Overall, the BRCP will result in landscape-level conservation of large areas of riparian forest and scrub distributed among the CAZs along streams and in the large dredger tailings associated with the Feather River. At completion of the BRCP conservation lands system, in combination with existing protected lands, about 70 percent of the cottonwood-willow and valley oak riparian forests and about 50 percent of willow scrub in the Plan Area will be protected and managed for the highest level of ecological function (Table 5–26a).

[33] Protected riparian must be stream-associated dredger tailings with riparian, cottonwood willow riparian forest, or valley oak riparian forest land cover type.

5.7.3 Permanent Emergent Wetland

Natural perennial emergent wetlands (not associated with managed wetlands) are found across the Plan Area associated with all major land cover types (Figure 3–17, *Distribution of the Wetland Natural Community in the Plan Area*). A rough estimate of the total extent of emergent wetlands in the Plan Area is 4,440 acres, with the largest extent in the Sacramento River CAZ and the remainder rather evenly distributed among the other CAZs (Tables 3–5 and 3–18). The estimated permanent direct impacts on emergent wetlands with implementation of covered activities in the Plan Area is 35 acres (Table 4–12), amounting to less than 1 percent of emergent wetlands in the Plan Area. Most of the impacts on emergent wetlands would result from fill for the construction of residential, commercial, and industrial developments in the Oroville UPA.

The potential impacts on emergent wetlands are minimized by strict impact limits set in the BRCP for each UPA and CAZ (Table 4–4). The BRCP sets a limit on impacts on emergent wetlands based on the proposed future development under the county and cities' general plans and other regional plans. The GIS analysis estimated impacts based on development footprints of general plans and other regional plans of 81 acres for emergent wetlands, however, the BRCP requires that these impacts be limited to 35 acres through avoidance planning in implementation of development under the general plans and other regional plans (Table 4–4). In addition, the BRCP includes avoidance and minimization measures in Chapter 6, *Conditions on Covered Activities* to eliminate or reduce physical and water quality impacts on emergent wetlands, see specifically:

- AMM1, Conduct Planning Surveys (including delineation of wetlands)
- AMM4, Avoid and Minimize Impacts on Sensitive Wetland and Riparian Habitats
- AMM5, Avoid Siting of Construction Staging Areas and Temporary Work Areas in Occupied Covered Species Habitat
- AMM16 Install Erosion Control Barriers
- AMM19, Implement Wet Weather Erosion Control Plan
- AMM20, Implement Stormwater Pollution Prevention Plan
- AMM21, Implement Additional Avoidance and Minimization Measures and Best Management Practices
- AMM25, Minimize Take and Impacts on Habitat of Giant Garter Snake

The BRCP includes specific conservation measures to ensure compensatory mitigation of impacts on all emergent wetlands and additional measures to conserve emergent wetlands within the Plan Area, specifically through implementation of the following conservation measures:

- CM1: Acquire Lands

- CM4: Develop and Implement Site Specific Wetland and Riparian Restoration Plans
- CM5: Enhance Protected Natural Communities for Covered Species

Impacts on emergent wetlands will be compensated through the acquisition and protection by conservation easement of one acre of emergent wetland for every acre of emergent wetlands permanently removed (1:1 ratio or approximately 35 acres) and restoration of two acres of emergent wetland for every acre of emergent wetland permanently removed (2:1 ratio or approximately 71 acres). Protected and restored emergent wetlands must be of equal or greater function for covered species habitat and biodiversity than those removed by covered activities. Mitigation must be in the same CAZ as impacts. Additional acreage of emergent wetlands will be restored as mitigation for loss of agricultural wetlands where irrigated croplands, pasture, and rice are removed for development (see Section 5.7.5, *Agricultural Wetlands*). Mitigation requirements for emergent wetlands are summarized in Table 5–10. In addition to the mitigation of emergent wetlands impacts, channels within rice land agriculture that support emergent wetlands that provide giant garter snake habitat will be protected at a 2:1 ratio as mitigation for impacts on giant garter snake habitat, amounting to 3,182 acres of rice land.

In addition to the mitigation of impacts on emergent wetlands, BCAG is responsible for bringing under protection 660 acres of emergent wetlands and to conduct the restoration of 500 acres of giant garter snake habitat, which would support roughly 150 acres of emergent wetland. This restoration of emergent wetlands for giant garter snake habitat would increase the total extent of emergent wetlands within the Plan Area. Additional conservation of emergent wetlands will come from the protection of 20,000 acres of rice land and the emergent wetlands supporting channels associated with rice agricultural to contribute to the recovery of giant garter snake.

Overall, the BRCP will result in landscape-level conservation of large areas of emergent wetlands distributed among the CAZ's but mainly within the Basin, Sacramento River, and Southern Orchard (associated with the Feather River) CAZs where emergent wetlands were historically most abundant. At completion of the BRCP conservation lands system, in combination with existing protected lands, about 57 percent of the emergent wetlands in the Plan Area will be protected and managed for the highest level of ecological function (Table 5–26a).

5.7.4 Managed Wetlands and Managed Seasonal Wetlands

Managed wetlands and managed seasonal wetlands are artificially created and maintained features found in the eastern and southern portions of the Plan Area (Figure 3–17). In the Plan Area, there are approximately 25,486 acres of managed wetlands in the Basin and Sacramento River CAZs and 2,097 acres of managed seasonal wetlands all in the Sierra Foothills CAZ (Tables 3–5 and 3–18). The estimated permanent direct impacts on managed wetlands and managed seasonal wetlands with implementation of covered activities is 12 acres (Tables 4–6 and 4–12), amounting to less than one tenth of one percent of these wetland types in the Plan Area.

The BRCP includes avoidance and minimization measures in Chapter 6, *Conditions on Covered Activities* to eliminate or reduce physical and water quality impacts on wetlands, see specifically:

- AMM1, Conduct Planning Surveys (including delineation of wetlands)
- AMM5, Avoid Siting of Construction Staging Areas and Temporary Work Areas in Occupied Covered Species Habitat
- AMM16, Install Erosion Control Barriers
- AMM19, Implement Wet Weather Erosion Control Plan
- AMM20, Implement Stormwater Pollution Prevention Plan
- AMM21, Implement Additional Avoidance and Minimization Measures and Best Management Practices
- AMM25, Minimize Take and Impacts on Habitat of Giant Garter Snake

The BRCP includes specific conservation measures to ensure compensatory mitigation of impacts on all managed wetlands and managed seasonal wetlands and additional measures to conserve emergent wetlands within the Plan Area, specifically through implementation of the following conservation measures:

- CM1: Acquire Lands
- CM4: Develop and Implement Site Specific Wetland and Riparian Restoration Plans
- CM5: Enhance Protected Natural Communities for Covered Species

Impacts on managed wetlands will be compensated through the restoration of one acre of managed wetland or emergent wetland for every acre of managed wetland permanently removed (1:1 ratio or approximately 5 acres). Restored wetlands must be of equal or greater function for covered species habitat and biodiversity than the managed wetlands removed by covered activities. Mitigation must be located in the same CAZ as impacts. Mitigation requirements for managed wetlands are summarized in Table 5–10.

Jurisdictional wetlands portions of managed seasonal wetlands removed by covered activities will be compensated by restoration of vernal pool and swale wetlands at a ratio of 0.5 acre of restore vernal pool and swale for every 1 acre of impacted jurisdictional wetland within managed seasonal wetlands directly removed (ratio of 0.5:1 or about 3.5 acres restored vernal pools and swales for 7 acres of jurisdictional wetlands within managed seasonal wetlands). Restored vernal pool and swale will be of higher ecological function than the impacted jurisdictional wetlands. Mitigation must be in the same CAZ as impacts with the following exceptions: Northern Orchards may also be mitigated in the Cascade Foothills, Sacramento River may be mitigated in any CAZ, and Basin may also be mitigated in Cascade Foothills. Mitigation requirements for managed seasonal wetlands are summarized in Table 5–10.

Overall, the BRCP will result in the replacement of lost managed wetlands and managed seasonal wetlands with high function restored emergent wetlands and vernal pools and swales. The great majority of the managed wetlands and managed seasonal wetlands in the Plan Area are within existing protected lands (about 89 percent of managed wetlands and 97 percent of managed seasonal wetlands; see Table 5–14).

5.7.5 Agricultural Wetlands

Agricultural lands such as rice lands, irrigated croplands, and irrigated pasture may support jurisdictional wetlands, though typically artificial irrigation must be stopped to delineate the jurisdictional extent of wetlands within these lands. Impacts of covered activities on jurisdictional wetlands that may be found within rice lands are roughly estimated as 79 acres and within irrigated cropland and wetlands in pasture are roughly estimated at 22 acres (Table 4–12). Methods used to estimate density of wetlands within each agricultural type are provided in Table 3–16, *Potential Jurisdictional Wetlands and Other Waters in the Plan Area* (see separate file). Note that jurisdictional wetlands are estimated to be 5 percent of impacted rice lands and 1 percent of impacted irrigated cropland and pasture for the purpose of estimating impacts. Actual impacts will be determined at the time project applications are reviewed.

Impacts on rice lands that provide giant garter snake habitat will be compensated by the protection and maintenance of rice lands at 2 times the acreage removed and rice land that supports habitat for other species will be compensated at 1 times the acreage removed. Alternatively, creation of managed wetland designed as giant garter snake habitat at a ratio of 0.2 to 1 may be substituted for rice land habitat acreage to be protected. Jurisdictional wetlands portions of rice lands removed by covered activities will be compensated by restoration of emergent wetland at a ratio of 0.5 times the acreage of impacted jurisdictional wetland within the impacted rice land. Approximately 39 acres of emergent wetland restoration would serve to mitigate loss of jurisdictional wetlands within rice. Restored wetlands will be of higher ecological function than the impacted jurisdictional wetlands. Restoration must be located in the Basin or Sacramento River CAZ. Mitigation requirements for rice lands and wetlands within rice lands are summarized in Table 5–10.

Impacts on irrigated croplands and pasture that provide giant garter snake habitat will be compensated by the protection and maintenance of irrigated croplands or pasture at two times the acreage impacted supporting giant garter snake habitat (2:1 ratio). Impacts on irrigated croplands and pasture that do not support giant garter snake habitat will be compensated by the protection and maintenance of irrigated croplands or pasture at one times the acreage impacted (1:1 ratio). Jurisdictional wetlands portions of irrigated croplands and pasture removed by covered activities will be compensated by restoration of emergent wetland at a ratio of 0.5 times the acreage of impacted jurisdictional wetland within the impacted irrigated croplands and pasture. Restored wetlands will be of higher ecological function than the impacted jurisdictional wetlands. Approximately 11 acres of emergent wetland restoration would serve to mitigate loss of jurisdictional wetlands within irrigated cropland and pasture. Mitigation must be located in

the Basin or Sacramento River CAZ. Mitigation requirements for irrigated croplands and pasture and wetlands within irrigated croplands and pasture are summarized in Table 5–10.

Overall, the BRCP will result in the replacement of lost jurisdictional wetlands within agricultural lands with high function restored emergent wetlands and the protection of agricultural lands that will continue to support jurisdictional wetlands therein (Tables 5–3, 5–5, and 5–26a).

5.7.6 Non-Wetland Waters

Streams, drainage channels, ponds, and open water (mostly large reservoirs and major canals) comprise the non-wetland, "other waters of the United States" in the Plan Area.

5.7.6.1 Streams

Under the BRCP, no permanent direct impacts on natural permanent and intermittent streams are allowed. The BRCP includes avoidance and minimization measures in Chapter 6, *Conditions on Covered Activities* to eliminate or reduce temporary direct and temporary and permanent indirect physical and water quality impacts on streams, see specifically:

- AMM1, Conduct Planning Surveys (including delineation of waters of the United States)
- AMM5, Avoid Siting of Construction Staging Areas and Temporary Work Areas in Occupied Covered Species Habitat
- AMM16, Install Erosion Control Barriers
- AMM19, Implement Wet Weather Erosion Control Plan
- AMM20, Implement Stormwater Pollution Prevention Plan
- AMM21, Implement Additional Avoidance and Minimization Measures and Best Management Practices

The BRCP includes conservation measures to protect and enhance streams in the Plan Area, specifically through implementation of the following conservation measures:

- CM1: Acquire Lands
- CM4: Develop and Implement Site Specific Wetland and Riparian Restoration Plans
- CM5: Enhance Protected Natural Communities for Covered Species
- CM9: Replenish Spawning Gravels for Salmonids
- CM10: Remove, Modify, or Screen Unscreened Diversions
- CM11: Remove Impediments to Upstream and Downstream Fish Passage

Streams within the Plan Area will benefit not only from avoidance of direct and indirect impacts of individual projects, but also from the protection of large portions of their watersheds through the establishment of the BRCP conservation lands system of over 90,000 acres of land that when combined with existing protected lands (i.e., Category 1 PEHL) amounts to over 151,000 acres of land within the Plan Area (Table 5–26a).

5.7.6.2 Open Water (Reservoirs and Major Canals)

No permanent direct impacts on the reservoirs (e.g., Oroville Reservoir, Thermalito Forebay, and Thermalito Afterbay) and major canals (e.g., Cherokee Canal) are allowed under the BRCP (Table 4–4).

5.7.6.3 Ponds

Up to 52 ponds, of an estimated 465 ponds in the Plan Area, may be removed by covered activities under the BRCP (Tables 4–6 and 4–12). The BRCP requires mitigation of these impacts through the protection of one pond for each pond removed (1:1 ratio or 52 ponds). Protected ponds must be of similar size and of equal or greater function for covered species and biodiversity. Alternatively the creation of ponds may be substituted for protection of existing ponds on a per unit basis if protection of existing ponds is determined to be less practicable or effective for covered species. Mitigation ponds may be located in any CAZ that supports modeled western pond turtle or western spadefoot toad habitat. Mitigation requirements for ponds are summarized in Table 5–10.

In addition to the mitigation of impacts on ponds, BCAG is responsible for restoration of 500 acres of giant garter snake habitat, which would support roughly 150 acres of ponds with fringing emergent wetlands. This restoration of ponds for giant garter snake habitat would increase the total acreage of ponds within the Plan Area, since the average size of the 52 ponds removed by covered activities is about 0.48 acres[34] for a total of 25 acres of impact, well under the estimated 150 acres of pond habitat restored as part of giant garter snake habitat.

An additional 28 ponds will be protected under the BRCP to contribute to the conservation of covered species (Table 5–3) and large, but indeterminate, number of ponds will be protected opportunistically in the implementation of conservation measures CM1: Acquire Lands and CM5: Enhance Protected Natural Communities for Covered Species with the acquisition, protection, and management of riparian, emergent wetlands, grasslands, oak woodlands, and oak savanna natural communities.

[34] Average pond size was estimated at 0.48 acre per pond based on 30 random samples from aerial imagery.

5.7.7 Other Wetland Habitats – Seeps

Seeps are wetlands that form under unique conditions of groundwater discharge in the Cascade Foothills and Sierra Foothills CAZs. Seeps will be protected opportunistically and as a priority in the implementation of conservation measures CM1: Acquire Lands and CM5: Enhance Protected Natural Communities for Covered Species with the acquisition, protection, and management of grasslands, oak woodlands, and oak savanna natural communities.

5.8 FUTURE CONDITIONS WITH CLIMATE CHANGE

Global climate change resulting from increased atmospheric concentrations of "greenhouse gases" is occurring now and is expected to continue over the next century (Cayan et al. 2009). Globally, climatic change is predicted to cause an increase in air temperature, a decrease in the annual number of nights that reach freezing temperatures, and an increase in severity of extreme weather events (storms, droughts, heat waves). In turn, many of the predicted atmospheric and physical climatic parameters may cause secondary effects, including sea level rise, increased wildfire frequency and intensity, increased flooding frequency, and changes in species ranges and habitats. Because of the range of potential modeled futures and the different predictive abilities among various climate change models, carbon emission scenarios, output parameters, and spatial scales, any prediction of climatic change at a particular location contains a significant amount of uncertainty (Kueppers et al. 2005, Cayan et al. 2009, Ackerly et al. 2010). Regional climate change estimates predict increasing temperature and decreasing precipitation in the Sacramento Valley over the next century (DWR 2009).

Models of future climate change predict how climatic physical processes are anticipated to change, and do not incorporate the wide range of biological interactions known to be important in determining the distribution of species and ecosystems (Conservation International 2008, Littell et al. 2010). As the various climatic characteristics change across the landscape at different rates, a series of novel climates will occur that have no modern analogs, so it will be impossible to determine how species conservation elements will respond (Williams and Jackson 2007, Ackerly et al. 2010). This means that attempts to use static concepts such as climate envelope models or historical disturbance regimes to predict future species' ranges will become increasingly problematic in a dynamically changing climate that defies categorization (Mote and Salathé, Jr. 2010). Even larger changes may become apparent as thresholds that cause immediate and irreversible changes to ecosystems (Fagre et al. 2009).

Results of predictive climate change models indicate that California's summers will generally become hotter and drier, and winters will become warmer and wetter, over the next century (California Climate Change Center 2006). Warmer and wetter winters will result in a greater proportion of precipitation being received as winter rain rather than snow in the Sierra Nevada and these effects on the snow pack will be greatest at elevations between 6,500 and 9,000 feet (Maurer et al. 2007, Pierce et al. 2008, Pierce and Cayan 2012). Such a shift would result in less snow pack and earlier runoff from watersheds such that late spring and summer stream flows

could decline substantially (Maurer et al. 2007). Additionally, there is an increased likelihood of large flood events (Das et al. 2011, Dettinger et al. 2011).

Applications of future climate change models to natural systems have only been attempted for a few species and ecosystems in California. A number of ecological responses to climate change could have specific effects on species. For example, the timing of seasonal events, such as migration, flowering, and egg laying, may shift earlier or later (Walther et al. 2002; Forister and Shapiro 2003; Root et al. 2003; Root et al. 2005). Such shifts may affect the timing and synchrony of events that must occur together, such as insect emergence and nectar availability. Range and distribution of species and natural communities may shift (Parmesan et al.1999; Pimm 2001; Walther et al. 2002; Easterling et al. 2000). Range is the area over which a species occurs or potentially occurs, whereas distribution refers to where a species is located within its range. Range shifts are a particular challenge for narrowly distributed species that have restricted ranges due to urban growth, topography, soil type, and other factors. Historically, most species could shift their ranges across the landscape following natural gradients and ecological corridors. Today, urban and rural development form barriers to the movement of many species across the landscape. Species and natural communities that occur only within a narrow range of environmental conditions (e.g., BCM) are particularly vulnerable to changing climate because they likely have nowhere to move if their habitat becomes less suitable (Shainsky and Radosevich 1986; Murphy and Weiss 1992; Thorne 2006).

Ecological processes are also affected by climate change. Increases in disturbance events, such as fire and flooding are predicted to result from climate change and could affect the distribution of disturbance-dependent land cover types (Brown and Hebda 1998; Lenihan et al. 2003; Fried et al. 2004; California Climate Change Center 2006; Rogers and Westfall 2007). An increase in the frequency and intensity of disturbance could increase the likelihood that these events will injure or kill individuals of covered species, many of which are already rare. Events that occur with unpredictable or random frequency (called stochastic events) such as those describe above can have an inordinately negative effect on rare species.

Changes in ecological conditions resulting from climate change can affect the number and density of individuals found in a particular location; such change may be triggered in large part by changes in resource availability associated with an increase or decrease in precipitation (Martin 1998; Dukes and Mooney 1999; Walther et al. 2002; Lenihan et al. 2003; Millar et al. 2006; Pounds et al. 2006). Changes such as these may benefit one species at the expense of another.

Over much longer time periods, natural selection may result in changes to the outward appearance and behavior of species. Changes in climate may favor different adaptive strategies or physical traits that may lead to genetic shifts (Davis and Shaw 2001). An example of this would be a shift to smaller average body size of certain mammals to use limited food sources for maintenance rather than growth.

For natural communities and species, the effects of global climate change are highly uncertain due to different models producing estimates that differ in magnitude and direction and because the models do not take into account biological interactions or individualistic responses of species. However, despite the uncertainty in the predicted magnitude and direction of climate change, it is anticipated that beyond some climatic threshold that there will be significant but unpredictable changes in the distributions of communities and species. Though the specific changes to species distributions may not be predictable, there are well accepted principles of conservation biology that are applicable to a broad range of redistribution outcomes. The primary principles are the protection and management of large, interconnected units of conservation lands with the connectivity situated geographically to allow for species movement and redistribution along latitudinal and altitudinal gradients.

5.8.1 Stream and Riparian Habitat

Future climate change can affect the riparian forest natural community of the valley and foothills in a number of ways. Increased variability in precipitation will change the timing, duration, and magnitude of stream flows, resulting in more intense winter flooding and greater erosion of riparian habitats (Field et al. 1999, Hayhoe et al. 2004). Increased variability in precipitation can also produce prolonged droughts, making riparian vegetation more prone to fires.

The extent of riparian habitats will likely be reduced as duration, timing, and volume of stream flow are altered. As more precipitation in the mountains falls as rain rather than snow, and as the snowpack melts earlier, an increased number of flashflood and high-flow events would be expected, leading to earlier and more rapid runoff (California Climate Change Center 2006). This change in the precipitation patterns would result in alterations in the surface and groundwater hydrology of the streams and width of riparian corridors, as well as losses, or shifts in species composition, of riparian vegetation. Riparian vegetation associated with intermittent streams may be impacted if the stream no longer maintains sufficient water later in the season to support riparian vegetation. Fish and other wildlife species that rely upon a sustained period of available water will be impacted. Protection of large areas of riparian forest under the BRCP provides the opportunity to maintain this habitat in the face of potential adverse effects of climate change. Restoration of riparian forest as mitigation under the BRCP provides the opportunity to adjust restoration designs as more is learned about changes to stream and floodplain dynamics during implementation.

In relatively unregulated streams (e.g., Butte Creek, Big Chico Creek) alterations in stream flow could affect the extent and quality of habitat for resident and anadromous fishes. For example, if flows are reduced sufficiently during salmonid migration periods, upstream passage of adults to spawning beds could be impeded and water temperatures could become unfavorable for incubation of eggs and rearing of young. The abundance and movement patterns of fish in the Feather River and Sacramento River could also be affected by changes in dam operations that may be necessitated by altered timing of water supplies (Mehta et al. 2011). Protection and

enhancement of streams under the BRCP provides the opportunity to improve fisheries habitat in the face of potential adverse effects of climate change on stream habitats.

Grassland and Vernal Swale Complex

Grassland models that predict increased residual soil moisture due to early senescing of annual grasses do not consider the considerable effects of native and exotic summer-flowering annuals that are present within the grasslands (Gerlach 2004, Reever-Morghan et al. 2007). The most decisive factor determining grassland presence or absence is soil water accessibility (Bartoleme et al. 2007). In the Plan Area, precipitation greatly influences soil water level and accessibility at any given location. Large seasonal and annual variations in rainfall amount and pattern typify this region, and valley grasslands respond significantly to such stochastic fluctuations. For example, an area dominated by lush grasses in a rainy year may exhibit a vivid display of wildflowers the following spring. Increased incidence of fire in grasslands may result in changes to species composition in the grassland and in type conversion of oak woodland and savanna to grassland. It is expected that valley grasslands could be greatly influenced, perhaps in unexpected ways, by climate change.

Implementation of all BRCP goals and objectives for grassland, especially the creation of large, interconnected conservation lands, will substantially improve the flexibility and resilience of this natural community and contribute to its persistence.

Predictions for vernal pools are heavily caveated (Pyke 2004, 2005) and are products of direct precipitation models (Pyke 2004) that do not account for significant groundwater contributions in hard-pan vernal pools or the unique hydrology of clay-pan vernal pools (Environmental Science Associates 2005, Williamson et al. 2005, Rains et al. 2006, 2008). Changes in precipitation patterns and increased evapotranspiration resulting from increasing temperatures would be expected to result in vernal pools and swales supporting saturated and ponded conditions less frequently and for shorter duration in average years with greater variation among years. Since vernal pools are tied to unique soil conditions there is no space for shifting distribution of this natural community. Protection of large expanses of grasslands with vernal swale complex under the BRCP provides the best opportunity to ensure the persistence of this natural community and the species dependent on it. Restoration of vernal pools as mitigation under the BRCP provides the opportunity to adjust restoration designs as more is learned about changes to the regional climate during implementation.

5.8.2 Oak Woodland and Savanna

Modeled responses for blue oak woodlands in California are complex, with variation in effects resulting from the choice of model (Kueppers et al. 2005, Crimmins et al. 2011), microclimate (Ackerly et al. 2010), and competitive interactions (Conservation International 2008). Using a future climate scenario based on a regional climate model, Kueppers et al. (2005) found that potential ranges of blue oak and valley oak in California, shrink considerably (to 59% and 54% of current potential range sizes, respectively) and shift northward. The regional climate model

used in this study predicted greater warming and larger precipitation decreases during the growing season than the global climate model in these species' potential ranges. Blue oak, the dominant species of blue oak woodlands and savanna and a component of mixed oak woodlands, are sensitive to temperature and precipitation at many stages of their life history. Tree-ring data show greater growth in years with greater mean annual precipitation, but with geographic variation in the strength of this effect. Blue oak seedlings are sensitive to soil moisture availability, with higher mortality and lower growth where competition with annual plants leads more rapidly to growing season soil moisture deficits. (Kueppers et al. 2005).

Increased incidence of fire in oak woodland and savanna may result in changes to species composition within this community and in type conversion of oak woodland and savanna to grassland.

Protection of oak woodland and savanna in large and interconnected reserves under the BRCP provides the opportunity for shifting distributions of the species that make up this community within the Plan Area and to areas outside the Plan Area. The eastern boundary of the Plan Area generally delineates the upper limit of the current oak woodland communities and, therefore, upslope re-distribution of oak woodland communities or component species would result in new stands of oak woodland outside the Plan Area. Upslope areas immediately east of the Plan Area support mostly Ponderosa pine forest and chaparral and it is not certain where soil conditions and competition from species in these communities may prevent upslope redistribution of the oak woodland community.

5.8.3 Agricultural Habitats and Climate Change

Increased variability in precipitation is likely to reduce the reliability of water supply available for irrigating crops at critical times of the year; and crop types cultivated may change with elevated ambient temperatures. Climate change effects on agricultural systems include biological effects on crop yields and additional complexity related to land use planning, market-driven factors, and economic factors both regionally and globally (Jackson et al. 2009). For example, agricultural planning for Yolo County to adapt to climate change indicates that over the next 50 years, certain warm season crops (tomatoes, cucumbers, sweet corn, and peppers) are expected to diminish, while hot season crops (melons, sweet potatoes) are expected to increase (Jackson et al. 2009). Many other potential changes in farm management practices in response to climate change (increases in use of drip irrigation, cover cropping, low-tillage techniques, and organic production) could affect agricultural habitat conditions and, thereby, habitat conditions for covered species.

Rice, irrigated cropland, and irrigated pasture are the primary agricultural types that provide habitat for covered species in the Plan Area. Threat to irrigation water supply is the key impact of climate change on these crops, but increasing temperature may also affect cropping patterns. Protection under the BRCP of agricultural practices that provide habitat for covered species will ensure more areas for these species to shift their distributions in response to climate change.

5.8.4 Managed Wetland

Increased variability in precipitation is likely to reduce the reliability of water supply available for managed wetlands at critical times of the year. Potential reductions of and changes in timing of flows in local and regional distribution systems will likely reduce the amount of water available for managed wetlands and would adversely affect management actions, such as flooding at precise times of the season, to provide habitat and food for covered species and for waterfowl. BRCP actions to protect giant garter snake rice habitat will maintain the availability of these existing habitat areas and actions to restore habitat for giant garter snake will increase the extent of managed wetlands in the Plan Area and ensure more habitat for giant garter snake to respond to the effects of climate change.

CHAPTER 6. CONDITIONS ON COVERED ACTIVITIES

6.1 INTRODUCTION

As required by Endangered Species Act (ESA) (Section 10[a][2][A][ii]) and Fish and Game Code Sections 2820 (a)(6) and 2820(f), this Plan includes measures to avoid and minimize take of covered species. These measures to avoid and minimize impacts are described as *avoidance and minimization measures (AMMs),* and are designed to meet the above referenced state and federal requirements.

Regional avoidance and minimization measures reduce the need for individual projects to avoid and minimize impacts at the project scale, allowing for streamlining of regulatory requirements. The Butte Regional Conservation Plan (BRCP) assumes that take will result from individual covered activities and that this take will be mitigated through the conservation strategy (Chapter 5, *Conservation Strategy*). The conditions on covered activities (AMMs) described in this chapter do not supersede requirements by other agencies and are not intended to provide a basis for non-compliance with other applicable design guidelines required by other federal, state, and local agencies.

The AMMs include such actions as avoidance of species occurrences and habitat through project design, timing of construction activities in the vicinity of occupied habitat to avoid times when a covered species is present, and avoiding habitat removal during breeding periods. These measures may also avoid or minimize the potential for take by reducing effects on covered and other native species by altering construction plans or activities (e.g., modifying construction footprints, covering open trenches, and using materials to reduce runoff from construction sites) or by modifying design elements of projects to reduce operational effects (e.g., noise, lighting, and urban runoff). The avoidance and minimization measures presented here are required BRCP elements and complement the protection of species occurrences and habitat, restoration of habitat, enhancement of habitat, management of conservation lands, and other beneficial actions described in the conservation measures in Sections 5.4.1 through 5.4.3. In addition to the conditions described in this chapter to avoid and minimize impacts, covered activities may also require payment of mitigation fees (see Chapter 10, *Implementation Cost and Funding*). For additional information on project-level implementation, see Section 8.7, *Process for BRCP Implementation* in Chapter 8, *Plan Implementation.*

6.2 CONDITIONS ON COVERED ACTIVITIES

Conditions on covered activities (AMMs) are presented below for permanent development projects, specific species, transportation projects, and recurring maintenance activities.

6.2.1 Permanent Development Projects Inside and Outside of Urban Permit Areas (UPAs)

This section describes the avoidance and minimization measures that will be implemented during the design and construction phases of covered permanent development projects described in Sections 2.2.1 through 2.4.1. These avoidance and minimization measures are presented in a roughly sequential order beginning with planning surveys to identify habitat conditions, followed by preconstruction surveys to identify presence or absence of covered species, the establishment of Activity Exclusion Zones to protect occupied sites during specified periods, and construction and design measures to minimize the effects of the covered activity on species and habitat.

6.2.1.1 Biological Surveys and Evaluations

Surveys and evaluation of existing information are required to identify the biological resources at permanent development project sites and surrounding areas to determine which avoidance and minimization measures will be implemented. Two types of surveys are required at different times in the planning of covered activities, planning surveys and preconstruction surveys. Planning surveys are conducted prior to design of projects to aid in the project design process and allow for development and implementation of an impact avoidance and minimization plan for each project. Preconstruction surveys are conducted immediately prior to construction activities, provide timely and full spatial information on the presence of resources, and support the implementation of avoidance and minimization measures.

AMM1: Conduct Planning Surveys. Planning surveys are reconnaissance-level and resource-specific surveys conducted for the purpose of identifying, documenting, and assessing habitat conditions and the presence or potential presence of covered species to support the design process for proposed projects. Planning survey requirements are presented in Table 6–1, *Planning Survey Requirements* (see separate file). Planning surveys will be conducted prior to the design phase for all permanent development covered activities described in Chapter 2, *Covered Activities* that could result in impacts on the biological resources listed in Table 6–1. Results of planning surveys will be reported and submitted as described in Section 8.2, *Compliance and Progress Reporting Requirements*.

Project proponents must conduct planning surveys for the covered species specified in Table 6–1 within and adjacent to project sites. Project proponents must delineate Clean Water Act (CWA) Section 404 jurisdictional wetlands and other waters of the United States within project sites. Project proponents are required to delineate Section 1602 Fish and Game Code jurisdictional riparian habitat within project sites. The BRCP Land Cover Geographic Information Systems (GIS) database and any subsequent revisions adopted by Butte County Association of Government (BCAG) as the Implementing Entity is the base resource for identifying land cover types at project sites. As indicated in Table 6–1, project proponents may use the BRCP Land Cover GIS database or conduct their own site surveys to identify land cover types for the purpose of mapping at a higher resolution and greater accuracy than the existing BRCP Land Cover GIS

database. Land cover type mapping categories will be used to determine acreages for calculation of the Base Fee and the Riparian Fee (see Chapter 10, *Implementation Costs and Funding Sources*, for fee structure). The Emergent Wetland Fee and Vernal Pool Fee for impacts on Section 404 jurisdictional wetlands will be based on acreage results of each project's Section 404 delineation.

Based on results of Land Cover GIS database or site survey reviews, project proponents will determine if suitable covered species habitats are present and if there is a need to conduct more focused planning surveys for the covered species as indicated in Table 6–1.[1] The likelihood for the presence of covered species habitat will be informed by the land cover types identified within and adjacent to project sites described above. Surveys will be required for a covered species if the conditions described in the "Project Site Conditions Requiring Surveys" column of Table 6–1 are identified in the site surveys or review of the BRCP Land Cover GIS database.

All covered species planning surveys will be conducted during the specified time period indicated in Table 6–1. All planning surveys will be conducted by qualified and permitted (as necessary) biologists using the methods indicated in Table 6–1 or alternative methods approved by BCAG, U.S. Fish and Wildlife Service (USFWS), and California Department of Fish and Wildlife (CDFW).

Following completion of planning surveys and based on the results of those surveys, project proponents must prepare an impact avoidance and minimization plan that adopts the applicable BRCP AMMs into the project design and construction (see AMM3-AMM26).

AMM2: Conduct Preconstruction Surveys. Preconstruction surveys are species-specific surveys of project sites and surrounding areas used, in addition to the planning surveys, to determine the impact avoidance and minimization measures that must be implemented to address the species found (see AMM3-AMM26). Preconstruction surveys are conducted after project design is complete and prior to project construction; the purpose of which is to provide timely information such that disturbance related effects of construction (e.g., the harassment of nesting birds) can be avoided or minimized. Preconstruction surveys will be conducted in and adjacent to permanent development covered activity project footprints if, based on results of planning surveys (conducted under AMM1, *Conduct Planning Surveys*), review of aerial imagery, and field reconnaissance surveys, the land cover types and other site conditions indicated for the species listed in Table 6–2, *Survey Area and Timing of Preconstruction Surveys for Permanent Development Projects* (see separate file) are present or species occurrences have been directly observed. Preconstruction surveys are not required for some covered species listed in Table 6–2 because 1) either planning surveys have been conducted for those species and appropriate avoidance and minimization actions are taken during project planning/design or 2) the species are assumed to be present (i.e., habitat is occupied) and are assumed to be impacted by project

[1] Suitable habitat for the covered species is described for each species in Appendix A, *Covered Species Accounts*.

implementation (i.e., take is permitted). Results of preconstruction surveys will be reported and submitted as described in Section 8.2.

Surveys will be conducted for the covered species indicated in Table 6–2, with the exception described below, for projects which contain the appropriate habitat and outside of the project site within the distance of the project site boundary specified in Table 6–2. This distance determines the survey area as measured from the edge of project site boundaries for each potentially occurring covered species. Survey methods for lands outside the project site may differ from the methods used at the project site. Land outside of the project site that is not accessible by the project proponent will be surveyed using the most suitable methods (e.g., searching for occupied bald eagle nest sites from public road access). The survey area outside the project site may be reduced based on a qualified biologist's professional opinion with concurrence from USFWS and CDFW using such parameters as line-of-sight, topography, and land use to determine the potential for the proposed project to result in adverse effects on specific species (e.g., harassment from construction noise and lighting). No surveys are required for habitat that occurs beyond the distance specified in Table 6–2 for each of the covered wildlife species. All surveys will be conducted during the specified time period indicated in Table 6–2. All preconstruction surveys will be conducted by qualified and permitted (as necessary) biologists using the methods indicated in Table 6–2 or alternative methods approved by BCAG, USFWS, and CDFW.

If take and impacts on covered species are avoided, then preconstruction surveys will not be required for covered species that would otherwise require surveys if the project proponent assumes the species is present, establishes set-backs from patches of the species assumed occupied habitat as described under AMM3, *Avoid and Minimize Impacts on Covered Species*, and implements all other avoidance and minimization measures applicable to the species described in Sections 6.2.1 through 6.2.4 (e.g., assuming that all trees on and adjacent to a project site support nesting Swainson's hawks during the nesting season and thus implementing all applicable Swainson's hawk avoidance and minimization measures to the entire area of nesting habitat).

6.2.1.2 Project Design

Project design measures are used to adjust project footprints or to incorporate habitat elements into project design that further avoid or reduce effects on covered and other native species.

AMM3: Avoid and Minimize Impacts on Covered Species. Permanent development projects will be designed to limit take of the covered species and impacts (i.e., removal) on their habitat listed in Table 6–3, *Take Limits for Covered Species and Avoidance and Minimization Criteria for Covered Species* (see separate file) in accordance with the indicated take limits. Criteria for determining avoidance of take and direct impacts on habitat for these species are also described in Table 6–3. Distances for avoidance and minimization criteria identified in Table 6–3 may be shorter (i.e., development under covered activities may be conducted closer to the species occurrence) if requested by the project proponent and approved by the BCAG with the

concurrence of USFWS and CDFW. Various site-specific factors may indicate appropriate reasons for shorter distances of separation between construction and occurrences including: existing development and roads at a shorter distance from species occurrences than provided in Table 6–3, indicating that the species may be habituated to and unaffected by construction and other activities; barriers, such topographic relief and tree cover between the development site and the species occurrence that may remove or greatly attenuate any effects of the development on the species occurrence; and existing hydrologic barriers or run-off and erosion control measures that eliminate any adverse watershed effects on covered plant and fairy shrimp occurrences.

Covered activities must avoid impacts on patches of cottonwood-willow forest habitat of 50 acres or larger that would result in reducing the total patch size to less than 50 acres.

AMM4: Avoid and Minimize Impacts on Sensitive Wetland and Riparian Habitats. To the extent consistent with the project purpose, projects will be designed to achieve the criteria to avoid and minimize direct and indirect impacts on wetland and riparian land cover types presented in Table 6–4, *Design Criteria for Avoiding Permanent Direct Impacts of Permanent Development Projects on Sensitive Wetland and Riparian Land Cover Types* (see separate file). For projects that are designed such that the criteria in Table 6–4 are achieved, permanent direct impacts on the wetland and riparian land cover types addressed in Table 6–4 are assumed to be avoided.

AMM5: Avoid Siting of Construction Staging Areas and Temporary Work Areas in Occupied Covered Species Habitat. Permanent development projects will be designed to site construction staging and other temporary work areas in habitat areas that will ultimately be permanently removed by the permanent development activities. If construction staging and other temporary work areas must be located outside of project footprints, they will be located either in areas that do not support habitat for covered species or that are easily restored to prior ecological functions (e.g., grassland). Construction staging and other temporary work areas that must be located outside of project footprints will be sited in areas that avoid impacts on:

- Cottonwood-willow riparian forest, valley oak riparian forest, willow scrub, and dredger tailings with riparian land cover types
- Emergent wetland,
- Vernal pools and other seasonal wetlands,
- Habitat occupied by covered plant, invertebrate, amphibian, and reptile species,
- Occupied western burrowing owl burrows, and
- Covered bird species nest sites during the breeding season.

Establishment of temporary work areas outside of the project footprint will require surveys to be conducted to determine if any of the biological resources listed above are present.

Following completion of project construction, temporary work and staging areas will be restored to a condition of equal or greater habitat function than the affected habitat. Restoration of

vegetation in temporary work and staging areas will use clean seed mixes approved by BCAG that are free of noxious plant species seeds and reestablishment of vegetation will be monitored to ensure baseline habitat conditions are restored.

AMM6: Establish Permanent Habitat Buffers along Stream and Riparian Corridors.

Project proponents will establish permanent habitat buffer zones to protect biological resources associated with perennial and intermittent streams as identified in the BRCP GIS Land Cover database. Impact avoidance and minimization requirements for each of these perennial and intermittent streams are described below. Also described for this AMM are authorization for narrower buffer zones and allowable activities within buffer zones.

Most streams and riparian habitat within the 2013 city limits of the Cities of Biggs, Chico, Gridley and Oroville are closely hemmed in by existing development. Human activities adjacent to this habitat are an existing condition that has resulted in disturbance of wildlife and new development is not expected to substantially change these existing effects. Within the city limits of these cities, buffer zone widths for perennial and intermittent streams and associated riparian habitat for new in-fill development will be determined by existing city ordinances and policies. The City of Chico General Plan Action OS 2.5.1 states: "Consistent with the City's Municipal Code, require a minimum 25-foot setback from the top of creek banks to development and associated above ground infrastructure as part of project review, and seek to acquire an additional 75 feet. In addition, require a larger setback where necessary to mitigate environmental impacts." The Cities' project approval processes will be used with involvement of BCAG. The BRCP standards for buffers will remain in effect should applicable policies of the Cities or city limit boundaries change in future years.

Perennial Streams and Major Conveyance Channels. New residential, commercial, public, and industrial facility projects outside of the 2013 city limits of the Cities of Biggs, Chico, Gridley and Oroville will be designed to include a minimum 100-foot permanent habitat buffer zone (set-back easement) from the top of bank along both sides of all natural perennial stream corridors as defined in the BRCP GIS database and a minimum 25-foot permanent habitat buffer zone from the edge of remaining or restored riparian forest and scrub if riparian forest/scrub is wider than 75 feet from the top of the stream bank. For major water conveyance channels that support woody riparian vegetation a minimum 25-foot permanent habitat buffer zone will be established from the edge of the existing or restored riparian forest and scrub. Permanent habitat buffers apply to stream and riparian habitat areas that remain following construction of permanent development projects (note the allowable level of impacts on riparian habitats by UPA and Conservation Acquisition Zones (CAZ) in Table 4-4, *Maximum Extent of Natural Communities and Land Cover Types Removed (Permanent Direct Effects) with Implementation of the Covered Activities in CAZs and UPAs*). The habitat buffer will be measured from the top of the stream/channel bank or from the edge of woody riparian vegetation (i.e., canopy drip line), and extend perpendicular to the bank/riparian vegetation. Where existing development is already within 100-feet of a stream, the habitat buffer will be established within the entire intervening

space between the development and the stream unless a narrower buffer is authorized (see below).

Intermittent Streams. New residential, commercial, public, and industrial facility projects outside of the 2013 city limits of the Cities of Biggs, Chico, Gridley and Oroville will be designed to include a minimum 50-foot permanent habitat buffer zone (set-back easement) from the top of bank along both sides of all natural intermittent stream corridors as defined in the BRCP GIS Land Cover database and a minimum 25-foot permanent habitat buffer zone from the edge of existing or restored riparian forest and scrub if riparian forest/scrub vegetation is wider than 25 feet from the top of the stream bank. Permanent habitat buffers apply to stream and riparian habitat areas that remain following construction of permanent development projects (note the allowable level of impacts on riparian habitats by UPA and CAZ in Table 4–4). The habitat buffer will be measured from the top of the stream/channel bank or from the edge of woody riparian vegetation, and extend perpendicular to the bank/riparian vegetation. Where existing development is already within 50-feet of an intermittent stream, the habitat buffer will be established within the entire intervening space between the development and the stream unless a narrower buffer is authorized (see below).

Authorization for Narrower Buffer Zones. Project proponents may request narrower buffer zones than described in this AMM and such zones may be allowed if approved by BCAG with the concurrence of USFWS and CDFW. Within the 2013 city limits of the Cities of Biggs, Chico, Gridley and Oroville, buffer zone widths are determined by the process described above in this AMM.

Allowable Activities/Facilities in Buffer Zones. No above ground project construction-related activities or placement of above ground structures will be allowed within the buffer zone. Below ground facilities are allowable in the buffer zone such as pipelines, electrical lines, and other utilities. Public and private roads at stream crossings and maintenance access roads are allowed within the buffer zones. Flood control and other municipal maintenance activities are allowed in the buffer zones. Buffer zones adjacent to residential permanent development projects will be designed to control access by humans and pets (see AMM7, *Design Developments to Minimize Impacts at Urban-Habitat Interfaces*).

AMM7: Design Developments to Minimize Impacts on Habitat at Urban-Habitat Interfaces. Where residential, commercial, public, industrial, and agricultural services facility projects are implemented adjacent to protected natural communities or natural communities that are expected to be protected under the BRCP in the future, urban-habitat interface elements will be incorporated into project design to minimize the impacts of the development on adjacent protected habitat areas, including habitat areas expected to be protected in the future. Where agricultural lands are protected under the BRCP that support habitat for covered species that are not tolerant of human disturbances, urban-habitat interface elements will also be incorporated into project design to minimize the impacts of development on these agricultural habitat lands. Impacts on adjacent habitat at urban-habitat interfaces result from:

- Human activities such as noise and visual disturbances that diminish the ability of covered and other native wildlife to use the habitat.
- Increased numbers of stray dogs and cats in adjacent habitats that harass and kill covered and other native wildlife species.
- Increased levels of direct habitat disturbances associated with increased human access to habitats (e.g., destruction of vegetation and injury or mortality of wildlife associated with use of off-road vehicles in habitat).
- Increased incidence of invasive plants and animals due to proximity of human sources (e.g., garden varieties and exotic pets).

BCAG must approve the design of all urban-habitat interface elements for covered activities. The following are examples of urban-habitat interface design elements and activities that could be incorporated, as applicable, into residential, commercial, public, and industrial, and agricultural services facility development projects.

- Place lot frontage and roads at the urban-habitat interface rather than abutting the backs of lots against the conservation land boundary to create the conservation lands as the "communities' front yard" promoting community policing and civic pride in the resource.
- Design roads, bike paths, and trails such that they minimize the likelihood for human disturbance of habitat areas and also promote community policing of the habitat areas.
- Establish access points to control entry of people and pets into habitat areas.
- Prevent the dumping of trash and lawn clippings into adjacent habitat areas.
- Shield adjacent habitat areas from visual disturbances that may interfere with normal wildlife behavioral patterns.
- Design development drainage systems and implement appropriate best management practices (BMPs) to avoid discharges of urban runoff into sensitive habitat areas.
- Design development lighting to avoid projecting light into adjacent habitat areas or use low-glare lighting to minimize lighting impacts on habitat.

AMM8: Implement Standard Urban Stormwater Management Plans. Project proponents for permanent development facility projects within UPAs must prepare and implement stormwater management plans consistent with the approved National Pollutant Discharge Elimination System (NPDES) permit for the jurisdiction within which the activity is implemented. The stormwater management plan must incorporate, at a minimum, either a volumetric or flow-based treatment control design standard, or both, as specified in the NPDES permit, to mitigate (infiltrate, filter, or treat) stormwater runoff. Treatment control BMPs set forth in the proposed project plans, shall meet the design standards set forth in the stormwater management plan.

6.2.1.3 Construction

Construction measures are on-site activities implemented during the construction phase of covered activities to avoid or minimize construction-related effects on covered species.

AMM9: Establish Activity Exclusion Zones for Nesting/Breeding Birds. Where preconstruction surveys indicate that nesting/breeding covered bird species listed in Table 6–5, *Activity Exclusion Zones* (see separate file) are present and are using habitat in or adjacent to the project site as indicated in Table 6–5 (or where presence and use is assumed based on results of planning surveys), direct impacts of construction-related activities on the occupied sites will be avoided through the establishment of activity exclusion zones. The establishment of activity exclusion zones is not required if no construction-related disturbances will occur within the activity exclusion periods indicated in Table 6–5.

An exclusion zone will be established around occupied habitat according to the distances indicated for each species in Table 6–5, the boundaries of which will be clearly marked with standard orange plastic construction exclusion fencing or its equivalent. The activity exclusion zones can be reduced through consultation with a qualified biologist and with concurrence from USFWS and CDFW based on line-of-sight, topography, land uses, type of disturbance, ambient noise and disturbance levels, and other appropriate factors. No project activities (e.g., vehicle use, storage of materials and equipment) will be permitted within activity exclusion zones during the time periods specified in Table 6–5 or until a qualified biologist determines that the risk of impact on individuals of the covered species is sufficiently avoided or minimized (e.g., young birds have fledged and are capable of independent survival and nests sites are no longer active).

AMM10: Establish Activity Exclusion Zones for Covered Plant Species. Where preconstruction surveys indicate that a covered plant species listed in Table 6–5 is present in or adjacent to the project site as indicated in Table 6–5 and for which take is not permitted under the conditions specified in Table 6–3), direct and indirect impacts of the project on the species will be avoided through the establishment of activity exclusion zones. Activity exclusion zones for covered plant species will be established around each occupied habitat site, the boundaries of which will be clearly marked with standard orange plastic construction exclusion fencing or its equivalent. Establishment of activity exclusion zones is not required if no construction-related disturbances will occur within the activity exclusion distances indicated in Table 6–4. The size of activity exclusion zones can be reduced through consultation with a qualified biologist and with concurrence from USFWS and CDFW based on project site-specific conditions.

AMM11: Minimize Impacts on Covered Fish Species. One or more of the covered species may be present in Plan Area streams and rivers at any time of year and thus impacts on fisheries resulting from in-channel construction and recurring maintenance activities cannot be avoided. To minimize impacts of operating equipment used to implement permanent development projects in channels during the greatest periods of risk and life cycle importance to covered fish

species, operation of equipment and placement of structures in stream channels is prohibited from January 1-May 31 in the following channels:

- Pine Creek,
- Singer Creek
- Rock Creek,
- Mud Creek,
- Lindo Channel,
- Big Chico Creek,
- Little Chico Creek,
- Butte Creek,
- Little Dry Creek, and
- Feather River.

See Figure 3–9, *Hydrologic Features in the Plan Area* for locations of these streams. An exception to this AMM is the maintenance of Sycamore Pool along Big Chico Creek in Bidwell Park, which is permitted to continue as has been the ongoing practice.

The prohibition on in-channel impacts during these periods may be adjusted with concurrence of NMFS, USFWS, and CDFW.

AMM12: Confine and Delineate Work Area. Where natural communities and covered species habitat are present, confine land clearing to the minimal area necessary to facilitate construction activities. Clearly identify the boundaries of work areas using temporary fencing or its equivalent. Movement of heavy equipment to and from the project site shall be restricted to established roadways to minimize habitat disturbance.

AMM13: Cover Trenches and Holes during Construction. To prevent injury and mortality of covered and other native wildlife, all open trenches and holes associated with implementation of covered activities will be covered or provided with escape ramps during non-working hours. All open trenches and holes will be inspected immediately prior to filling and any trapped wildlife removed and released by a qualified biologist.

AMM14: Control Fugitive Dust. Water will be spread on work sites consistent with the Butte County Air Quality Management District's requirements and as needed to minimize spread of dust to habitat on adjacent lands.

AMM15: Conduct Worker Training. All permanent development facility project construction personnel will participate in a worker environmental training program that will educate workers regarding the covered species and their habitats, the need to avoid impacts, state and federal

protection, and the legal implications of violating environmental laws and regulations. At a minimum, this training may be accomplished through "tailgate" presentations at the project site and the distribution of informational brochures, with descriptions of sensitive biological resources and regulatory protections, to construction personnel prior to initiation of construction work.

AMM16: Install Erosion Control Barriers. Where ground disturbing activities associated with implementation of permanent development projects will potentially result in runoff of sediment or other materials into emergent wetland, riparian, vernal pool, or other wetland or aquatic habitats (e.g., stream channels), erosion control barriers will be installed as needed to prevent sedimentation or contamination of these habitats. Erosion control materials shall be free of plant seeds and other propagules to prevent introductions of nonnative plant species. Erosion control materials may include coir (coconut husks), jute (fibers from the plant genus *Chorchorus*), straw or excelsior (fine wood fibers, usually aspen), or other combinations of these types of products. Note that jute may not be used in areas with giant garter snake because of the risk of entanglement (see AMM25, *Minimize Take and Impacts on Habitat of Giant Garter Snake*).

AMM17: Night-Time Lighting of Project Construction Sites. With the exception of permanent development project sites surrounded by existing developed areas and sites that require lighting to maintain public safety, all lights for night-time lighting of project construction sites will be directed into the project construction area and will minimize the lighting of natural habitat areas adjacent to the project construction area.

AMM18: Implement Spill Prevention, Control, and Counter Measure Plan to Eliminate or Minimize Sources of Contaminants. Each entity implementing a permanent development facility project will prepare and implement a Spill Prevention, Control, and Counter Measure Plan (SPCC). The SPCC will to identify all sources of contaminants (e.g., leaking fuel tanks or chemical tanks) at construction sites and eliminate or minimize the potential for such substances to enter ground and surface waters.

AMM19: Implement Wet Weather Erosion Control Plan. Each entity implementing a permanent development facility project that will leave soil disturbed during the rainy season (i.e., October 1 through April 15) will prepare and implement an approved Wet Weather Erosion Control Plan (WWECP) consistent with the local jurisdiction's NDPES requirements. The WWECP must be available 30 days before construction commences. Information to be provided in WWECPs will include, but not be limited to the following information:

- The name, location, period of construction, and a brief description of the project;
- Contact information for the owner and contractor;
- A site map (construction plans may be used) showing the location of erodible land sediment control BMPs that will be implemented for the rainy season; and

- A certification statement that all required and selected BMPs will be effectively implemented.

AMM20: Implement Stormwater Pollution Prevention Plan. Each entity implementing permanent development facility project will prepare and implement an approved Stormwater Pollution Prevention Plan (SWPPP) that identifies BMPs per the requirements of the jurisdiction within which each activity is implemented. Typical BMPs are listed below.

- Placement of trash receptacles situated at convenient locations on construction sites and maintained such that trash and litter do not accumulate on the site or migrate off-site.
- Placement of structural controls such as sediment barriers, filters, and berms.
- Removal of any construction-related debris that falls into streams, or other bodies of water.
- Prohibiting the washing of construction or other vehicles adjacent to a construction site.
- Controlling erosion from slopes and channels through the effective combination of BMPs.

AMM21: Implement Additional Avoidance and Minimization Measures and Best Management Practices. Each entity implementing a permanent development facility project will implement applicable avoidance and minimization measures and BMPs identified in current Central Valley Regional Water Quality Control Board guidelines that are in addition to those required under AMMs 17–21.

6.2.2 Species-Specific Avoidance and Minimization Measures

Additional measures to minimize impacts may be required if direct impacts on covered species cannot be fully avoided. Some of these measures are based on state or federal guidance (e.g., western burrowing owl and giant garter snake); others are standard practices that involve relocating animals out of impact areas in order to avoid mortality. The following are species-specific AMMs.

AMM22: Exclusion of Wintering Western Burrowing Owls. Where preconstruction surveys for permanent development projects indicate occupied western burrowing owl burrows cannot be avoided, the project proponent will prepare and implement an exclusion plan in accordance with guidance for exclusion provided in *Staff Report on Burrowing Owl Mitigation* (DFG 2012; see Appendix E, *Survey Protocols*) such that burrowing owl fatalities are avoided.

AMM23: Install Wire Markers on New or Modified Power Transmission Lines within Greater Sandhill Crane Habitat. Sandhill cranes are known to fly into overhead transmission lines, particularly during periods of low visibility (e.g., foggy conditions), resulting in the injury or mortality of individuals. If preconstruction surveys indicate that new distribution or transmission lines that link solar energy generation facilities or agricultural services facilities to the electrical grid are constructed or modified in height and wire dimensions in habitat traditionally used, or likely to be used, by wintering greater sandhill cranes, transmission wire markers approved by

BCAG will be installed to increase the visibility of these lines to migrating cranes and reduce mortality associated with collision of cranes with power lines. Markers will be installed on suspended wires at regular intervals according to manufacturer's recommendations and as approved by BCAG. Maintenance of power line markers shall be conducted at regular intervals and missing or broken markers will be replaced before September 15 of each year prior to the arrival of migrating cranes in the Plan Area.

AMM24: Prevent Raptor Electrocutions. To reduce the likelihood of electrocution of Swainson's hawk, white-tailed kite, bald eagle and other native raptors in the Plan Area, all new transmission lines associated with solar energy facility and other permanent development projects will be required to comply with raptor-safe power pole design standards for the construction of new power lines as recommended by the Avian Power Line Interaction Committee (APLIC 2006). Wire spacing, installation of electrocution prevention devices, and other design standards will be implemented according to the current Avian Power Line Interaction Committee standards and manufacturer's recommendations. Maintenance of raptor exclusion devices shall be conducted at regular intervals and missing or broken devices will be replaced prior to the arrival of migrating raptors in the Plan Area.

AMM25: Minimize Take and Impacts on Habitat of Giant Garter Snake. Where preconstruction surveys for permanent development projects indicate the presence of suitable habitat for giant garter snake, impacts will be avoided, if practicable, and minimized in all cases. To avoid impacts on giant garter snake aquatic habitat during construction activities there must be no in-water/in-channel activity and a 200-foot no-disturbance buffer from the outer edge of potentially occupied aquatic habitat must be maintained. If impacts of construction activities cannot be avoided, the following measures will be implemented to minimize impacts.

- Restrict all construction activity involving the disturbance to giant garter snake habitat to the snake's active season, May 1 through October 1.
- In areas where construction is to occur, dewater all irrigation ditches, canals, or other aquatic habitat between April 15 and September 30 to remove giant garter snake habitat. Dewatered habitat must remain dry, with no water puddles remaining for at least 15 consecutive days prior to excavating or filling of the habitat. If a site cannot be completely dewatered, netting and salvage of prey items may be necessary to discourage use by snakes.
- Conduct preconstruction clearance surveys using USFWS approved methods within 24 hours prior to construction activities within identified giant garter snake aquatic and adjacent upland habitat. If construction activities stop for a period of two weeks or more, conduct another preconstruction clearance survey within 24 hours of resuming construction activity.
- Confine clearing to the minimum area necessary to facilitate construction activities. Flag and designate as "Environmentally Sensitive Areas" giant garter snake habitat to be

avoided within or adjacent to the project. The marked environmentally sensitive areas shall be avoided by all construction vehicles, other equipment, and personnel.

- If a live giant garter snake is encountered during construction activities, immediately notify the project's biological monitor and USFWS. The monitor shall stop construction in the vicinity of the snake and monitor the snake and allow it to leave on its own. The monitor shall remain in the area for the remainder of the work day to ensure the snake is not harmed or, if it leaves the site, does not return. If the snake does not leave the project site, BCAG will work with USFWS to relocate the snake away from the construction site within three days of reporting the snake's presence at the construction site to USFWS.
- Employ best management practices to minimize disturbances to habitat, including the following:
    - Install temporary fencing to identify and protect adjacent marshes, wetlands, and ditches from encroachment from construction equipment and personnel;
    - Maintain water quality and limit construction runoff into wetland areas through the use of hay bales, filter fences, vegetative buffer strips, or other accepted practices. No plastic, monofilament, jute, or similar erosion control matting that could entangle snakes will be permitted on the project site within 200 feet of snake aquatic or rice habitat.

6.2.3 Transportation Facility Permanent Development Projects

In addition to implementation of other AMMs applicable to transportation facility projects, the following avoidance and minimization measure will be implemented for all roadway construction and maintenance actions.

AMM26: Implement Caltrans Construction Site Best Management Practices (BMPs) to Maintain Water Quality. Entities implementing covered activities involving the construction and maintenance of transportation facilities will implement applicable California Department of Transportation (Caltrans) BMPs (Caltrans 2003). BMPs include, but are not limited to, the following:

- **Preservation of existing vegetation:** Preservation of existing vegetation is the identification and protection of desirable vegetation that provides erosion and sediment control benefits.
- **Stream bank stabilization:** Best management practices will be conducted to stabilize stream banks and reduce the discharge of sediment and other pollutants to minimize the impact of construction activities on streams. Streams included on the Clean Water Act section 303(d) list of impaired waters by the State Water Resources Control Board

(SWRCB) may require specific monitoring to ensure that construction-related increases in sedimentation, siltation and/or turbidity are prevented.[2]

- **Wind erosion control:** Wind erosion control consists of applying water and/or other dust palliatives as necessary to prevent or alleviate erosion by the forces of wind. Dust control shall be applied in accordance with Caltrans standard practices. Covering of small stockpiles or areas is an alternative to applying water or other dust palliatives.
- **Water conservation practices:** Water conservation practices are activities that use water during the construction of a project in a manner that avoids causing erosion and/or the transport of pollutants off site.
- **Sanitary/septic waste management:** Procedures and practices will be used to minimize or eliminate the discharge of construction site sanitary/septic waste materials to the storm drain system or to watercourses.

AMM27: Avoid and Minimize Noise and Other Disturbances from Bridge Construction Activities. Entities implementing bridge construction and replacement activities across flowing stream courses will implement Caltrans noise reduction measures and BMPs (Caltrans 2009). These measures include, but are not limited to the following:

- **Project timing:** In-water work windows should be scheduled to avoid potential impacts on covered fish species based on species movement/migration timing (i.e., avoid in-water work when salmonids are present).
- **Pile placement:** Eliminate or minimize the number of piles placed in the water body or that require in-water work.
- **Pile type:** Minimize the use of steel piles placed in the water body.
- **Pile driving equipment:** Use pile driving techniques that minimize impacts when practicable.
- **Pile size:** Minimize the size of piles as engineering constraints allow.
- **Noise minimization tools:** If in-water work that will create noise levels harmful to fish and wildlife species is deemed unavoidable, use one or a combination of structures and techniques to reduce noise levels to the maximum extent practicable. These structures and techniques include air bubble curtains, cofferdams, isolation casings, and cushion blocks.

[2] Under section 303(d) of the Clean Water Act, states, territories, and authorized tribes are required to develop lists of impaired waters. These impaired waters do not meet water quality standards that states, territories, and authorized tribes have set for them, even after point sources of pollution have installed the minimum required levels of pollution control technology. The law requires that these jurisdictions establish priority rankings for waters on the lists and develop total maximum daily loads (TMDLs) for these waters.

AMM28: Avoid and Minimize Impacts on Bats Roosting on Bridges. Surveys of bridges to be replaced or undergo structural repairs/maintenance will be conducted by qualified biologists using standard visual and acoustic survey methods approved by BCAG. Surveys will be conducted prior to commencement of bridge replacement/repair activities to determine if occupied bat roosts are present. If occupied roosts of special-status bat species are present[3], bridge replacement/repair activities may only be conducted from September 16 to April 14 to minimize impacts on reproductively active females and dependent young. Work may commence prior to April 14 if subsequent surveys have indicated the bats have vacated the roost site.

6.2.4 Recurring Maintenance Activities

This section describes survey and mitigation requirements for recurring maintenance activities associated with permanent development projects and water and irrigation district facilities. In addition to the AMMs below, AMM11, *Minimize Impacts on Covered Activities* also applies to recurring maintenance activities.

AMM29: Cover Trenches and Holes Excavated for Maintenance. Open trenches and holes excavated to perform maintenance on underground pipes and utilities will be covered or designed with escape ramps during non-working hours to prevent injury and mortality of covered and other native wildlife. All open trenches and holes will be inspected immediately prior to filling and any trapped wildlife removed and released by a qualified biologist.

AMM30: Swainson's Hawk and White-Tailed Kite Nest Surveys. Surveys will be conducted before implementing operations and maintenance actions that will result in the pruning or removal of trees that support Swainson's hawk and white-tailed kite nesting habitat to determine if occupied nest sites of these species are present. Surveys are only required for these activities that will be conducted from March 15-August 15. Surveys will use the survey protocol indicated in Table 6–2. If occupied nest sites are present and pruning or removal of the nest tree(s) cannot be avoided, tree pruning and removal will be deferred until the nest is abandoned by adults and young, at which time the tree(s) may be pruned or removed.

AMM31: Minimize Impacts of Water Conveyance Channel Maintenance on Giant Garter Snake. Recurring maintenance activities by local water and irrigation districts covered under the BRCP require removal of vegetation, debris, and sediment from canals and ditches that serve agricultural water users. Conveyance facility maintenance typically occurs from mid-January through April when conveyance canals and ditches are not in service; this timing is during the giant garter snakes inactive period when they may be using underground borrows. To minimize the take of giant garter snake, maintenance of conveyance structures will be limited to clearing one side along at least 80 percent of the linear distance of canals and ditches during each maintenance year (e.g., the left bank of a canal is maintained in the first year and the right bank

[3] Special-status bat species with the potential to occur in the Plan Area include pallid bat, Pacific Townsend's big-eared bat, and greater western mastiff bat (see Appendix B, *Evaluation of Species Considered for Coverage*).

in the second year). To avoid collapses when re-sloping canal and ditch banks that are comprised of heavy clay soils, clearing along both sides of canal and ditch banks is permissible along no more than 20 percent of the linear distance of canals and ditches during each maintenance year. Project specific modifications to this AMM may be made with the approval of USFWS and CDFW.

CHAPTER 7. MONITORING AND ADAPTIVE MANAGEMENT

7.1 INTRODUCTION

This chapter presents the Butte Regional Conservation Plan (BRCP) monitoring program and adaptive management plan. The monitoring program provides the framework within which Butte County Association of Government (BCAG) as the Implementing Entity will develop and implement a monitoring plan for specified BRCP elements as described in Section 7.2.4, *Monitoring Plan Content and Schedule*. The adaptive management plan describes the framework and the processes that will be undertaken by BCAG to adjust BRCP implementation in response to results of BRCP monitoring, directed studies, and relevant new information collected by others over the term of the BRCP.

7.2 MONITORING PROGRAM

This section describes the elements of the BRCP monitoring program. Monitoring can be defined as the "systematic and usually repetitive collection of information typically used to track the status of a variable or system" (Atkinson et al. 2004). The BRCP monitoring program is designed to guide the collection and compilation of relevant data and information necessary to 1) demonstrate compliance with permit terms and conditions, 2) assess the effectiveness of BRCP implementation over time, and 3) ensure that the adaptive management decision-making process described in Section 7.3, *Adaptive Management Plan*, is informed by the best available science.

The purpose of the monitoring program is to periodically assess the status of species and natural communities on BRCP conservation lands as the basis for their ongoing conservation and recovery. By tracking the success of the BRCP protection, enhancement, and restoration activities, the monitoring program will provide the justification for adjusting BRCP implementation over time through the adaptive management process to improve conservation effectiveness and to increase the precision and utility of the monitoring data. As described in Section 7.3, BCAG may also implement or collaborate in directed studies to address specific scientific questions regarding covered species, natural communities, and ecosystem processes to increase the base of knowledge about these resources such that conservation measures can be adaptively implemented to more effectively achieve the biological goals and objectives. While Habitat Conservation Plans (HCPs) and Natural Community Conservation Plans (NCCPs) are not specifically required to include directed studies, the uncertainty regarding the level of anticipated beneficial outcomes for some covered species highlight the need for focused studies and research to better inform BRCP implementation and monitoring.

The monitoring program, in concert with BRCP directed studies, will be designed to provide a means by which information necessary to implement the BRCP over time will be collected and compiled, and that the adaptive management process is informed by the best available science.

BRCP implementation, monitoring, directed studies, and adaptive management are all part of a feedback loop process that is illustrated in Figure 7–1, *BRCP Implementation, Monitoring, Directed Research, and Adaptive Management Feedback Loop* (see separate file).

7.2.1 Regulatory Context

The monitoring framework is consistent with the guidance provided by the U.S. Fish and Wildlife Service (USFWS) and National Marine Fisheries Service (NMFS) Five-Point Policy for HCPs[1] and provisions of the Natural Community Conservation Planning Act (NCCPA)[2] for monitoring the implementation of HCPs and NCCPs. As described in the Five-Point Policy, the monitoring program of a conservation plan should generate information sufficient to guide plan implementation, particularly with respect to the following matters.

"The monitoring program should reflect the measurable biological goals and objectives. The following components are essential for most monitoring protocols (the size and scope of the HCP will dictate the actual level of detail in each item): 1) assess the implementation and effectiveness of the HCP terms and conditions (e.g., financial responsibilities and obligations, management responsibilities, and other aspects of the incidental take permit, HCP, and the IA, if applicable); 2) determine the level of incidental take of the covered species; 3) determine the biological conditions resulting from the operating conservation program (e.g., change in the species' status or a change in the habitat conditions); and 4) provide any information needed to implement an adaptive management strategy, if utilized. An effective monitoring program is flexible enough to allow modifications, if necessary, to obtain the appropriate information."[3]

By regulation, an HCP specifically must incorporate monitoring of conservation measures and the response of covered species to these measures.[4] Likewise, NCCPA provisions and requirements related to monitoring are as follows:

"(f) 'Monitoring program' means a program within an approved natural community conservation plan that provides periodic evaluations of monitoring results to assess the adequacy of the mitigation and conservation strategies or activities and to provide information to direct the adaptive management program. The monitoring program shall, to the extent practicable, also be used to meet the monitoring requirements of Section 21081.6 of the Public Resources Code. A monitoring program includes all of the following:

- Surveys to determine the status of biological resources addressed by the plan, including covered species.
- Periodic accountings and assessment of authorized take.
- Progress reports on all of the following matters:

[1] 65 FR 106, June 1, 2000.
[2] Fish and Game Code section 2810(a)(7).
[3] 65 FR 106: 35254, June 1, 2000.
[4] [50 *Code of Federal Regulations* (CFR) 17.22(b)(1)(iii) and 50 CFR 222.22(b)(5)(iii).

a. Establishment of habitat reserves or other measures that provide equivalent conservation of covered species and providing funding where applicable.

b. Compliance with the plan and the implementation agreement by the wildlife agencies, local governments, and landowners who have responsibilities under the plan.

c. Measurements to determine if mitigation and conservation measures are being implemented roughly proportional in time and extent to the impact on habitat or covered species authorized under the plan.

d. Evaluation of the effectiveness of the plan in meeting the conservation objectives of the plan.

e. Maps of land use changes in the Plan Area that may affect habitat values or covered species.

f. A schedule for conducting monitoring activities."[5]

7.2.1.1 Responsibility for the Monitoring Program

BCAG is responsible for developing and implementing the monitoring program. Components of monitoring, however, may be implemented by multiple parties, including staff of BCAG or, with the oversight of BCAG, other BRCP participants (e.g., Permittees, Project Applicants, USFWS, California Department of Fish and Game [CDFW], and NMFS), academic institutions, consulting firms, or other qualified entities. Monitoring conducted under existing programs implemented by other entities (e.g., universities, Central Valley Regional Water Control Board, USFWS, NMFS, CDFW, and United States Geological Survey [USGS]) may also be used by BCAG to assess the effectiveness of conservation measures in achieving biological goals and objectives. BCAG, however, is responsible for ensuring that monitoring and directed studies undertaken by others on behalf of BCAG comply with BRCP implementation requirements.

BCAG will coordinate and share monitoring and directed study results, as appropriate, with other regional restoration and management programs. Effective data sharing requires standardization of protocols, sampling design, and training of personnel, as well as integrative data analyses. Programs and organizations with which BCAG should coordinate include approved and developing HCPs and NCCPs that adjoin the Plan Area; USFWS, NMFS, CDFW, and other federal and state resource agency monitoring programs; and organizations conducting monitoring of existing conserved lands within and adjacent to the Plan Area.

7.2.2 Monitoring Process

A well designed monitoring program provides an unbiased, scientific way to evaluate the compliance with permit conditions and the effectiveness of the BRCP's conservation measures. This information allows BCAG to adaptively adjust conservation practices or methods when biological goals or objectives are not met, and it documents the overall success in protecting,

[5] Fish and Game Code section 2805(f).

enhancing, restoring and supporting natural communities and covered species in the Plan Area. The USGS in collaboration with CDFW and USFWS (Atkinson et al. 2004) provide a stepwise guidance for creating a monitoring program, which includes:

1. Monitoring objectives
2. Scope, scale and intensity of monitoring
3. Database development
4. Prioritization
5. Management-oriented conceptual models
6. Attributes, Metrics and Key uncertainties
7. Strategy for implementing monitoring
8. Data quality assurance, data management, analysis, and reporting
9. Feedback to decision-making

The purpose of this section is to briefly describe the tenets of USGS's monitoring approach (Atkinson et al. 2004) to provide sufficient guidance to BCAG to ensure that the monitoring program will meet regulatory standards and that the monitoring program is sufficiently flexible to address uncertainties and input of new information over the term of the BRCP. The exact location and extent of the conservation activities and target areas for monitoring are not known at this time, thus precluding the ability to establish specific monitoring actions and requirements (e.g., monitoring protocols, thresholds, triggers, and other key variables). These specific monitoring requirements will be addressed in monitoring plans that will be development by BCAG during BRCP implementation as described in Section 7.2.4.

7.2.2.1 Monitoring Objectives

The overall purpose of an HCP/NCCP monitoring program is to provide information to evaluate compliance with permit terms and conditions and to assess the effectiveness of implementation in achieving the biological goals and objectives. More specifically, BRCP monitoring will be conducted primarily to:

- Establish baseline conditions of biological resources in the Plan Area from which deviations can be detected (e.g., changes in the ecological functions of protected natural communities and in the distribution and abundance of covered species over time);
- Produce scientifically valid data which are relevant and informative to the adaptive management process and which integrate with other monitoring efforts (e.g., adjacent HCP/NCCP plan areas, state-wide and nation-wide monitoring of biological resources);
- Document compliance with terms and conditions of BRCP permits, including limits set on the incidental take of covered species;

- Document and evaluate the effectiveness of conservation measures in achieving BRCP biological goals and objectives;
- Provide information necessary to indicate whether adjustments to BRCP implementation and necessary to better ensure that biological goals and objectives are achieved; and
- Assess progress towards achieving the biological goals and objectives.

7.2.2.2 Scope, Scale, and Intensity

The scope of the monitoring program will be commensurate with the scope and duration of the Conservation Strategy and impacts of the covered activities, of sufficient scale to assess the range of ecological conditions across the entire Plan Area, and to evaluate progress towards achieving the biological goals and objectives. As described in Section 5.3, *Biological Goals and Objectives*, the BRCP Conservation Strategy operates at multiple ecological scales, including habitat patches, habitat components, natural communities, and populations up to the landscape-level scale of Conservation Acquisition Zones (CAZs) and the Plan Area. The monitoring program also operates at corresponding scales as appropriate to detect change at the species, natural community, and landscape scales. At the broadest spatial extent, landscape-level monitoring is designed to detect large-scale changes in ecosystem processes, shifts in natural community distribution, the composition and integrity of landscape linkages, and the abundance and distribution of covered and other native species across the Plan Area. Because these types of changes are typically slow and widespread, monitoring to detect landscape change often is typically conducted at multi-year intervals.

Natural community-level monitoring is focused on the BRCP conservation lands system and is designed to detect changes in the composition and function of protected natural communities, covered species habitats, key predator or prey populations, invasive species, and other important habitat factors for covered species. Species-level monitoring focuses on assessing the distribution and abundance of covered species within the BRCP conservation lands system (e.g., the size and distribution of covered plant species occurrences, nesting success of covered bird species). The frequency of natural community-level and species-level monitoring ranges from annual to multi-year intervals, depending on the conservation land-specific parameters being assessed. Monitoring intensity is closely related to the specified level of precision required to determine effectiveness of conservation measures. For example, sampling of plants in a restoration area typically is conducted at high initial intensity to ensure that planted individuals survive and become established (e.g., compliance with a habitat restoration target). After that point, intermittent sampling can ascertain that the development of desired ecological functions is following the expected trajectory (e.g., effectiveness of restoration for a given covered species). Similarly, baseline surveys may be conducted at a higher initial monitoring intensity to ascertain species presence and status then ongoing routine monitoring of conservation lands once they have been protected and the continued presence of covered species need only be verified. Other decisions regarding monitoring intensity are related to the specific biological characteristics of

species (e.g., different emergence and flowering of covered vernal pool plant species, seasonal habitat use patterns of covered wildlife species).

7.2.2.3 Database Development and Maintenance

BCAG will develop and maintain a comprehensive spatially-linked database to track implementation of the BRCP. Monitoring data, results of directed studies, geospatial data, and information collected by others (e.g., USFWS, NMFS, and CDFW) that is relevant to covered species and conservation lands will be integrated into the BRCP database. The BRCP data will also be shared, upon request, with USFWS, NMFS, and CDFW. The database will thus serve as the repository of the current understanding of species and natural communities in the Plan Area and will serve as a tool for identifying data gaps and additional information necessary to ensure that the biological goals and objectives are achieved.

The database will be "user friendly" and allow for future expansion and integration with external databases if desired (e.g., linkage to USFWS, NMFS, and CDFW databases). The database will be designed to support the following services.

- Data documentation such that future users can determine why, how, and where data were collected (i.e., metadata);
- Quality assurance and control of the data and data entry;
- Provide the most current information for analysis and decision making; and
- Evaluation of data by all users, as appropriate, and incorporation of corrections and improvements in the data.

Major types of information expected to be maintained within the database include:

- Monitoring, directed study, and adaptive management data and results;
- BRCP funding and expenditures;
- Status of covered activities, including implementation and impacts;
- Implementation status of conservation measures;
- Implementation status of directed studies and adaptive management assessment results;
- Adopted changes to BRCP implementation through the adaptive management process; and
- All reports and documents generated by BCAG and relevant data and reports generated by other entities.

BCAG may choose to develop a web-linked database to facilitate controlled transference of information into and out of the database by other entities. If the BRCP Implementing Entity

chooses to allow access to the database by others, the database will incorporate strict controls and monitoring to ensure the integrity of the database is maintained.

7.2.2.4 Prioritization

Threats to covered species and natural communities, and operational constraints (e.g., funding) dictate that BCAG must prioritize "what" and "how much" information is to be collected through the monitoring program. Grouping covered species with similar management and monitoring requirements is a cost effective approach for tracking the status of each species and natural communities. Whenever possible, BRCP monitoring will use a multispecies approach.

7.2.2.5 Management-Oriented Conceptual Models

Conceptual models based on ecological functions can help develop management plans by organizing the existing knowledge and assumptions about a particular landscape, natural community, or species, and thus aid in defining the scope and scale of the monitoring. This facilitates assessments of key uncertainties and provides a direction for future improvements in management and identification of data needs. Conceptual models provide a framework and basis for discussion among scientists, stakeholders, and managers. Although conceptual models are not a required to be included in NCCPs and HCPs, BCAG will consider developing basic conceptual models to support the design of management-relevant monitoring of conservation actions, especially for covered species which are poorly understood (e.g., Blainesville's horned lizard) or for highly dynamic, complex natural systems (e.g., vernal pools).

7.2.2.6 Attributes, Metrics, and Key Uncertainties

Selection of the attributes (i.e., monitoring variables) for covered species and natural communities is a critical step in designing a monitoring program. "An attribute is any component or condition of the system that can be quantifiably measured, for example, forest cover, precipitation or arthropod species diversity" (Atkinson et al 2004). For covered species, presence/absence and abundance or population size are most commonly measured attributes, but additional metrics may be required (e.g., for giant garter snake the proportion of young in the population is a recovery criterion). Attributes should be selected such that the hypotheses regarding conservation actions can be evaluated. Metrics provide the unit in which the attribute is measured. Metrics should be relevant to management and regulatory parameters, have strong scientific underpinnings, and be measurable, feasible, statistically rigorous, and easily understood and interpreted (Atkinson et al. 2004). Metrics should provide a logical link to biological goals, such as abundance, density, trend, age composition, or spatial distribution of a covered species.

Uncertainties are those aspects or functional relationships of a species, natural community or ecosystem that are poorly understood. Uncertainties that constrain decision-making are key uncertainties, and thus should be prioritized. While not all uncertainties must be resolved at the same time, and some are perhaps impossible to eliminate, it is important to understand and

evaluate possible consequences for interpretation of monitoring results. BCAG, through the development of conceptual models and expert input, will identify and prioritize key uncertainties that may impact the effectiveness of conservation measures or the measurement of attributes. High priority key uncertainties will be addressed by increasing the intensity of monitoring, implementing directed studies, or conducting management experiments.

7.2.2.7 Monitoring Strategy, Data Quality Assurance, Data Management, and Reporting

BCAG will develop a monitoring strategy that documents specific protocols and schedules for monitoring (see Section 7.2.4). Quality assurance of monitoring data is a critical feature of a long-term monitoring program, if long-term trends are to be reliably assessed (Atkinson et al. 2004). The quality of data collection will be addressed through adoption and adherence to statistically sound sampling designs and survey protocols as described in Sections 7.2.3, *Monitoring and Survey Requirements*, and 7.2.4. Because monitoring results are a primary source of information for supporting adaptive management changes in BRCP implementation over time and to measure progress toward achieving the BRCP biological goals and objectives, monitoring plans need to be based on the best available science and subject to rigorous standards, including statistically sound sampling designs and analysis methods. Biased or unreliable monitoring data could result in erroneous decision making and therefore could reduce the effectiveness of the implemented conservation measures. Development of standardized monitoring protocols, will allow for comparison of monitoring data among different monitoring locations, different individuals conducting the monitoring, and among monitoring years over the term of the BRCP.

Following permitting of the BRCP, BCAG will develop detailed monitoring schedules for compliance and effectiveness monitoring. In addition, site-specific monitoring schedules will be developed for each BRCP conservation land parcel or group of parcels as they are acquired. Monitoring plans will include survey protocols, attributes and metrics, sampling design, and methods (e.g., statistical techniques) used to analyze monitoring data. Where appropriate, BCAG may adopt existing and generally accepted methods (e.g., USFWS survey protocols for listed species, protocols for monitoring status and trends in abundance and distribution of covered bird species). BCAG may develop new monitoring procedures, if scientifically-reviewed procedures as they might be applicable to the BRCP have not been developed for the subject of monitoring. In this case, BCAG will solicit information from resource agency experts, independent scientists, and other experts as appropriate. Draft procedures may be field tested and revised as necessary based on test results to ensure that they can be effectively implemented and yield the desired monitoring information.

7.2.2.8 Analysis of Monitoring Data and Scientific Reviews

BCAG will use the best available technology and science to ensure quality control of all monitoring data. Steps will be instituted to maintain the accuracy and functionality of any

installed monitoring devices, and protocols will be established to govern the collection, transcription, and storage of data. BCAG will involve internal and external scientific reviews as appropriate throughout BRCP implementation, and whenever significant changes are necessitated within the adaptive management framework (see Section 7.3). Internal scientific review will predominantly focus on cost effectiveness of techniques for implementing conservation measures, scheduling of implementation, and interrelationships between BRCP elements (i.e., prioritization). These reviews will consider monitoring and other evidence on the current scientific knowledge of the covered species and habitats and the effectiveness of conservation measures as they are implemented. External scientific review will be conducted by recognized experts for the respective species, natural community, or ecological process under review. The need for external reviews will be determined by BCAG.

BCAG will document all standardized analytical procedures and update procedures as necessary. Results of the analysis of monitoring data will feed back into the adaptive management decision making process as described Section 7.3 (see Chapter 8, *Plan Implementation*, for reporting and review of monitoring and adaptive management programs).

7.2.2.9 Feedback to Decision-Making

The following are considered by Atkinson et al. 2004 to be important elements of decision support systems:

- Managing plan implementation including monitoring, management, targeted studies, and the conservation strategy.
- Periodic evaluation of monitoring and management projects and targeted studies regarding scientific rigor and reliability of knowledge gained.
- Synthesizing and compacting information for managers.
- Evaluation of monitoring objectives, priorities and corrective actions.
- Revision of conceptual models and recommendations for changes to conservation strategy, management plans and monitoring program design.
- Integration of external scientific input and review.
- Triggers for adjustments, additions or deletions, changes in monitoring intensity or scale, and other adaptive changes to the implementation of the conservation strategy.

BCAG's decision support system for effectively integrating the data and knowledge collected by the monitoring program into the BRCP adaptive management decision making framework is described in Section 7.3 (for a discussion of reporting and review of monitoring and adaptive management actions see Chapter 8, *Plan Implementation*).

7.2.3 Monitoring and Survey Requirements

BCAG will conduct monitoring and surveys to collect information necessary to demonstrate compliance with BRCP permits and to assess the effectiveness of BRCP implementation in achieving the biological goals and objectives. The type and intensity of monitoring will vary over the term of the BRCP as the conservation lands system is assembled and data is accumulated (e.g., as the response of covered species to particular conservation actions during early implementation years is documented, the need to monitor the response of covered species to implementation of those same actions in later implementation years may be reduced). Compliance and effectiveness monitoring and survey requirements are described below. In addition, BCAG will routinely monitor the condition of habitat management infrastructure on BRCP conservation lands to determine if infrastructure maintenance or replacement is needed to maintain habitat conditions over time (e.g., road and fence maintenance, pump replacement).

7.2.3.1 Compliance Monitoring

The purpose of compliance monitoring is to ensure compliance with terms and conditions of the BRCP and its associated permits during implementation of covered activities. It also tracks progress of BRCP implementation in accordance with the implementation schedule (see Chapter 8, *Plan Implementation*). Compliance monitoring actions and procedures are presented in Table 7–1, *Compliance Monitoring Actions* (see separate file).

The compliance monitoring actions will be implemented, as applicable, for all covered activities by the responsible entities as indicated in Table 7–1. The procedures to be used by the Permittees and third party project proponents for documenting compliance with the BRCP are described in Section 8.7, *Process for BRCP Implementation*. Results of compliance monitoring may also serve the purposes of effectiveness monitoring (see below). For example, documenting the protection of a specified amount of a covered species habitat for compliance also documents progress towards achieving the biological objective for protection of that species habitat. Results of compliance monitoring will also be used by BCAG along with results of effectiveness monitoring to determine if BRCP implementation should be adjusted under the provisions or the BRCP adaptive management plan (see Section 7.3).

7.2.3.2 Effectiveness Monitoring

Effectiveness monitoring will be conducted for three purposes: 1) to assess the effectiveness of habitat restoration, enhancement, and management techniques in achieving the desired habitat conditions for covered and other native species (i.e., are the hypotheses supporting the actions validated), 2) to assess covered species responses to the implementation of conservation measures, and 3) to document progress made toward achieving the BRCP biological goals and objectives. Effectiveness monitoring actions are identified at the landscape-, natural community, and species-levels. These monitoring actions will provide the data necessary to assess the status and trend of covered species populations at Plan Area-wide and BRCP conservation land unit

scales and will provide the basis for tracking progress towards achieving the biological goals and objectives. In addition, initial baseline ecological surveys will be conducted on all BRCP conservation lands from which the effectiveness of BRCP habitat enhancement and management actions will be measured.

Results of effectiveness monitoring will inform BCAG as it considers adjustments to implementation through the adaptive management plan (see Section 7.3). The effectiveness monitoring requirements for specific conservation actions will be determined by BCAG prior to implementing the actions and will be designed to collect information necessary to improve their effectiveness over time and to resolve key uncertainties. It is anticipated that the extent of effectiveness monitoring will be reduced over time as causal relationships between the implementation of conservation actions and the responses of covered species and natural communities to those actions are better understood. For example, if relationships between a specific habitat enhancement action and the response of a particular covered species to the action are established through monitoring, then effectiveness monitoring for assessing the species response to the same action in another location may be reduced or no longer required.

7.2.3.2.1 Baseline Ecological Surveys

Conservation measure CM5, Enhance Protected Natural Communities for Covered Species (see Section 5.4, *Conservation Measures*) provides for conducting surveys of acquired conservation lands within two years of acquisition to collect information necessary to describe the baseline ecological conditions present on the lands. All or a portion of ecological baseline condition data may be collected during pre-acquisition surveys (see Section 5.4.1.1.1, *Pre-Acquisition Surveys*) before a parcel is protected by BCAG.[6] BCAG will prepare standardized survey protocols that include a description of the attributes and metrics for describing the baseline conditions. Depending on the biological resources present on a protected parcel or collection of parcels, the description of baseline ecological conditions will include the following items (see Table 7–2, *Landscape-Level Effective Monitoring Actions and Example Monitoring Approaches and Metrics* [separate file]).

- A vegetation/habitat type map, including tree snags, and a description of dominant species and vegetation structure in each vegetation type;
- A description of percent canopy cover in each mapped riparian vegetation polygon;
- A description of hydrologic conditions, including a map of water features (e.g., vernal pools, ponds, intermittent and perennial stream channels);
- A description of current and historical land uses (e.g., livestock grazing regimes, cropping practices);
- A map (if applicable) and description of areas infested with nonnative invasive plants;

[6] BCAG will need to collect biological and other information necessary to determine if a parcel being considered for protection meets the conservation land site selection criteria and, if applicable, to document site conditions in conservation easements.

- Mapped locations of covered plant species occurrences and estimated abundance of the number of plants in each occurrence;[7]
- Occurrence of covered wildlife species and documentation of key habitat uses (e.g., presence of covered bird species nest sites), including mapped locations of raptor nest sites; and
- CWA section 404 jurisdictional wetlands and other waters of the United States delineation on all BRCP acquired non-agricultural conservation lands and agricultural conservation lands on which natural communities and covered species habitats will be restored.

Results of baseline ecological surveys will establish baseline conditions from which the ecological effectiveness of BRCP enhancement, restoration, and management actions will be measured. Depending on the types of habitat enhancements or management actions that may be implemented on a particular parcel, additional information may need to be collected before those actions are implemented to ensure that the sufficient baseline data has been collected to evaluate the effects of those actions. Baseline ecological survey results will also be used to document the natural resources and their characteristics and condition of lands protected under BRCP conservation easements at the time of the easement transfer. Provisions of the baseline ecological surveys are intended to comply with the statutory requirement for baseline studies pursuant to U.S. Treasury Department Regulations that stipulate requirements for conservation easements[8] (see Section 8.7).

7.2.3.2.2 Landscape-Level Monitoring Actions

Landscape-level monitoring includes actions to: 1) monitor trends in ecological conditions, including the status and trends in covered species populations, Plan Area-wide and in the context of the regional conditions and trends and 2) monitor progress towards achieving the biological goals and objectives. Landscape-level monitoring actions are presented in Table 7–2. Landscape-level monitoring includes the use of data collected for other BRCP purposes (e.g., pre-acquisition surveys implemented under CM1 [Section 5.4.1.1, *Acquire Lands*] and planning surveys implemented under AMM1, Conduct Planning Surveys [Chapter 6, *Conditions on Covered Activities*]). Landscape-level monitoring is intended to complement natural community- and species-level monitoring (see below) by helping to determine causality when examining a biological response, or lack thereof, to implementation of a conservation action. Results of landscape-level monitoring will provide a basis for assessing biological changes above and beyond those related to individual conservation measures. Information within the scope of landscape-level monitoring includes the overall status, distribution, and trends related to covered species populations and the status of the natural communities, including the ecological functions they provide for covered and other native species. Results of landscape-level monitoring will

[7] As appropriate, the estimated size of each plant occurrence will be augmented by any available historical descriptions of the occurrences.
[8] Treasury Regulations § 1.170A-14(g)(5)(i).

help BCAG to discriminate whether any observed response to a conservation action can be attributed to the implementation of the BRCP or if the lack of response indicates failure of that particular action. Landscape-level monitoring will be important in particular for covered wildlife species that are migratory, nomadic, or otherwise highly mobile (i.e., dispersing readily in and out of the Plan Area). For these species, factors external to the Plan Area can readily obscure the type and extent of response to the implementation of the conservation measures. For example, it may be that a conservation measure intended to restore habitat for a covered species is not followed by use of that habitat by the species. The apparent lack of response, however, may be due to a population decline of the covered species caused by reduced production or increased mortality outside of the Plan Area. Thus, landscape-level monitoring is important to provide context for interpretation of results of effectiveness monitoring and other monitoring and results of directed studies and other research. It also provides BCAG with information necessary to make implementation adjustments through the adaptive management process in advance of large-scale changes in the ecological conditions of the Plan Area that appear forthcoming.

Status of Natural Communities within the Plan Area. BCAG will map each natural community within the Plan Area at least every five years over the term of the BRCP to determine the extent (areal or linear) and distribution of each natural community. It is anticipated that the mapping will be performed using aerial imagery taken at each analysis point for this purpose. Natural community mapping results will be used by BCAG to identify changes in the extent and distribution of natural communities and associated covered species habitats within the Plan Area over time. This information will be used by BCAG to determine if there is a need to adjust BRCP implementation through the adaptive management process to better address the conservation needs of covered species if substantial and unanticipated changes in the distribution and extent of natural communities and covered species habitats are detected within the Plan Area.

Concurrent with the periodic monitoring and assessment of natural communities within the Plan Area, BCAG will review and evaluate available data regarding the acreage and distribution of agricultural crop types within the Plan Area every five years. Results of the evaluation will be used to determine if agricultural land uses have changed sufficiently to warrant any change in BRCP implementation to ensure conservation of covered species whose habitats are supported by agricultural lands. For example, if agricultural cropping patterns change in the Plan Area such that Swainson's hawk agricultural foraging habitats are substantially reduced relative to the Plan Area abundance of Swainson's hawk, modification of BRCP implementation to improve habitat conditions for the Swainson's hawk through the adaptive management process may be appropriate. Monitoring tools will include relevant information currently collected by the Butte County Agricultural Commissioner and other agencies, such as NRCS; information regarding trends in agricultural practices from the agricultural community; and relevant reports by local, state, and federal agencies regarding trends in agricultural production and practices; and other relevant information sources that may become available over the term of the BRCP.

Status of Covered Species within the Plan Area. BCAG will assess the status, distribution, and trends of covered species within the Plan Area for at least every five years over the term of the BRCP. This assessment will be conducted based on reviews of all previous BRCP monitoring and land evaluation (e.g., preconstruction surveys, pre-acquisition surveys) results, and results of BRCP directed studies and relevant monitoring and research conducted by others (e.g., USFWS, NMFS, and CDFW survey results and status and trends assessments). Plan Area-wide monitoring for covered species will provide BCAG with information to help track long-term changes attributable to any of a number of factors (e.g., covered activities, climate change, and activities of others) that may affect the status of covered species within the Plan Area. As part of landscape-level monitoring, BCAG will also review relevant scientific data regarding the regional status of covered species whose range and life stage distribution extends beyond the Plan Area as it becomes available. This information will help inform the need for making adjustments to BRCP implementation through the adaptive management process (see Section 7.3). For birds in particular, the Breeding Bird Survey (BBS) programs, in addition to raptor counts along migration routes, provide readily available, continuously updated data on the global and regional status of species.

7.2.3.2.3 Natural Community-Level Monitoring Actions

Natural community-level monitoring includes actions to monitor the 1) effectiveness of habitat enhancement, restoration, and management techniques in maintaining and increasing the ecological functions of natural communities and covered species habitats on BRCP conservation lands, 2) change in the abundance and distribution of covered and other native species on BRCP conservation lands over time, and 3) change in the acreage and ecological functions of BRCP protected natural communities and covered species habitats over time. Natural community-level monitoring actions are presented in Table 7–3, *Natural Community-Level Monitoring Actions and Example Monitoring Approaches and Metrics* (see separate file). Results of natural community-level monitoring actions will be evaluated by BCAG to determine if adjustments in habitat enhancement, restoration, and management techniques are needed to improve their effectiveness in achieving the biological goals and objectives.

Restored Habitats. As described in conservation measure CM4: Develop and Implement Site Specific Wetland and Riparian Restoration Plans (Section 5.4), the BRCP includes actions to restore natural communities and covered species habitats. Monitoring actions NCM3-7 (Table 7–3) and SLM1 and 7 (Table 7–4, *Species-Level Monitoring Actions and Example Monitoring Approaches and Metrics* [see separate file]) address monitoring the development of ecological functions of restored riparian, emergent wetland, giant garter snake, and vernal pool and swale habitats (e.g., vegetation composition and cover) and the use of restored habitat by covered species. Prior to implementing habitat restoration actions, BCAG will develop monitoring plans and schedules for each type of habitat restoration action and/or habitat restoration site (see below). These habitat restoration monitoring plans will be incorporated into conservation land management plans as described in Section 5.2.4, *Monitoring Plan Content and Schedule*. The duration and frequency of monitoring of each type of habitat restoration is

determined by the time required for covered species habitat functions to fully develop (e.g., riparian forest habitat may require the entire term of the BRCP to fully develop habitat functions for covered species that use mature forest) and annual variability in environmental conditions that affect habitat functions (e.g., to assess the full habitat functions of restored vernal pools may require monitoring over the course of several wet water years).

The BRCP monitoring plan (see Section 5.2.4), will describe the attributes to be monitored (e.g., percent vegetation cover and composition, hydrologic conditions, and presence and abundance of covered species) and criteria that, when achieved for each of the attributes, indicate that ecological objectives of the restored habitat have been achieved or are trending towards being achieved[9]. The selected attributes should be those that represent measures of habitat function for associated covered and other native species and that can be practicably measured. Attributes for each restored habitat type that will be considered by BCAG and for which, when adopted, criteria will be established include but are not limited to the following.

- Acreage and location of restored habitat patches;
- Vegetative characteristics over time (species composition, tree height and diameter distribution, tree density, canopy closure, number of snags, ground cover, etc.);
- Complexity (e.g., edge to area ratio, percent open water to emergent vegetation in restored emergent wetland);
- Hydrographic characteristics (inundation periods, inundation depths, frequency of inundations);
- Presence of specified elements that comprise habitat for covered species;
- Presence and abundance of invasive plants, nonnative competitors or predators over time;
- Number and abundance of covered species over time; and
- Connectivity of restored habitat patches.

The criteria established for selected attributes will serve as thresholds for determining the need for subsequent management actions. Failure to achieve or trend towards achieving the criteria established for the attributes will trigger an adaptive management review by BCAG to determine if 1) remedial actions should be implemented to improve the likelihood for achieving the performance criteria, 2) the threshold criteria are inappropriate based on site capability and need to be modified, and/or 3) designs of subsequent restored habitats need to be adjusted to improve development of the desired ecological conditions.

Habitat restoration sites will also be monitored to determine their use by associated covered species over time. Use of restored habitats by associated covered and other native species is a strong indicator that the restored habitat has successfully developed the desired habitat functions

[9] The criteria for some environmental variables may not be achieved until after the term of the BRCP, depending on the variable and when a site is restored during BRCP implementation.

for these species. As previously described, failure of restored habitat to be used by covered and other native species does not necessarily indicate that the restored habitat has failed to develop the desired habitat functions.

The intensity of monitoring required for restoration of specific habitat types is expected to change over the BRCP implementation period as more is learned about how restored habitats develop under various designs. For example, initial riparian habitat restoration projects will be intensively monitored until a relationship is established between restoration actions and the development of riparian habitat attributes. As these relationships are established, the monitoring intensity of subsequent riparian habitat projects would be expected to be reduced.

Habitat Enhancement and Management Actions. As described in conservation measure CM5, Enhance Protected Natural Communities for Covered Species (Section 5.4), the BRCP includes actions to enhance and manage protected habitats to maintain and increase their functions as habitat for covered and other native species over time. Before implementing habitat enhancement and management actions, BCAG will develop and implement monitoring requirements and schedules for each type of habitat enhancement and management action and/or each specific site to be enhanced and managed. These monitoring requirements will be incorporated into conservation land management plans (see Section 5.2.4) and will describe the attributes to be monitored, thresholds for triggering adaptive management actions, and criteria that, when achieved, indicate that ecological objectives of the habitat enhancement and management actions have been achieved.

Baseline ecological conditions will be determined through results of baseline surveys conducted for each parcel as described in Section 7.2.3.2.1, *Baseline Ecological Surveys*. Additional surveys may be required if the necessary baseline variable conditions were not adequately assessed in baseline ecological surveys. Depending on the type of habitat enhancement and management actions to be undertaken, BCAG may also need to collect information necessary to evaluate the likely effects of historical land use practices (e.g., grazing regimes) on historical and current site conditions. Specified attributes for each type of enhancement and management action will be measured for and compared to the baseline ecological conditions to determine the effectiveness of the actions. Monitoring results will provide BCAG with information necessary to make project-level adaptive management adjustments in the implementation of subsequent habitat enhancement and management actions (see Section 7.3). The intensity of monitoring required is expected to change over the BRCP implementation period for the reasons described above for monitoring of restored habitats.

7.2.3.2.4 Species-Level Monitoring

Species-level monitoring includes actions to monitor the status and trends in the abundance and production of covered species on BRCP conservation lands over time. Species-level monitoring actions are presented in Table 7–4. Species-level monitoring focuses on monitoring covered and other native species for which specific types of data regarding their status are not collected

through landscape- and natural community–level monitoring actions (e.g., year over year trends in fledging success of Swainson's hawk nest sites on BRCP conservation lands). Results of species-level monitoring actions will be evaluated by BCAG to determine if adjustments in ongoing enhancement of management of conservation lands are required to maintain and improve the status covered species.

BCAG will implement periodic standardized surveys to determine the abundance and use of habitats of covered species on BRCP conservation lands over the term of the BRCP (Table 7–4). The purpose of this monitoring is to provide BCAG with information necessary to detect unanticipated and undesirable changes in the distribution and abundance of covered species that may warrant adjustments in BRCP implementation to better conserve the covered species. Based on the precision of monitoring results, BCAG may conduct additional monitoring beyond what is indicated in Table 7–4 to improve the precision and the understanding of monitoring results.

7.2.4 Monitoring Plan Content and Schedule

BCAG will prepare a detailed monitoring plan for implementing the types of monitoring and surveys described in Section 5.2.3, *Assembly of Conservation Lands*. The monitoring plan will be finalized within 18 months of issuance of Endangered Species Act (ESA) and NCCP permits. The monitoring plan will describe survey protocols and other monitoring methods for applicable monitoring actions in Tables 7–1 through 7–4 and the inter- and intra-year schedule for conducting such surveys and other monitoring actions. BCAG will develop and will incorporate site-specific monitoring requirements that are consistent with the overall monitoring plan into BRCP conservation land management plans as the conservation lands addressed by each of the management plans are acquired as described in CM5 (Section 5.4.2.2, *Enhance Protected Natural Communities for Covered Species*). All elements of the monitoring plan will be subject to change through the BRCP adaptive management decision making process (see Section 7.3) as new information is acquired during implementation.

Monitoring plan protocols will be science-based, ensuring that results are repeatable and that data has minimal bias and variance. Monitored units must reflect the units of the corresponding biological objective; if the objective is numerical (e.g., number of individuals) the monitoring program must likewise measure progress numerically. Monitoring must be based on established and accepted scientific principles.

The monitoring plan will include the following information:

- Description of the purpose and objectives of each monitoring action (e.g., assessing progress towards achieving a biological objective);
- Description of monitoring protocols, including sampling design and justification supporting the validity of monitoring methods and sampling design;

- Monitoring data storage procedures;
- Analytical and statistical methods for assessing monitoring results;
- Procedures for validating monitoring data and methods;
- Monitoring schedule, duration, and rationale;
- Content requirements and submission schedule for monitoring reports;
- References, including printed references and personal communications;
- Provisions for documenting subsequent revisions to the monitoring plan;
- Other information pertinent to specific monitoring plans; and
- Date the monitoring plan was prepared and dates of subsequent revisions.

BCAG will provide for internal science-based review of monitoring plans and external science review as appropriate. Internal review of draft monitoring plans will be conducted by individuals with relevant expertise in biological and physical sciences, scientific method, habitat restoration design and engineering, and resource management, as appropriate to the monitoring topic. The review will ensure that methods and approaches are valid and well documented and that they will achieve their intended objectives.

The monitoring element of individual BRCP conservation land management plans will describe the monitoring requirements for the lands covered under each plan, including:

- the biological goals and objectives applicable to the subject conservation lands,
- A description of the specific monitoring actions applicable to the subject conservation lands, and
- A description of the monitoring protocols, analytical methods, and schedule in the BRCP monitoring plan that are applicable to the subject conservation lands and any specified deviations from the monitoring plan.

7.2.5 Post-BRCP Permit Monitoring Requirements

Following the 50-year term of BRCP permits, BCAG will need to continue to conduct monitoring, though at a reduced scale from that required during the term of BRCP permits. Monitoring actions that will be implemented during the post-BRCP permit period include:

- Monitoring the development of habitat enhancement and restoration actions that are implemented towards the end of the BRCP permit period for which ongoing monitoring is necessary to document restoration success (see monitoring actions NCM3-7 and NCM10 in Table 7–3; and SLM1, 2, and 5-10 in Table 7–4).

- Monitoring of nonnative species on BRCP conservation lands to determine if control actions need to be implemented to maintain covered species habitat functions (see monitoring actions NCM8 in Table 7–3).
- Monitoring of ecological responses to substantial changes in management (e.g., grazing regimes) of BRCP conservation lands implemented during the post-permit period (see monitoring actions NCM1 and NCM2 in Table 7–3).
- Monitoring necessary to document the status and trends in natural communities and covered species and their habitats on BRCP conservation lands at 10 year intervals to determine to the ongoing effectiveness of the Conservation Lands System management in maintaining ecological functions (see monitoring actions NCM9 [provides for 5 year monitoring intervals during the BRCP permit period] in Table 7–3 and SLM1 in Table 7–4 [provides for 5 year monitoring intervals during the BRCP permit period]).

7.3 ADAPTIVE MANAGEMENT PLAN

The BRCP adaptive management process is consistent with the guidance for adaptive management provided in the USFWS's and NMFS's Five-Point Policy for HCPs[10], the NCCPA[11], and the U.S. Department of the Interior Applications Guide for Adaptive Management (Williams and Brown 2012). The USFWS and NMFS Five-Point Policy broadly defines adaptive management "…as a method for examining alternative strategies for meeting measurable biological goals and objectives, and then if necessary, adjusting future conservation management actions according to what is learned" and the NCCPA defines adaptive management as "…to use the results of new information gathered through the monitoring program of the plan and from other sources to adjust management strategies and practices to assist in providing for the conservation of covered species." NCCP's must include both a monitoring program and an adaptive management program[12] and also must provide for periodically reviewed adaptive management strategies subject to the results of monitoring efforts and other sources of new information.[13]

The conservation measures described in Section 5.4 were developed based on the best scientific and commercially available information and, as crafted, provide BCAG with a road map for initial implementation of the Conservation Strategy. The conservation measures are directed primarily towards the protection, enhancement, and restoration of natural communities and the covered species habitats they support. There is a relatively high certainty regarding the effectiveness of protecting existing, functioning natural communities and associated covered species habitat for effectively conserving covered species, though the specific size and configuration of the BRCP conservation land system will be tested during BRCP implementation and may require adaptive management adjustments. The adaptive management approach is

[10] 65 FR 106, June 1, 2000.
[11] California Fish and Game Code sections 2800-2835.
[12] California Fish and Game Code Section 2820[7] and [8].
[13] California Fish and Game Code Section 2820[a][2].

focused on addressing conservation actions with greater uncertainty of effectiveness; such conservation actions include habitat enhancement, restoration, and management techniques for achieving the applicable biological goals and objectives.

A key issue in adaptively managing the BRCP is the recognition and measurement of success of conservation measures. The BRCP adaptive management framework provides a learning-based decision process which ensures that progress is made toward achieving BRCP biological goals and objectives. Over the term of the BRCP, it is anticipated that ongoing modifications to implementation of the Conservation Strategy will be needed as new information is developed that addresses the uncertainties regarding the nature and magnitude of the response of covered species to habitat enhancement, restoration, and management techniques as well as the potential for substantially altered future conditions that may result from climate change (e.g., change in the hydrology of Plan Area watersheds, temporal shifts in the wet season, change in wildfire risk). Consequently, the adaptive management process is a keystone element of BRCP implementation, providing BCAG with the flexibility necessary to modify BRCP implementation to address uncertainties as the knowledge base regarding ecological processes, natural communities, and covered species is expanded. As such, the adaptive management process provides BCAG with the ability to modify conservation measures, implementation techniques, and monitoring elements (e.g., monitoring protocols, attributes and attribute criteria, and metrics) of the Conservation Strategy as indicated by new information that will be gathered over the term of the BRCP to improve their effectiveness. This new information will come from the results of BCAG's monitoring and directed studies and from monitoring and research data from other entities.

Elements of the BRCP subject to the adaptive management process include all program aspects related to implementation of conservation measures and the monitoring program. Deed restrictions specified in conservation easements are not subject to adaptive management and thus cannot be altered, changed or otherwise modified without mutual agreement of the landowner and easement holder and subsequent recordation of amendments to the easement deed.

Implementation elements of conservation measures subject to adaptive management include the following:

- Habitat restoration design and implementation methods;
- Habitat management tools and techniques;
- Changes to, discontinuation of, and addition of conservation measures;
- Shifting of implementation funds among conservation measures;
- Land acquisition criteria and conservation land assembly principles; and
- Directed studies and adaptive management conducted to inform implementation.

Implementation elements of the monitoring program subject to adaptive management include the following:

- The subjects of monitoring;
- Duration and scope of monitoring;
- Monitoring methods, metrics, and attribute criteria; and
- Analytical tools and methods.

In addition to providing BCAG with a process to better ensure effective BRCP implementation, outcomes of applying the adaptive management process are anticipated to be an important factor in BCAG's annual and long-term budgeting and funding decision-making processes.

7.3.1 Adaptive Management Decision-Making

The adaptive management process will be administered by BCAG and will operate at two levels: project-level and plan-level adaptive management. The adaptive management decision-making process for each level is illustrated in Figure 7–2, *Adaptive Management Decision Making Process* (see separate file).

A key decision point is the determination if an adaptive management response is at the project-level or the plan-level as defined below. Adaptive management roles and responsibilities among BCAG, the Permitting Agencies, and stakeholders are described in Chapter 9, *Implementation Structure*.

7.3.1.1 Project-Level Adaptive Management

Project-level adaptive management provides for ongoing adjustments in the implementation of the conservation measures and minor adjustments to the monitoring plan (e.g., improvements in monitoring techniques) by BCAG. Adaptive management responses considered to be project-level include small adjustments to techniques used to manage, enhance, and restore habitat.

Project-level adaptive management will not require participation or concurrence by the Permitting Agencies. Such adjustments will be described in BCAG's annual report (see reporting requirements in Chapter 8, *Plan Implementation*) and the USFWS, NMFS, and CDFW may provide input on those adjustments following review of the report. BCAG may choose to coordinate with the USFWS, NMFS, and CDFW at the project-level to better inform its adaptive management decision-making.

Project-level adaptive decision-making will apply to all aspects of implementing conservation measures that do not change the commitments described in the conservation measure and that do not increase costs beyond the level of funding appropriated for the conservation measure. For example, under the project-level adaptive management process, BCAG could modify methods for conducting a conservation measure based on new information indicating that doing so would

improve its effectiveness. Changes by BCAG to the monitoring plan would include adjusting monitoring protocols to improve their effectiveness or to comply with new monitoring standards established by the USFWS, NMFS, and CDFW (e.g., the establishment of new species-specific monitoring protocols). The purpose of the project-level adaptive management process is to provide for timely and effective implementation decision-making by BCAG.

7.3.1.2 Plan-Level Adaptive Management

Plan-level adaptive management provides for large adjustments to the Conservation Strategy, including:

- Revisions to conservation measures, including removal from the Conservation Strategy;
- The addition of new conservation measures to the Conservation Strategy;
- Shifting of emphasis among conservation measures, changes in acreage targets, or other elements of the Conservation Strategy (i.e., adaptive management and monitoring);
- Changes in the required schedule of implementation; and
- Major modifications to the monitoring plan, including discontinuing a monitoring effort, changing monitoring metrics, and adding new monitoring efforts.

All plan-level adaptive management changes require participation and approval from the USFWS, NMFS, and CDFW. Some plan-level adaptive management changes may involve major changes in BRCP commitments and may require a formal amendment to implement (see Section 8.6.4, *Formal Amendments*). Plan-level changes are not expected to be common over the term of the BRCP, but the process provides BCAG with the flexibility to implement such changes if needed to ensure that biological goals and objectives are achieved.

7.3.2 Adaptive Management Process Framework

Adaptive management is a decision-making process promoting flexible management by adjusting management actions in response to knowledge gained and changed conditions. The BRCP adaptive management process framework is illustrated in Figure 7–3, *Natural Community-Level Monitoring Actions and Example Monitoring Approaches and Metrics*. Monitoring the results of ecosystem and habitat management is at the heart of the adaptive decision making process. Generally, monitoring results provide both practical knowledge ("did it work") and scientific understanding ("why did it not work"). At its core, adaptive management is an experimental approach in which observations recorded through monitoring are used to update, revise, and adjust hypotheses and conceptual models of the managed system. The integration of monitoring into the adaptive management process requires a close attention to data quality, standardization, sampling designs, statistical methods, and the ongoing training of key personnel. Adaptive management tasks include the following.

- Regular evaluation and updates to improve the efficacy of monitoring protocols based on implementation experience and testing of new methods.
- Ongoing incorporation of the best available scientific information into management (see Section 7.2, *Monitoring Program*, on scientific principles and data management) based on regular reviews of literature and interaction with experts to ensure that new understanding of the covered species and monitoring approaches is incorporated into implementation.
- Regular evaluation of and refinements to conceptual models (e.g., species habitat models; see Section 7.2.2.5, *Management-Oriented Conceptual Models*) based on the availability of new information.
- Scheduled reviews of monitoring and directed studies that may be undertaken by the BRCP to revise hypotheses or expectations.
- Adjusting implementation of conservation measures or adoption of new conservation measures to be more effective in achieving the biological goals and objectives based on new information.
- Periodic evaluation of and adjustments to habitat enhancement and restoration attributes and criteria (see Section 7.2.3, *Monitoring and Survey Requirements*) if they have been determined to be ineffective measures or indicators of success.

7.3.2.1 BRCP Objectives and the Knowledge Base

The starting point for the adaptive management process is the hypotheses that underlie the biological goals and objectives and the conservation measures. These hypotheses are a reflection of the existing ecological knowledge base. The knowledge base is the totality of current scientific understanding of the ecological and biological processes and conditions of species and natural communities in the Plan Area (see large shaded box underlying the right side of Figure 7-3). The existing knowledge base supported the development of the Conservation Strategy, including the biological goals and objectives, conservation measures, conservation metrics and targets, and monitoring actions. Information and analysis derived through monitoring and directed studies conducted under the BRCP (Section 7.2) and other programs will supplement and expand the knowledge base over the term of BRCP implementation.

7.3.2.2 Collect and Manage Data

Critical to the adaptive management process is the collection and management of data (Figure 7-3, Box 1) to assess conservation measure performance and the achievement of biological goals and objectives. Data collection and management will be conducted through implementation of the monitoring plan (Section 7.2) and any directed studies undertaken by BCAG (see Section 7.3.5, *Directed Studies*) following the initial implementation of conservation measures. Monitoring requirements are described in Section 7.2. In addition, results of directed studies conducted under the BRCP or by other entities will contribute to the knowledge base to

support understanding of ecological cause-and-effect relationships. Monitoring data and directed studies results will provide BCAG with information to help determine the effectiveness of conservation measures in providing benefits to species and habitats, including the effectiveness of habitat enhancement, restoration, and management actions. Decisions by BCAG to modify implementation of conservation measures will be guided by information gathered through the monitoring plan and other research sources. The monitoring plan is designed to discern apparent cause and effect relationships between implementation of specific conservation actions and the type and magnitude of species responses to those actions.

7.3.2.3 Analyze Data, Assimilate Information, and Develop and Recommend Adjustments to Implementation.

Monitoring data will be analyzed, synthesized, and evaluated to determine if adaptive management thresholds established for key ecological attributes (see Section 7.2.3.2, *Effectiveness Monitoring*) have been exceeded, thus triggering implementation of adaptive management actions. Analysis of data will also inform BCAG of the cause and effect relationships between conservation measures and ecological processes, covered species, and natural communities; the status of ecosystem conditions and covered species; and the effectiveness of the conservation measures and the monitoring program (Figure 7-3, Box 2). Information gained through the analytical process may indicate the need to redefine hypotheses underlying biological objectives and conservation measures; refine, discontinue, or expand conservation measures; or develop and implement new conservation measures within limits set by the BRCP and its associated regulatory authorizations. New data and analytical results will also be used to update models (e.g., conceptual, statistical, and process models) and other analytical tools that may be used to assess the performance of conservation measures in achieving the biological goals and objectives. Based on assimilation of new information, BCAG will formulate new approaches for implementation to improve its effectiveness in achieving the biological objectives (Figure 7-3, Box 4). These new approaches would then be routed through the adaptive management decision-making process (illustrated in Figure 7-2; Box 3).

7.3.2.4 Follow a Decision-Making Process

BCAG will follow a defined decision-making process before making significant adaptive management changes (Figure 7-3, Box 5). This adaptive management decision-making process is illustrated in Figure 7-2.

7.3.2.5 Implement Modified Conservation Measures, Tools, Metrics, and Targets

Outcomes of the adaptive management decision-making process can include, within the limits set by authorizing permits, changes to conservation measures, the monitoring program, analytical tools, metrics, and targets as indicated in Figure 7-2, Boxes 6-11.

7.3.3 Internal Scientific Review and Implementation of Changes

BCAG will establish an internal process of review by technical experts within BCAG or retained (e.g., biologists, restoration ecologists, physical scientists, habitat managers) to regularly assess the results of effectiveness monitoring, the selection of directed studies, the appropriateness of analytical tools and techniques, and the relevance of new scientific information developed by others (e.g., universities). These reviews will be used to determine whether changes in the implementation of the conservation measures and the monitoring program would be desirable to improve effectiveness of the BRCP in achieving biological goals and objectives (Figure 7–2, Box 2a). BCAG may also request the assistance of the USFWS, NMFS, and CDFW and knowledgeable outside scientists and experts in the review process (Figure 7–2, Box 2b).

Recommendations made through the internal science review process will be documented and will include a description of the recommended change in implementation; a description of the justification for the recommended change; an assessment of effects the change may have on other elements of BRCP implementation, if any; and any other relevant information in support of the recommendation. Recommendations adopted by BCAG will be described in BCAG's annual work plan (see Section 8.2, *Compliance and Progress Reporting Requirements*). BCAG will document the rationale for rejection of adaptive management recommendations made through the internal science review process.

7.3.4 External Independent Scientific Review

BCAG will from time to time seek additional science input on specific adaptive management-related issues. BCAG may convene, at its discretion, experts in selected topic that are not affiliated with BCAG, Permittees, or USFWS, NMFS, and CDFW (Figure 7–2, Box 2b).

7.3.5 Directed Studies

BCAG may identify the need for and undertake adaptive management actions, such as pilot habitat restoration projects to test restoration methods, as needed over the term of the BRCP. These actions would be implemented to provide information necessary to help inform subsequent implementation of conservation measures. The types of directed studies that may be conducted include those related to resolving BRCP-specific uncertainties related to:

- Technologies and methods for effectively implementing conservation measures;
- The ecological requirements of covered species as they relate to effective implementation of conservation measures; and
- The likely response of covered species to conservation measures.

Results of directed studies would also be used to help direct and prioritize subsequent implementation of conservation measures.

Potential study needs identified in the course of BRCP development include conducting investigations necessary to:

- Develop effective methods for successfully establishing new occurrences of rare covered plant species, including Butte County meadowfoam, veiny monardella, and other covered vernal pool plant species;
- Develop livestock grazing regimes on BRCP conservation lands that promote the establishment and increase the abundance and vigor of existing occurrences of covered plant species and improve habitat conditions for covered wildlife species; and
- Develop appropriate waterfowl habitat management practices to maintain and enhance known occurrences of Ferris' milkvetch and lesser saltscale.

Additional study needs are expected to be identified by BCAG over the term of BRCP implementation.

7.3.6 Program Status Reviews

BCAG will conduct program-wide status reviews of BRCP implementation at five-year intervals over the term of BRCP implementation. The level of effort required to conduct each status review, however, will vary with the degree of change in Plan Area conditions, availability of new information relevant to BRCP implementation, and other factors that could affect implementation procedures over the course of the review period. The purpose of these status reviews is to provide BCAG with a methodical process to periodically evaluate its BRCP implementation procedures. Results of program status reviews will be used to adjust implementation procedures and approaches to species conservation through the adaptive management decision-making process if needed. Status reviews will also include evaluations to determine if implementation procedures (e.g., monitoring protocols) require updating based on the best available information and regional assessments of the status of covered species to determine if their status has changed sufficiently to affect their conservation needs.

BRCP implementation elements subject to status reviews include, but are not limited, to the following:

- The monitoring plan (see Section 7.2);
- Conservation land management plans, including habitat enhancement and management prescriptions;
- Directed studies;
- Approaches to habitat restoration;
- Guidelines for screening and evaluating lands under consideration for protection;

- Funding levels and sources (see Chapter 10, *Implementation Costs and Funding Sources*); and
- GIS and database structure, software, documentation, user manuals, and other elements of BCAG's data management system.

BCAG will prepare a document summarizing review results and recommending corrective actions and schedules for their implementation. Recommended corrective actions will be coordinated with the Permittees, USFWS, NMFS, and CDFW as appropriate.

Chapter 8. PLAN IMPLEMENTATION

The Butte Regional Conservation Plan (BRCP) Conservation Strategy will be implemented over a period of 50 years. This chapter describes the schedule of implementation of the BRCP conservation measures (CMs); requirements for compliance reporting; the regulatory assurances provided to the BRCP under the federal Endangered Species Act (ESA) and the Natural Community Conservation Planning Act (NCCPA); BRCP planned measures to respond to anticipated changed circumstances; procedure for addressing unforeseen circumstances; the effect that future species recovery plans could have on the BRCP; the processes under which BRCP permit authorizations could be amended; and specific process guidance on how to implement the BRCP.

8.1 BRCP IMPLEMENTATION SCHEDULE

This section describes the schedule for implementing the BRCP conservation measures. The schedule for BRCP implementation provides a timeframe and sequence for the completion of actions under the conservation measures described in Section 5.4, *Conservation Measures*. Implementation begins in the year the Implementing Agreement is executed (see Appendix L, *Implementing Agreement*), the ESA section 10(a)(1)(B) incidental take permits and NCCPA Section 2835 permit are issued, and all applicable local ordinances take effect.[1] Based on currently available information, this schedule describes a reasonable estimate of the timing and sequence for implementation of the various conservation actions over the term of the BRCP. The timing of implementation of actions required to mitigate the impacts of covered activities will be primarily driven by the timing of covered activity implementation as funding generated by impact fees becomes available (see Chapter 10, *Implementation Costs and Funding Sources*). The timing of implementation of actions that contribute to the conservation of covered species and natural communities is determined by the schedules described in this section.

8.1.1 Timing of Mitigation Actions and "Rough Proportionality"

NCCPA requires that the timing and extent of mitigation actions be roughly proportional to the impacts. Section 2801(d) states that: "Natural community conservation planning… provides one option for identifying and ensuring appropriate mitigation that is roughly proportional to impacts on fish and wildlife...". Monitoring plans developed for Natural Community Conservation Plans (NCCPs) must provide "measurements to determine if mitigation and conservation measures are being implemented roughly proportional in time and extent to the impact on habitat or covered species authorized under the plan." [section 2805(f)(3)(C)]. This section describes how BRCP will meet this mitigation timing requirement of the NCCPA. For additional mitigation timing assurances see the Jump Start and Stay Ahead provisions described in Section 8.7.8, *Jump Start and Stay Ahead Provisions*.

[1] Authorization of a Regional General Permit by the U.S. Army Corps of Engineers (USACE) under Section 404 of the Clean Water Act is expected to be issued close to the time that USFWS, NMFS, and California Department of Fish and Wildlife (CDFW) authorizations are issued, but could be a year or more later.

The protection and restoration of natural communities and covered species habitats for the mitigation component of the BRCP must be implemented in advance of or concurrent with the impacts of the covered activities. Consequently, the schedule for implementing the mitigation component of conservation is determined by the timing of when the permanent development and ongoing maintenance activities described in Chapter 2, *Covered Activities*, are implemented.

The timing of mitigation (i.e., protection and restoration of natural communities and covered species habitats) must be in advance of the timing of the impact from the covered activity. For habitat protection, the lands acquired (through permanent conservation easement or fee title) must transfer to the Butte County Association of Governments (BCAG) as the Implementing Entity or other land owner approved by the BCAG prior to impacts of the covered activities on the resource to be mitigated. For habitat restoration actions, the construction of the habitat restoration must be completed prior to the impacts on the resource to be mitigated. Restoration construction completion is defined as completion of all grading and planting of the restoration site such that the only remaining activities are irrigation and weed control (if necessary), monitoring, ongoing maintenance, and adaptive management.

To provide time for BCAG to establish as the Implementing Entity to become established, to have acquired sufficient acreage of conservation lands suitable for restoration of the various natural communities, and to become efficient at processing and completing restoration projects, a variance in the timing of mitigation habitat restoration will be allowed as follows:

1. For the first 10 percent of impacts on the specific resource (vernal pools and other seasonal wetlands, permanent emergent wetlands, and riparian forest and scrub habitats) requiring mitigation restoration during implementation, the restoration for mitigation under the BRCP will be completed no later than one (1) year after initiation of impacts from covered activities.

2. For the second 10 percent of impacts (i.e., up to 20 percent of impacts total impacts allowed) on the specific resource requiring mitigation restoration during implementation, the restoration for mitigation under the BRCP will be completed no later than six (6) months after initiation of impacts from covered activities.

3. For the remaining 80 percent of impacts, restoration must be completed prior to initiation of impacts.

Required habitat restoration for mitigation of impacts on individual covered species habitat is a subset of the natural community restoration and the same timing is required for meeting the mitigation requirements of covered species habitat.

Under allowable circumstances, such as instances in which funding sources are not restrict from use for mitigation purposes, BCAG may “borrow” against BRCP conservation lands already protected or with completed habitat restoration that has been implemented for conservation

purposes until such time as the mitigation habitat can be protected or restored. See Section 8.7.8, *Jump Start and Stay Ahead Provisions*, for additional discussion.

8.1.2 Timing of Non-Mitigation Conservation Actions

Implementation of actions under the BRCP conservation measures that are independent of mitigation will be implemented on the time schedule described in the sections below.

8.1.3 CM1: Acquire Lands

The natural communities to be protected under this conservation measure include oak woodland and savanna, grassland (including grassland with vernal swale complex), riparian, emergent wetland, and aquatic natural community land cover types. This conservation measure also provides for the protection and maintenance of agricultural crop types that provide habitat for associated covered species. The schedule for protection of each natural community land cover type is provided in Table 8–1, *BRCP Land Acquisition Schedule for Natural Communities for Species Conservation Component*. The first 10-year increment of the schedule has lower targets than each of the second through fourth 10-year increments to provide the time necessary for BCAG to become established as the Implementing Entity, develop implementation procedures and processes, develop partnerships, raise funds, and gather information necessary to initiate implementation of the BRCP. Lands selected for protection under the BRCP must also protect specified biological resources (e.g., protection of known and currently unprotected covered plant species occurrences) to achieve the biological goals and objectives (see Section 5.3, *Biological Goals and Objectives*). The schedule for the protection of these specified biological resources is presented in Table 8–2, *BRCP Schedule for Conservation Component (i.e., Non-Mitigation) of Specified Biological Resources*.

In addition to the protection of existing natural communities and covered species habitat, the BRCP requires lands be protected for the restoration of natural communities and covered species habitat. The implementation schedule for natural community restoration is described in separate sections below.

The implementation schedule assumes that monitoring and management of protected and restored natural communities will follow completion of each restoration increment and continue over the term of the BRCP as described in CM5, Enhance Protected Natural Communities for Covered Species.

Table 8–1. BRCP Land Acquisition Schedule for Natural Communities for Species Conservation Component (i.e., Non-Mitigation)[1]

Natural Community/ Land Cover Type	Land Acquisition Target by Implementation Period (acres)										Total
	Years 1–10		*Years 11–20*		*Years 21–30*		*Years 31–40*		*Years 41–50*		
	Protected/ Maintained	Percent of Total	Protected/ Maintained	Percent of Total	Protected/ Maintained	Percent of Total	Protected/ Maintained	Percent of Total	Protected/ Maintained	Percent of Total	
Oak woodland and savanna	458	5%	2,383	26%	2,658	29%	2,658	29%	1,008	11%	9,167
Grassland	193	3%	1,431	25%	1,947	34%	1546	27%	630	11%	5,747
Grassland with vernal swale complex[2]	3,975	23%	2,950	17%	4,809	28%	3,778	22%	1,717	10%	17,229
Riparian[3]	878	15%	1,171	20%	1,873	32%	1,288	22%	644	11%	5,854
Wetland[4]	99	15%	172	26%	172	26%	152	23%	65	10%	660
Perennial stream channel[5]	30	12%	54	22%	61	25%	61	25%	36	15%	242
Rice	2,000	10%	5,000	25%	6,000	30%	5,000	25%	2,000	10%	20,000
Total	7,633	13%	13,161	22%	17,520	30%	14,483	25%	6,100	10%	58,899

[1] Land acquisition may be through fee title or conservation easement. Acreages provided are for measures to contribute to species recovery and natural community conservation ("conservation component") and do not include land acquisition to address the mitigation of impacts of covered activities ("mitigation component").
[2] Butte County meadowfoam habitat within the hardline Chico Butte County Meadowfoam Preserve will be protected in Years 1–10.
[3] Includes cottonwood-willow riparian forest, valley oak riparian forest, dredger tailings riparian forest and scrub (stream associated), and willow scrub.
[4] Includes emergent wetland.
[5] 50 percent of channels are assumed to be in grassland and 50 percent in orchard lands.

Table 8–2. BRCP Schedule for Conservation Component (i.e., Non-Mitigation) of Specified Biological Resources

Conservation Action (metric)	Applicable Conservation Measure[1]	Target by Implementation Period					
		Years 1-10	*Years 11-20*	*Years 21-30*	*Years 31-40*	*Years 41-50*	Total
Protect seeps supporting emergent wetland (number)	CM1	1	3	3	2	1	10
Protect perennial stream channel (miles)[2]	CM1	5	9	10	10	6	40
Protect intermittent stream channel (miles)	CM1	2	3	4	3	0	12
Protect ponds (number)[3]	CM1	2	5	10	7	4	28
Protect tricolored blackbird nesting sites (number)	CM1	Not applicable[4]	Not applicable[4]	Not applicable[4]	Not applicable[4]	Not applicable[4]	3
Protect modeled bank swallow nesting habitat (miles)	CM1	1	3	7	7	2	20
Protect occupied California black rail habitat (number of habitat patches)	CM1	Not applicable[4]	Not applicable[4]	Not applicable[4]	Not applicable[4]	Not applicable[4]	5
Protect Conservancy fairy shrimp habitat in the Vina Plains Core Recovery Area (acres)	CM1	0	75	75	0	0	150
Protect Conservancy fairy shrimp occurrences (number)	CM1	0	3	0	0	0	3
Protect Hoover spurge occurrences (number)	CM1	1	0	0	0	0	1
Protect Ahart's dwarf rush occurrences (number)	CM1	2	5	8	0	0	15
Protect slender Orcutt grass occurrences (number)	CM1	0	2	0	0	0	2
Protect Red Bluff dwarf rush occurrences (number)	CM1	1	3	6	0	0	10

Table 8–2. BRCP Schedule for Conservation Component (i.e., Non-Mitigation) of Specified Biological Resources (continued)

Conservation Action (metric)	Applicable Conservation Measure[1]	Target by Implementation Period					
		Years 1-10	*Years 11-20*	*Years 21-30*	*Years 31-40*	*Years 41-50*	Total
Protect Greene's tuctoria occurrences (number)	CM1	0	3	0	0	0	3
Place salmonid spawning gravels in stream channels (thousands of cubic yards)	CM9	0	10	10	10	0	30
Remove impediments to passage of covered fish species (number)	CM10	0	2	3	0	0	5
Remove, modify, or screen diversions (number)	CM11	4	8	8	5	0	25
Protect Butte County Meadowfoam occurrences (acres)	CM12	1,000	2,000	2,500	965	0	6,465
Translocate Conservancy fairy shrimp (number of sites)	CM14	0	1	1	0	0	2
Translocate Hoover's spurge (number of sites)	CM14	0	1	1	0	0	2
Translocate Ahart's dwarf rush (number of sites)	CM14	0	1	1	0	0	2
Translocate hairy Orcutt grass (number of sites)	CM14	0	1	1	0	0	2
Translocate slender Orcutt grass (number of sites)	CM14	0	1	1	0	0	2
Reintroduce Greene's tuctoria (number of sites)	CM14	0	1	1	0	0	2

[1] CM1, Aquire Lands; CM9, Replenish Spawning Gravels for Salmonids; CM10, Remove Impediments to Upstream and Downstream Fish Passage; CM11, Remove, Modify, or Screen Unscreened Diversions; CM12, Conserve Butte County Meadowfoam; CM14, Translocate Conservancy Fairy Shrimp, Hoover's Spurge Ahart's Dwarf Rush, Butte County Meadowfoam, Hairy Orcutt Grass, Slender Orcutt Grass, and Greene's Tuctoria.

[2] Includes protection of 15 miles of salmonid habitat along Butte Creek and 5 miles along Little Chico Creek.

[3] At least 19 ponds must support western pond turtle habitat and at least 9 ponds must support western spadefoot toad habitat.

[4] The overall target may be achieved in any combination of implementation periods.

8.1.4 CM2: Develop an Invasive Species Control Program

BCAG will prepare, with input and concurrence from U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Wildlife (CDFW), an invasive species control program for the BRCP conservation lands system within five years of BRCP authorization. BCAG will initiate implementation of the invasive species control program for natural communities and species habitat as lands are acquired and brought into the conservation lands system. The program will be updated, with input and concurrence from USFWS and CDFW, on an ongoing basis to address the addition of new conservation lands to the system over the term of the BRCP.

8.1.5 CM3: Identify High Priority Locations for Wildlife Passage Structures and Secure Funding

For new proposed projects, BCAG will coordinate with authorities having jurisdiction over transportation or other infrastructure corridors to include in the project planning and design process wildlife crossings that enable covered species to safely negotiate roads, railroads, canals and other man-made structures that are found to be impeding the permeability of habitat within designated ecological corridors. For existing facilities, BCAG will work on an ongoing basis with the appropriate jurisdiction to conduct studies of wildlife mortality, identify opportunities to improve permeability of linear structures, and seek funding for implementation.

8.1.6 CM4: Develop and Implement Site Specific Wetland and Riparian Restoration Plans

8.1.6.1 Vernal Pool Restoration

This conservation measure provides for the restoration of vernal pool complex to mitigate impacts of covered activities on vernal pools and vernal pool-associated covered species habitats (see Tables 5–7, *BRCP Restoration Targets* and 5–11, *Natural Community Mitigation Requirements for Permanent Direct Effects*). Timing requirements are described in Section 8.1.1, *Timing of Mitigation Actions and "Rough Proportionality."* The schedule for implementing vernal pool habitat restoration actions is dependent on when covered activities that affect vernal pool complex habitat are implemented and must be implemented in advance of the impacts.

8.1.6.2 Emergent Wetland Restoration

Restoration of emergent wetland is required to mitigate the effects of covered activities on emergent wetland and emergent wetland-associated covered species habitats (see Tables 5–7 and 5–11). Timing requirements are described in Section 8.1.1. The schedule for implementing emergent wetland habitat restoration actions is dependent on when covered activities that affect emergent wetland habitats are implemented and must be implemented in advance of the impacts.

8.1.6.3 Riparian Habitat Restoration

This conservation measure provides for the restoration of riparian habitats to achieve the BRCP riparian natural community and riparian-associated covered species biological goals and objectives (see Section 5.3, *Biological Goals and Objectives*, and Table 5–7). The timing and amount of restoration of cottonwood-willow riparian forest, valley oak riparian forest, and willow scrub for the purpose of conservation (i.e., non-mitigation) is provided in Table 8–3, *BRCP Schedule for Restoration of Natural Communities for Conservation Component*.

Restoration of riparian habitat is required to mitigate the effects of covered activities on riparian land cover types and riparian-associated covered species habitats (see Tables 5–7 and 5–11). Timing requirements are described in Section 8.1.1. The schedule for implementing riparian habitat restoration actions is dependent on when covered activities that affect riparian habitats are implemented and must be implemented in advance of the impacts.

8.1.7 CM5: Enhance Protected Natural Communities for Covered Species

This conservation measure provides for the ongoing enhancement and management of all natural community lands protected and restored under the BRCP. Implementation begins when each parcel of land is acquired for the BRCP conservation land system. Within two years of acquisition of land parcels for habitat protection or restoration, BCAG will conduct assessments to collect information on the ecological condition and function of the acquired parcels. These surveys are in addition to the biological and physical surveys conducted prior to site acquisitions. Based on results of the assessments, BCAG will develop management plans with input and concurrence from USFWS, National Marine Fisheries Service (NMFS), and CDFW within one year of completing the assessments for individual newly acquired conservation lands or will incorporate management actions for the new lands into management plans for existing conservation land units. The management plans will describe enhancement and management actions necessary to achieve the biological objectives established for the restored and protected lands. Subsequent habitat enhancement and management actions will be implemented in accordance with the enhancement and management schedule for each plan. Ongoing updates to management plans will be made as new information regarding site conditions and appropriate management prescriptions becomes available over the term of the BRCP.

Table 8–3. BRCP Schedule for Restoration of Natural Communities for Conservation Component (i.e., Non-mitigation)[1]

Restored Habitat Type	Habitat Restoration by Implementation Period (acres)										Total
	Years 1-10		*Years 11-20*		*Years 21-30*		*Years 31-40*		*Years 41-50*		
	Restored	Percent of Total	Restored	Percent of Total	Restored	Percent of Total	Restored	Percent of Total	Restored	Percent of Total	
Giant garter snake habitat (mosaic of emergent wetland, open water, and upland)	75	15%	130	26%	145	29%	100	20%	50	10%	500
Greater sandhill crane roosting habitat (managed wetland)	0	0%	80	50%	0	0%	80	50%	0	0%	160
Total	75	11%	210	32%	145	22%	180	27%	50	8%	660

[1] Habitat restoration acreages provided are for measures to contribute to species recovery and natural community conservation ("conservation") and do not include habitat restoration acreage to address the mitigation of impacts of covered activities on natural communities and covered species ("mitigation").

8.1.8 CM6: Maintain and Enhance Covered Species Habitat on Public and Easement Habitat Lands

Under this conservation measure, BCAG will work with land owners and managers of public and easement habitat lands (PEHL) to develop and implement management methods that would benefit of covered species on those lands. While BCAG cannot control the actions of federal and state agencies, BCAG will seek to develop and complete Memoranda of Understanding (MOUs), Memoranda of Agreement (MOAs), and cooperative agreements with all federal and state agencies that own and manage existing protected lands (PEHL Category 1) and other PEHL within the Plan Area shown in Figure 5–2, *Existing Protected Lands and Conservation Acquisition Zones* by Year 15 of BRCP implementation. This BCAG activity will be on-going as BCAG seeks better protection on PEHL over time.

8.1.9 CM7: Create and Maintain Greater Sandhill Crane Winter Roost Sites

Creation and maintenance of managed wetland as greater sandhill crane roosting habitat for the purpose of contributing to the recovery of greater sandhill crane is required under this conservation measure. The timing and amount of creation and maintenance of managed wetland as greater sandhill crane roosting habitat for the purpose of conservation (i.e., non-mitigation) is provided in Table 8–3.

8.1.10 CM8: Restore Giant Garter Snake Habitat

This conservation measure provides for the restoration of giant garter snake habitat including emergent wetland, open water, and uplands to achieve the biological goals and objectives for the conservation of this species (see Section 5.3 and Table 5–7). The timing and amount of restoration of giant garter snake habitat for the purpose of conservation (i.e., non-mitigation) is provided in Table 8–3.

8.1.11 CM9: Replenish Spawning Gravels for Salmonids

This conservation measure provides for the placement of 30,000 cubic yards of suitable salmonid spawning gravels in reaches of Plan Area streams known to support Chinook salmon and steelhead spawning. The 30,000 cubic yards of spawning gravel will be placed in stream channels by Year 40 of BRCP implementation in accordance with the schedule presented in Table 8–2.

8.1.12 CM10: Remove Impediments to Upstream and Downstream Fish Passage

This conservation measure provides for removing debris and other in-channel material that impedes the upstream and downstream passage of covered fish species. BCAG will coordinate

with NMFS and CDFW to complete existing planned modifications to the Iron Canyon Fish Ladder within the first 10 years of BRCP implementation and will remove other impediments to fish passage at five stream channel locations by Year 30 of BRCP implementation in accordance with the schedule presented in Table 8–2.

8.1.13 CM11: Remove, Modify, or Screen Unscreened Diversions

This conservation measure provides for removing, modifying, or screening up to 25 currently unscreened diversions on Big Chico and Butte creeks to reduce entrainment risk for juvenile salmonids. Actions to reduce salmonid entrainment risk at up to 25 diversions will be completed by Year 40 of BRCP implementation in accordance with the schedule presented in Table 8–2.

8.1.14 CM12: Conserve Butte County Meadowfoam

Acquisition of lands through fee title or conservation easement within the boundaries of the Chico Butte County Meadowfoam Preserve as indicated in Figure 5–5, *Chico Butte County Meadowfoam Preserve* will be completed by Year 10 of BRCP implementation.

In addition to the protection of Butte County meadowfoam occurrences and habitat within the Chico Butte County Meadowfoam Preserve, this conservation measure provides for the protection of Butte County meadowfoam occurrences and 3,600 acres of mapped primary habitat and 892 acres of mapped secondary habitat (Table 5–18, *Acreage of Modeled Butte County Meadowfoam Habitat that will be Protected by Population Grouping* and Appendix O, *Conservation Outcomes Figures*, Figure 5–28a, *Butte County Meadowfoam: Conservation Strategy Overview* and 5–28b, *Butte County Meadowfoam Avoidance Requirement for Occurrence #22*). These additional Butte County meadowfoam occurrences and 4,492 acres of Butte County meadowfoam habitat will be protected through implementation of CM1, Acquire Lands (through the protection of grassland with vernal swale complex and other grassland supporting Butte County meadowfoam habitat) in accordance with the schedule presented in Table 8–2.

This conservation measure provides for conducting surveys to locate currently unknown occurrences of Butte County meadowfoam and to protect occurrences that are important to its survival and recovery. Implementation of this conservation measure is an ongoing activity that will be undertaken by BCAG over the 50 year term of the BRCP and implemented through CM1, Acquire Lands.

This conservation measure provides for the ongoing enhancement and management of all BRCP protected Butte County meadowfoam occurrences and habitat. Within one year of acquisition of Butte County meadowfoam habitat, BCAG will conduct assessments to collect information on the ecological condition and function of the acquired parcels. Based on results of the assessments, BCAG will develop management plans with input from USFWS and CDFW within one year of completing the assessments for individual newly acquired habitat or will incorporate

actions to manage Butte County meadowfoam into management plans for existing conservation land units. Subsequent habitat enhancement and management actions will be implemented in accordance with the enhancement and management schedule for each plan. Ongoing updates to management plans will be made with input and concurrence from USFWS and CDFW as new information regarding site conditions and appropriate management prescriptions becomes available over the term of the BRCP.

8.1.15 CM13: Conduct Surveys to Locate and Protect New Occurrences of Butte County Checkerbloom

This conservation measure provides for conducting surveys to locate and protect unknown and new occurrences of Butte County checkerbloom in the Cascade Foothills Conservation Acquisition Zone (CAZ) north of upper Bidwell Park. BCAG will conduct surveys to locate occurrences of Butte County checkerbloom over the term of the BRCP until 20 previously unknown or new occurrences have been identified and brought under protection. BCAG will seek to protect newly discovered occurrences within five years of their discovery with the goal of protecting 20 such occurrences by Year 50 of the BRCP implementation.

8.1.16 CM14: Reestablish Occurrences of Conservancy Fairy Shrimp, Ahart's Dwarf Rush, Hoover's Spurge, Hairy Orcutt Grass, Slender Orcutt Grass, and Greene's Tuctoria

This conservation measure provides for the establishment or reestablishment of occurrences of Ahart's dwarf rush, Hoover's spurge, hairy Orcutt grass, slender Orcutt grass, and Greene's tuctoria in at least two protected vernal pools that support site conditions required by these species (e.g., hydrology, soil). The reestablishment of occurrences of these species will be completed by Year 30 of BRCP implementation in accordance with the schedule presented in Table 8–2.

8.2 COMPLIANCE AND PROGRESS REPORTING REQUIREMENTS

The BRCP Implementing Entity will regularly prepare planning documents and implementation reports to demonstrate compliance with the Plan, Implementation Agreement, and terms and conditions of the ESA section 10 and NCCPA permits. Preparation of these documents and reports will satisfy the USFWS/NMFS Five-Point Policy (65 Federal Register [FR] 106, June 1, 2000) that habitat conservation plan (HCP) monitoring plans provide for the reporting of compliance with permit terms and conditions and NCCPA requirements that implementation agreements include "provisions for periodic reporting to wildlife agencies and the public for purposes of information and evaluation of plan progress." (California Fish and Game Code § 2820(b)(7)). BCAG will, over the term of the BRCP, submit various documents and reports and plans to USFWS, NMFS, and CDFW that do the following:

- Provide the data and information necessary to demonstrate that the BRCP is being properly implemented;
- Provide monitoring results and analyses demonstrating progress towards achieving the BRCP biological goals and objectives and progress in implementing conservation measures;
- Document the process and results of adaptive management (decisions, changes, and corrective actions);
- Disclose issues and challenges concerning plan implementation, and identify potential modifications to the Conservation Strategy that would increase the likelihood of success; and
- Document impacts and take resulting from covered activities to ensure compliance with permit take limits.

Over the term of BRCP implementation, BCAG will prepare and submit to USFWS, NMFS, and CDFW, and make available to the public, the following documents:

- Annual workplans and budgets,
- Annual progress reports, and
- Five-year comprehensive review reports.

These documents will provide the information necessary to enable USFWS, NMFS, and CDFW, stakeholders, other state and federal agencies, and the general public to assess on an ongoing basis the progress and performance of the BRCP toward meeting the BRCP biological goals and objectives, and to make informed recommendations to BCAG regarding Plan implementation.

BCAG will develop a standardized process for reporting of Permittee's reporting of compliance-related information to BCAG.

8.2.1 Annual Workplans and Budgets

On an annual basis, the Executive Director of the BRCP Joint Powers Authority (JPA)[2] will prepare a workplan and budget for the upcoming implementation year through the term of the BRCP. The workplan will identify planned actions for the implementation of conservation measures and the monitoring and adaptive management plans in the coming year. The budget will identify planned expenditures and sources of funding for those expenditures. A Draft Annual Workplan and Budget will be provided to USFWS, NMFS, CDFW, Permittees, JPA

[2] See Chapter 9, *Implementation Structure* for descriptions of BRCP Executive Director.

Board of Directors, and the BRCP Stakeholder Committee[3] for review and comment no later than 65 days prior to the annual due date for the Final Annual Workplan and Budget. The Final Workplan and Budget will be completed and approved by the BRCP JPA Board of Directors no later than one month prior to the beginning of the upcoming implementation year. If no comments are received from one or more of the entities receiving the Draft Workplan and Budget within their 60-day review period, the BRCP JPA Board of Directors may proceed with approving it.

At a minimum, the Annual Workplan and Budget will contain the following information:

1. A description of the planned actions to implement conservation measures, including acquisition of conservation lands, and the entities that will carry out the actions;

2. A description of the planned monitoring actions and any anticipated research studies to be undertaken, and the entities that will conduct the monitoring and research;

3. A budget reflecting the costs of implementing the planned conservation actions and monitoring along with all other costs for operating BCAG in the workplan year, and a summary of the projected and actual budgets for all prior implementation years; and

4. A description of the sources of funding to support the budget.

8.2.2 Annual Progress Reports

At the end of each implementation year, BCAG will prepare an Annual Progress Report. These reports will provide a summary of the activities carried out during the previous implementation year. Annual progress reports will be completed within 3 months of the close of each reporting year to provide sufficient time to compile data and complete analyses of monitoring data. BCAG will develop a standardized format for annual progress reports, including submittal of geographic information system (GIS) data. Final annual progress reports will be maintained in the BRCP implementation database (see Section 7.2.2.3, *Database Development and Maintenance*).

Each annual progress report will provide the following information.

1. Documentation of the implementation of habitat conservation measures (protection/enhancement/creation/restoration) in relationship to the implementation schedule described in Section 8.1, *BRCP Implementation Schedule*, including the following information:

    - A summary of the completed or in-progress habitat conservation actions, including information related to type, extent, and location of restored, enhanced, and protected habitats and natural communities and a description of the conservation land assembly

[3] See Chapter 9, *Implementation Structure*, for descriptions of these various entities involved in BRCP implementation.

criteria supporting the acquisition of conservation lands. The report will document, on an annual and cumulative basis, the habitat conservation actions that have been carried out.

- A summary of all land management activities undertaken on BRCP conservation lands and a discussion of overall and site-specific management issues encountered by BCAG.

- Identification of habitat protection, restoration, or enhancement actions that have not been implemented in accordance with the implementation schedule (i.e., behind or ahead of schedule) and an explanation for the deviation from the schedule and method of remediation.

2. An assessment of the nature and extent of the impacts of covered activities on natural communities and covered species, including the following information:

   - A list of covered activities conducted, the entity responsible for each covered activity, and the location of habitat permanently or temporarily removed or disturbed by each covered activity;

   - A cumulative accounting (for the report year and for all years of implementation) of all impacts of BRCP covered activities on covered natural communities and covered species habitats, habitat mitigation implemented to address these impacts, and a description of how implementation of conservation measures is roughly proportional in time and extent to the impacts on covered species and their habitats;

   - Amount of take that occurred (for the report year and for all years of implementation) and reporting of any mortality of covered species observed; and

   - The status of the BRCP conservation lands system assembly, including an accounting of habitat providing mitigation for covered activities impacts.

3. An evaluation of the results of monitoring and research activities, including the following:

   - A description of the monitoring program objectives, techniques, and protocols including monitoring locations, variables measured, sampling frequency, timing and duration, analysis methods, and who performed the analyses.

   - A description of all BRCP directed studies conducted during the reporting period, a summary of study results to date, and a description of how these results were or will be integrated into implementation.

4. A description of adaptive management activities, including the following:

- A description of the adaptive management decisions made during the reporting period, including how existing information was used to guide these decisions and the rationale for the actions.
- A description of the use of independent scientists or other experts in the adaptive management decision-making processes.
- A summary of the recommendations or advice provided by the USFWS, NMFS, CDFW, and science advisors regarding adaptive management.
- A description of adopted and recommended changes to the conservation measures and monitoring plan (e.g., monitoring protocols, variables, analytical methods) through the adaptive management process based on monitoring results and research findings.

5. A financial report describing the following:
   - Funds acquired by BCAG by source.
   - Annual and cumulative expenditures by cost category.
   - Deviations in expenditures from the annual budget and other relevant information as appropriate.
6. A description of changed circumstances and actions to respond to changed circumstances, including the following:
   - A description of the changed circumstance and its effects on covered species and natural communities.
   - A description of the actions taken to address the changed circumstance and the effectiveness of those actions, including the outcomes of actions to address changed circumstances from earlier years.
7. A description of any unforeseen circumstances occurrences and responses.
8. A summary of any administrative changes, minor modifications and revisions, or formal amendments to the BRCP proposed or approved during the reporting period.

8.2.3 Five-Year Comprehensive Review Report

As described in Section 7.3.6, *Program Status Reviews*, the BRCP adaptive management plan provides for five-year reviews of BRCP implementation to provide BCAG with a longer term and methodical process to periodically evaluate its progress and implementation procedures. BCAG will prepare a report for submittal to USFWS, NMFS, CDFW, and the Stakeholder

Advisory Committee describing findings of each review within six months following the completion of each BRCP five-year implementation period.

8.3 REGULATORY ASSURANCES

Regulations under the ESA and provisions of the NCCPA provide for regulatory and economic assurances to permittees covered by approved HCPs and NCCPs concerning their financial obligations under a plan. These assurances are intended to provide a degree of certainty regarding the overall costs associated with the mitigation of impacts on species and other conservation measures and to add durability and reliability to agreements reached between Permittees and the USFWS, NMFS, and CDFW. If unforeseen circumstances occur that adversely affect species covered by an HCP or NCCP, the USFWS, NMFS, and CDFW will not require additional land, water, or financial compensation or impose additional restrictions on the use of land, water, or other natural resources.

The assurances provided under the ESA and the NCCPA do not limit or constrain USFWS, NMFS, or CDFW, or any other public agency, from taking additional actions to protect or conserve species covered by a HCP or NCCP. The state and federal agencies may use the variety of tools at their disposal and take actions to reduce adverse effects on species and to ensure that the needs of species affected by unforeseen events are adequately addressed.

8.3.1 Regulatory Assurances under the ESA

Under an ESA regulation known as the "No Surprises Rule," once an incidental take permit has been issued pursuant to an HCP and the HCP's terms and conditions are being fully implemented, the federal government will not require additional conservation or mitigation measures, including land, water, money, or restrictions on the use of those resources.[4] As explained by the USFWS and NMFS:

"Once an HCP permit has been issued and its terms and conditions are being fully complied with, the Permittee may remain secure regarding the agreed upon cost of conservation and mitigation. If the status of a species addressed under an HCP unexpectedly worsens because of unforeseen circumstances, the primary obligation for implementing additional conservation measures would be the responsibility of the Federal government, other government agencies, and other non-Federal landowners who have not yet developed an HCP."[5]

The USFWS and NMFS may, in the event of unforeseen circumstances, require additional measures provided they are limited to modifications within conserved habitat areas or to the conservation plan's operating conservation program for the affected species, and that these measures do not involve additional financial commitments or resource restrictions without the

[4] 63 *Federal Register* (FR) 8859 (February 23, 1998).
[5] *Id*. at 8868. The No Surprises Rule was promulgated jointly by the Department of the Interior (USFWS) and the Department of Commerce (NMFS).

consent of the Permittee(s). These assurances are provided to all HCP Permittees that properly implement their plans.

The assurances provided by the No Surprises Rule, however, are not absolute and are tempered by other regulatory provisions of the ESA. The "Permit Revocation Rule" moderates the scope of the No Surprises Rule, providing that in instances where a species covered by an HCP is threatened with extinction, assurances may be nullified and the USFWS and NMFS may revoke the HCP permit.[6] The USFWS and NMFS may exercise this authority even if a Permittee is in compliance with the terms and conditions of the permit, if the permitted activity would appreciably reduce the likelihood of the survival and recovery of the species in the wild.[7]

8.3.2 Assurances under the NCCPA

Under the NCCPA, CDFW provides assurances to Permittees commensurate with the long-term conservation measures and associated actions that will be implemented under the approved NCCP. In its determination of the level and term of the assurances to be provided, CDFW takes into account the conditions specific to the NCCP, including such factors as: the level and quality of information regarding covered species and natural communities, the sufficiency and use of the best available scientific information in the analysis of impacts on these resources, reliability of mitigation strategies, and appropriateness of monitoring techniques, including the use of centralized information to evaluate the effectiveness of the plan; the adequacy of funding assurances; the range of foreseeable circumstances that are addressed by the plan; and the size and duration of the plan.[8]

The assurances provided under the NCCPA ensure, at a minimum, that if there are unforeseen circumstances, no additional financial obligations or restrictions on the use of resources will be required of the Permittees without their consent. Specifically, the NCCPA directs that, "[i]f there are unforeseen circumstances, additional land, water, or financial compensation or additional restrictions on the use of land, water, or other natural resources shall not be required without the consent of plan participants for a period of time specified in the implementation agreement, unless [CDFW] determines that the plan is not being implemented consistent with the substantive terms of the implementation agreement." [9] Like the provision in the ESA regulations, however, the NCCPA requires that CDFW suspend or revoke a permit, in whole or in part, if the continued take of a covered species would jeopardize its continued existence.

[6] 50 *Code of Federal Regulations* (CFR) § 17.22(b)(8).
[7] 69 FR 71723, 71727 (December 10, 2004).
[8] CDFW bases its determination of the level of assurances on multiple factors. See Fish and Game Code section 2820(f).
[9] Fish and Game Code § 2820(f)(2).

8.4 CHANGED CIRCUMSTANCES AND UNFORESEEN CIRCUMSTANCES

8.4.1 Definitions

USFWS/NMFS regulations define changed circumstances as "changes in circumstances affecting a species or geographic area covered by a conservation plan that can reasonably be anticipated by plan developers and the [USFWS and NMFS] and that can be planned for…" [10] and the NCCPA defines changed circumstances as "…reasonably foreseeable circumstances that could affect a covered species or geographic area covered by the plan."[11]. To ensure successful implementation of the Conservation Strategy, the BRCP identifies measures are designed to respond to these anticipated changed circumstances. The BRCP changed circumstances and responses to those circumstances, should they occur, are described in Section 8.4.2, *Changed Circumstances*.

The USFWS and NMFS define unforeseen circumstances as those "changes in circumstances affecting a species or geographic area covered by a conservation plan that could not reasonably have been anticipated by the plan developers and the [USFWS and NMFS] at the time of the conservation plan's negotiation and development and that result in a substantial and adverse change in the status of a covered species"[12]. Under ESA regulations, if unforeseen circumstances arise during the term of the BRCP, USFWS and NMFS may "not require the commitment of additional land, water, or financial compensation, or additional restrictions on the use of land, water, or other natural resources beyond the level otherwise agreed upon for the species covered by the conservation plan" unless the BRCP Permittees consent.[13]

Similarly, unforeseen circumstances are defined in the NCCPA as "changes affecting one or more species, habitat, natural community, or the geographic area covered by a conservation plan that could not reasonably have been anticipated at the time of plan development, and that result in a substantial adverse change in the status of one or more covered species"[14]. The NCCPA further provides that, in the event of unforeseen circumstances, CDFW shall not require "additional land, water, or financial compensation or additional restrictions on the use of land, water, or other natural resources…without the consent of the plan participants for a period of time specified in the implementation agreement." However, such assurances are not applicable in those circumstances in which CDFW determines that the plan "is not being implemented consistent with the substantive terms of the implementation agreement".[15]

[10] 50 CFR §17.3.
[11] Fish and Game Code §2805(c).
[12] 50 CFR §17.3, 50 CFR §222.102.
[13] 50 CFR §17.22(b)(1)(5)(iii); 50 CFR §222.307(g)(3)(iii).
[14] Fish and Game Code §2805(k).
[15] Fish and Game Code §2820(f)(2).

8.4.2 Changed Circumstances

Ecological conditions in the Plan Area may change as a result of future events and circumstances that may occur over the term of BRCP implementation. This section identifies changes in circumstances that are reasonably foreseeable and that could adversely affect BRCP covered species and natural communities, consistent with the "changed circumstances" provisions of ESA regulations and of the NCCPA described in Section 8.4.1, *Definitions*. The changed circumstances provisions of the BRCP are intended to address reasonably foreseeable events, both inside and outside of the Plan Area, that may impede or prevent the BRCP from achieving its biological goals and objectives within the Plan Area. The BRCP identifies a range of potential changed circumstances, including events or conditions that may cause population-level declines in covered species, such as new invasive species, or that may substantially degrade habitat functions, such as flooding, fire, and climate change. Future changes in circumstances, should they occur, that are not identified in this section as changed circumstances will be deemed as unforeseen circumstances.

To address the potential for changed circumstances, the BRCP identifies specific funding commitments for remedial measures (see Chapter 10, *Implementation Costs and Funding Sources*). In the event that changed circumstances occur, BCAG will implement the remedial measures identified in this section.

The following sections describe the process for identifying the occurrence of changed circumstances, the changed circumstances that will be addressed by the BRCP, and the remedial measures that would be implemented in response to such occurrences.

8.4.2.1 Process to Identify Changed Circumstances

The occurrence of a changed circumstance will generally become apparent to BCAG through information gained from effectiveness monitoring, scientific study, or by notification received from another party (e.g., a reported wildfire on BRCP conservation lands). With indication that a changed circumstance has occurred or is likely to occur, BCAG will immediately investigate and confirm the occurrence of the event. BCAG will notify the BRCP JPA Board of Directors, Permittees, and other appropriate entities of the changed circumstance. BCAG will notify USFWS, NMFS, and CDFW within two (2) working days after learning of any changed circumstance identified in section 6.4.2.2, *Changed Circumstances Addressed by the BRCP* and will coordinate a response to the changed circumstance. USFWS, NMFS, and CDFW will provide BCAG with guidance for responding to a declared changed circumstance within 30 days. The occurrence of a changed circumstance and BCAG's response will be reported in annual progress reports as described in Section 8.2.2, *Annual Progress Reports*.

BCAG will determine specific remedial actions that are consistent with the responses described below for the particular changed circumstance and develop a schedule for implementation. After implementing remedial actions, BCAG will monitor the effectiveness of the measures.

8.4.2.2 Changed Circumstances Addressed by the BRCP

1. Floods

Nature of the Changed Circumstance

The effects of floods on BRCP conservation lands and covered species depend on several factors, including the severity of the flood event, its duration, and the type of habitat affected. Flood events are a natural process that maintain aquatic, riparian, and wetland ecosystems and small flood events are expected to have relatively minor effects on protected natural communities and covered species. Many of the covered species are either adapted to flooding (e.g., sandhill crane), would likely not be present or nesting during winter flood events (e.g., Swainson's hawk, western burrowing owl), or are capable of fleeing flooded areas (e.g., bank swallow, tricolored blackbird). Generally, flood events will have beneficial effects on the riparian natural community and the covered species and other native species it supports. More severe flood events, however, can have deleterious consequences for biological resources, including erosion of sensitive terrestrial and wetland habitats, deposition of sediment and debris on conservation lands that damage habitat functions for covered species, and loss of recently installed vegetation in restored riparian habitats.

While flood frequencies, such as 10 or 100-year events could be used to identify changed circumstances, it is not the size of the flood event that determines the changed circumstance but the amount of damage to natural communities and covered species habitat. Generally, however, a flood event of greater size (lower frequency) than a 100-year event that results in substantial damage to wetland, riparian, and upland habitats would be considered an unforeseen circumstance. Flood damage to natural communities and species habitats within BRCP conservation lands caused by 100-year or more frequent flood events on a given stream are considered to be a changed circumstance that are reasonably foreseeable over the term of the BRCP. This changed circumstance includes the deposition of flood debris in channels that inhibit the upstream and/or downstream movement of covered fish species and scour and removal of riparian habitats within the floodplains of stream channels in the Plan Area. Damage to upland habitats (e.g., grassland and oak woodland) that are typically located outside of active floodplains and is not expected to occur, but inspection of these habitats will be conducted following flood events that extend into them. The magnitude of flood events addressed by this changed circumstance are not expected to result in the complete removal of riparian habitats along stream channels, but could scour and result in loss of habitat patches along affected stream channels. In many cases, the removal of riparian habitat by flood flows provides beneficial effects through creating or maintaining the mosaic of riparian seral stages. For restored riparian habitat recently constructed, flood flows can damage installed plantings, anti-herbivory apparatus, and irrigation equipment.

Unforeseen Circumstances

The occurrence of more than four 25 year flood events or two 50 year or greater flood events adversely impacting a BRCP conservation land management unit over the term of the BRCP will be considered an unforeseen circumstance.

Planned Response

Following a flood event, affected conservation lands will be inspected within 30 days of the end of the event (e.g., recession of all flood waters) or as soon thereafter as conditions permit access by BCAG to evaluate the extent of damage to the protected habitats and evaluate the need for implementing actions to rehabilitate affected habitat functions. Prior existing restored riparian habitat will be evaluated to determine the extent of damage and the ecological need for a remedial response. In cases in which damage is limited or a natural mosaic of seral stages is created that benefits covered species and common wildlife, then remedial actions need not be conducted. In cases where the damaged riparian habitat is removed to such an extent that natural regeneration would not return habitat function for covered species within a reasonable timeframe, then remedial action will be taken. All debris deposited within stream channels that inhibit the passage of covered fish species will be removed within 30 days after a flood event. Remedial actions to address flood damage to riparian habitats may include actions such as grading, new riparian plantings, debris removal, covered plant species restoration. These remedial actions will be implemented within a time period to maintain permit compliance with the Stay-Ahead provision for restoration, creation, and enhancement. Measures shall be implemented through the adaptive management program. In some cases, the cost to rebuild/restore a damaged site may exceed the cost for constructing a new project somewhere else in the BRCP conservation lands system; in this case, BCAG, with USFWS, CDFW, and NMFS approval, will have the option of implementing remedial actions elsewhere within the BRCP conservation lands system of equivalent or greater biological value.

Flood events that remove or damage installed plantings, anti-herbivory apparatus, and irrigation equipment from recently constructed riparian restoration projects (typically less than 5 years old) will remediate all damage at the site within 1 year of the event.

If the cost to rebuild/restore a damaged site exceeds the cost for constructing a new restoration project elsewhere in the reserve system, BCAG, with USFWS, NMFS, and CDFW concurrence, will have the option of implementing remedial actions elsewhere within the conservation lands system of equivalent or greater biological function.

2. Drought/Water Availability

Nature of the Changed Circumstance

The Plan Area is characterized by a Mediterranean climate, with cool, wet winters and warm, dry summers but temperature and rainfall can vary greatly among years. El Niño and La Niña climatic events typically cause large annual fluctuations in precipitation levels (Minnich 2007,

Reever-Morghan et al. 2007). Precipitation is almost exclusively in the form of rain, approximately 90 percent of which is received from October through April. Drought is a natural part of Mediterranean climates and native species and natural communities have survived many drought periods.

To estimate how many drought years might be expected during the term of the BRCP, annual hydrological conditions were examined within the Plan Area from 1906 through 2010 by water year. The BRCP considers a drought year to occur when the governor of the State of California officially declares a drought, or state water officials or Butte County officials make a similar proclamation. Drought conditions in Northern California and Butte County have occurred nine times during the 20th century (Butte County Drought Preparedness Plan http://www.buttecounty.net/waterresourceconservation) with droughts exceeding three years occurring two times (22%) and droughts exceeding two years occurring four times (44%) during the 1900s. The influences of climate change are expected to alter this drought frequency, but exactly how is uncertain. There could be fewer droughts, but of longer duration, or more frequent droughts of shorter duration. Drought conditions experienced over the term of the BRCP could result in the loss of restored riparian and wetland habitats and BRCP maintained agricultural habitats.

Planned Response

Drought conditions may affect the development and maintenance of habitat restoration sites. In the event of drought conditions, BCAG will evaluate habitat restoration sites to assess the degree of effect on habitat development and functions. Following the evaluation, BCAG will prepare a report that documents the effects of drought on restoration sites and identifies management actions that will be implemented through the adaptive management process (see Section 7.3, *Adaptive Management Plan*) to remediate restoration sites affected by drought (i.e., providing supplemental irrigation of riparian plantings, replanting of riparian vegetation). For droughts that affect the availability of water for irrigation of agricultural habitats managed by BCAG, BCAG will ensure additional water supplies necessary to maintain crop types or acquire natural habitat areas to replace the habitat provided by the affected agricultural habitat when appropriate (e.g., acquisition of grassland to replace affected foraging habitat associated with croplands fallowed in response to drought may be appropriate, whereas it may not be feasible to replace the loss of giant garter snake rice habitat with natural wetlands under drought conditions).

The irrigation of BRCP protected wetlands within the Plan Area relies on continuous water supplies that are generally provided by water districts. If circumstances change and the water districts are no longer able to provide the same level ofwater service or cease to provide irrigation water deliveries in the Plan Area, the covered species and their habitat could potentially experience a significant impact. Considered herein are changed circumstances that could result in the event of either temporary or long-term reductions in the delivery of irrigation water by the water districts.

Unforeseen Circumstances

Drought. In order to account for impacts from drought the BRCP assumes droughts exceeding 3 years will occur twice and droughts exceeding two years will occur four times during the term of the BRCP (i., doubling the historic frequency). Droughts exceeding two years occurring more than four times during the term of the BRCP will be considered an unforeseen circumstance.

Water Districts Discontinuing Service. Water districts within the Plan Area are long established privately held water companies that provides irrigation water service within the Butte County. The potential for the water districts to discontinue providing irrigation water service within the Plan Area is not foreseeable, nor predictable because the water districts have provided irrigation service throughout the Plan Area since 1914, and there are no plans to discontinue service. As long as agricultural activities continue within the Plan Area, water supply service for irrigation purposes will be necessary. Consequently, if the water districts discontinues service it is reasonable to assume that another water company would provide irrigation service for such activities. Therefore, financial implications to the BRCP resulting from water districts discontinuing service within the Plan Area are considered an unforeseen circumstance.

3. Fire

Nature of Changed Circumstance

Fire as a changed circumstance is defined as any fire on BRCP conservation lands not prescribed by BCAG that removes a sufficient extent of vegetation such that the intended habitat functions of the conservation land for covered species are substantially reduced and would not naturally recover habitat functions within a sufficient time to meet BRCP goals and objectives, as determined by BCAG, or that destroys infrastructure that is necessary to maintain conservation benefits of the affected conservation lands over time.

A total of 20 wildfires larger than 50 acres have been recorded in the Plan Area from 1985-2010, burning on average approximately 2,200 acres per year.[16] These wildfires ranged from 91 to 23,344 acres, all but three of which burned less than 2,200 acres. The natural community types that are susceptible to damage by wildfire are oak woodland and savanna, grassland, and riparian.[17] Based on the historical average annual 2,200 acres of wildfire loss, the area of each of these natural communities in the Plan Area that are likely to be annually affected by wildfire in the Plan Area is 939 acres, 1,036 acres, and 224 acres respectively (the variance, however, is expected to be high). Based on the proportion of these natural communities in the Plan Area that will be protected on conservation lands under the BRCP (Table 5–9, *BRCP Covered Species*

[16] Source: Butte County Fire Safe Council (http://www.thenet411.net/index.php/component/search/?searchword=fire+history&ordering=&searchphrase=all)

[17] Wetland and aquatic natural communities are well watered environments that are typically not subject to loss by wildfire. The probability of loss of cropland to wildfire is low because of low fuel availability or are well watered (e.g., rice land). Agricultural lands that support covered species habitats are also annually cultivated and thus if any loss of cropland to fire will be remediated through annual cultivation cycles.

Modeled Habitat Protection Targets), this changed circumstance applies to an average annual loss of 323 acres of oak woodland and savanna and 71 acres of riparian. An additional 427 acres of grassland would also be affected by wildfire per year, on average. With their low above-ground biomass and large seed bank, grasslands are expected to naturally recover during the subsequent wet season and, therefore, fire impacts on grasslands (including grasslands with vernal swale complex) are not considered a changed circumstance.

Planned Response

In the event of a wildfire on BRCP conservation lands, BCAG will assess the proportion of the species habitat area within the conservation lands that has burned and its likely effect on covered species. BCAG will make an initial determination of whether or not a changed circumstance exists. The following conditions will be considered in determining if a changed circumstance exists for burned oak woodland and savanna or riparian forest and scrub natural communities:

- Have fires burned more than 323 acres of oak woodland and savanna or 71 acres of riparian forest and scrub within conservation lands? If yes, then remedial actions must be taken, unless USFWS and CDFW agree that natural regeneration would be ecologically preferable.

- Did fire remove a large proportion of the forest canopy (crown fire) within the burn area or predominately remove only the understory? Removal of understory vegetationtypically indicates a cool fire and likely rapid recovery of ecosystem functions in just a few years; therefore remedial actions may not be necessary.

- Would forest recover naturally and restore habitat functions for covered species without active remediation or restoration efforts, including consideration of the speed of recovery? In riparian habitats, particularly early successional riparian scrub, the vegetation may recover as quickly without active remedial intervention as with intervention.

- Would remediation efforts do more damage to ecological functions than allowing for natural regeneration?

- Were recent restoration plantings and infrastructure (e.g., irrigation systems, herbivore exclosures) damaged? If so, these must be replaced.

If a changed circumstance requiring remedial measures is determined to exist, BCAG will implement the appropriate post-fire monitoring plan for a two-year period following the fire. The following remedial measures will be implemented as appropriate to reestablish natural communities and covered species habitat lost to wildfire to restore pre-fire or improved conditions.

- Initiate a post-fire damage assessment within six months following the fire event to identify the appropriate post-fire restoration and rehabilitation actions.

- Initiate habitat restoration and invasive-species control actions in affected conservation lands to ensure the reestablishment of covered species habitat conditions and covered plant populations through active or passive means, as appropriate, within one year post-fire. Appropriate actions include seeding and replanting of native vegetation, including care and maintenance of plantings (e.g., irrigation, herbivory control) and mechanical/chemical removal of invasive plants.

- Ensure appropriate erosion control measures/structures (e.g., seeding of grasses and placement of coir logs to reduce erosion) are in place prior to the following post-fire wet season.

- Removal of debris that may inhibit passage of covered fish species in affected stream channels.

4. Invasive Species and Diseases

Nature of Changed Circumstance

A changed circumstance that involves a new infestation or substantial increase in an existing infestation of nonnative animals and plants affecting covered wildlife and plant species and diseases affecting covered plant species and/or native vegetation will be considered to have occurred under the following circumstances for all grassland, riparian, and wetland natural community land cover types except managed wetland and managed seasonal wetlands (agricultural and aquatic land cover types are not included in this changed circumstance).

- All grassland, riparian, and wetland natural community land cover types except managed wetlands and managed seasonal wetlands (agricultural and aquatic land cover types are not included in this changed circumstance).

- An increase from baseline conditions in the absolute cover of nonnative invasive plant species of 0 to 10 percent is not a changed circumstance; of greater than 10 and up to 25 percent is a changed circumstance; and of greater than 25 percent is an unforeseen circumstance.

- Establishment of any new non-native animal that through predation, parasitism, or competition reduces the abundance of a covered wildlife or plant species on conservation lands from baseline conditions of 0 to 10 percent is not a changed circumstance; of greater than 10 and up to 25 percent is a changed circumstance; and of greater than 25 percent is an unforeseen circumstance.

- Establishment of plant diseases that reduces the absolute cover of native vegetation on conservation lands from baseline conditions by 0 to 10 percent is not a changed circumstance; of greater than 10 and up to 25 percent is a changed circumstance; and of greater than 25 percent is an unforeseen circumstance.

- For instances in which scientific information and practicable technology do not exist to address invasive species or diseases no remedial actions are required of BCAG.

It is highly unlikely that infestations of a nonnative animal, plant, or disease that result in greater than 25 percent loss of native vegetative cover or covered species populations within BRCP conservation lands can be addressed within the operating budget of the BRCP or the authority of BCAG. Such infestations would likely need to be addressed at a regional scale beyond the Plan Area.

Outbreaks of existing or introduction of new wildlife diseases that affect covered wildlife species are unforeseen circumstances because what diseases may establish in the Plan Area or the degree of their effects on covered wildlife species cannot be known or predicted.

Planned Response

As described in Section 7.2, *Monitoring Program*, BCAG will take steps to detect, through the monitoring program and through collaboration with other responsible entities, new infestations or substantial increase in existing infestations of nonnative animal, plant, or disease in the Plan Area. If an infestation of a nonnative animal, plant, or disease is discovered, BCAG in coordination with USFWS and CDFW will conduct an assessment to determine the possible threats of the species or disease to covered species and the Plan Area ecosystems. The BRCP Implementing Entity, through the adaptive management process, will determine the best method of measuring, monitoring, and eradicating or controlling the disease or invasive species. Remedial measures, for which scientific information and practicable technology exist to address the invasion of nonnative species or disease, include the following.

- Prepare a damage-assessment report within four months of detection that describes the extent of the affected area, covered species affected or at risk of being affected, and the degree of effects on covered species.

- Within six months of detection, conduct coordination with responsible local, state, and federal agencies (e.g., Butte County Agricultural Commissioner, California Department of Conservation, USDA, USFWS, CDFW) and identify practicable remedial actions that can be implemented to address the threat.

- Initiate proposed actions approved by USFWS and CDFW within one year of detection of the changed circumstance. Depending on the nature of the invasive species or disease, remedial actions could include trapping and shooting of nonnative vertebrate animals, trapping and chemical removal of invertebrate animals, mechanical and chemical

removal of nonnative plants, removal of infested vegetation, and restoration of native plant species and covered plant species occurrences. Ecosystem management tools, such as controlled fire, may also be effective at controlling nonnative species and diseases. If the invasive species or disease is being addressed under existing or new regional programs, control actions will be coordinated with or implemented by responsible local, state, and/or federal agencies.

If methods to adequately reduce and/or control adverse effects of the species or disease are not available, BCAG will identify alternative design, implementation, and management approaches to future habitat restoration and management actions to avoid or minimize potential adverse effects of the disease on covered species. If such modifications are ineffective, BCAG, through the adaptive management process, will identify and implement alternative conservation measures that provide equivalent levels of benefit to applicable covered species.

5. Climate Change

Global climate change is occurring as a result of high concentrations of greenhouse gases in the Earth's atmosphere (National Research Council 2010; Intergovernmental Panel on Climate Change 2007). Greenhouse gases include water vapor, carbon dioxide, methane, nitrous oxide, chlorofluorocarbons, and ozone. These gases absorb energy emitted by the Earth's surface, and then reemit some of this energy back to Earth, warming the Earth's surface, and influencing global and local climates. As more and more greenhouse gases are emitted into the atmosphere from human activities such as the burning of fossil fuels, the Earth's energy balance is disrupted, resulting in a number of changes to the historical climate. Evidence of long-term changes in climate over the twentieth century include the following (Intergovernmental Panel on Climate Change 2007; National Research Council 2010; Global Change Research Program 2009):

- An increase of 0.74 degree Celsius (°C) (1.3 degrees Fahrenheit [°F]) in the earth's global average surface temperature;
- An increase of 0.17 meter (6.7 inches) in the global average sea level;
- A decrease in arctic sea-ice cover at a rate of approximately 4.1 percent per decade since 1979 with faster decreases of 7.4 percent per decade in summer;
- Decreases in the extent and volume of mountain glaciers and snow cover;
- A shift to higher altitudes and latitudes of cold-dependent habitats;
- Longer growing seasons; and
- More frequent weather extremes such as droughts, floods, severe storms, and heat waves.

Current global and regional trends suggest that climate change is likely to have an effect on the Plan Area (see Section 5.8, *Future with Climate Change*). However, current or near-term forecasting technology for modeling changes in climate at the regional or county scale is not currently reliable. By mid-century, the average annual mean temperature in California is projected to rise from 1.1°C (2°F) to more than 2.8°C (5°F), with little to no change in total annual precipitation (Luers et al. 2006). There is significant variability in the precipitation projections by individual model and emissions scenario. Individual simulations suggest that there could be up to a 10 to 20% decrease in total annual precipitation. A number of ecological responses to climate change could occur in the study area.

First, the timing of seasonal events, such as migration, flowering, and egg laying, may shift earlier or later (Walther et al. 2002; Forister and Shapiro 2003; Root et al. 2003; Root et al. 2005). Such shifts may affect the timing and alignment of events that must occur together, such as butterfly emergence and nectar availability.

Second, range and distribution of species and natural communities may shift (Parmesan 1999; Pimm 2001; Walther et al. 2002; Easterling et al. 2000). Range is the area over which a species occurs or potentially occurs, whereas distribution refers to where a species is located within its range. This is of particular concern for narrowly distributed species that already have restricted ranges due to urban growth or altitudinal gradients. Historically, some species could shift their ranges across the landscape. Today, urban and rural development prevents the movement of many species across the landscape.

Species or natural communities that occur only at higher elevations or within narrow environmental gradients (e.g., Butte County meadowfoam) are particularly vulnerable to changing climate because they likely have nowhere to move if their habitat becomes less suitable (Shainsky and Radosevich 1986; Murphy and Weiss 1992; Thorne 2006). Model predictions for California range from a 6mm (0.24 inches) annual decrease in precipitation to a 70 mm (2.76 inches) annual increase (Hayhoe et al. 2004). Consequently, it is likely that the climate in the study area would shift to be warmer and dryer.

Second, increases in disturbance events, such as fire or flooding, could increase the distribution of disturbance-dependent land cover types, such as annual grassland, within the study area (Brown and Hebda 1998; Lenihan et al. 2003; Fried et al. 2004; California Climate Change Center 2006; Rogers and Westfall 2007). An increase in the frequency and intensity of

disturbance could increase the likelihood that these events will harm or kill individual covered species, many of which are already quite rare. Events that occur with unpredictable or random frequency (called stochastic events) such as those describe above can have an inordinately negative effect on rare species.

Third, the number or density of individuals found in a particular location may change. This may be triggered in large part by changes in resource availability associated with an increase or decrease in precipitation (Martin 1998; Dukes and Mooney 1999; Walther et al. 2002; Lenihan

et al. 2003; Millar et al. 2006; Pounds et al. 2006). Changes such as these may benefit one species at the expense of another.

Fourth, over a longer time period, species may change in outward appearance and behavior. Changes in climate may favor different adaptive strategies or appearances that may lead to genetic shifts (Davis and Shaw 2001). An example of this would be a shift to smaller average body size of certain mammals to use limited food sources for maintenance rather than growth.

The conservation strategy, reserve design, and monitoring and adaptive management program anticipate possible effects of climate change using a multiscale approach that views conservation through landscape, natural-community, and species level. This approach focuses on protecting and enhancing a range of natural communities, habitat types, and environmental gradients (e.g., altitude, aspect, slope), as well as other features that are important as global warming changes the availability of resources and habitat types in the study area.

Implementing conservation actions that protect a variety of landscapes over a large scale provides flexibility for shifts in range and distribution of species and natural communities due to climate change. Land-acquisition actions target properties that provide connectivity to allow for northward and upslope movement, maintenance and restoration of habitat linkages, and reduced habitat fragmentation. In addition, habitat types across environmental gradients would be targeted for acquisition in the reserve system to provide topographic diversity, thereby reducing the chance of population extinction (Murphy and Weiss 1992). As a result, some species and natural communities in the study area would continue to be able to “move” in response to climate change, allowing for shifts in range and distribution.

At the natural-community level, conservation and monitoring actions were developed to address natural communities primarily through the protection, enhancement, restoration, and management of vegetation types (i.e., land cover types) and monitoring those changes. Habitats will be managed to ensure natural community and species persistence in the face of abundance shifts driven by climate change. Enhancement, restoration, and management actions will likely increase the resilience of natural communities by improving habitat quality overall and controlling invasive plants and nonnative predators.

At the species level, conservation and monitoring actions were developed to supplement and focus actions developed at broader scales and to ensure that all the needs of particular species are addressed. These species-specific actions will help ensure that shifts of range, distribution, and abundance driven by climate change are buffered by protection and enhancement of individuals, populations, and groups of populations. Monitoring actions will serve as an early warning system for the possible effects of climate change and will allow the conservation strategy to adapt to ensure species persistence in the study area. In addition to the conservation actions, monitoring actions will allow for the early detection of trends driven by climate change over multiple scales.

Collectively, these monitoring actions will allow BCAG to detect and respond to the effects of climate change. Taken together, conservation and monitoring actions described above will help buffer against the effects of climate change in the Plan Area.

Climate change is considered a foreseeable event and is therefore a changed circumstance. For the purposes of the BRCP, limits on the changed circumstance must be identified.

Planned Response

BCAG will use a method consistent with the California Climate Action Team for measuring temperature change within the study area. The baseline index, as measured from Chico, Oroville, and Gridley weather stations (or other stations deemed appropriate by Implementing Entity and Wildlife Agencies) will be historic temperatures from 1961 to 1990. For the purposes of the Plan, three baseline measurement periods will be set using 1961 to 1990 historic temperatures: average annual temperature, average summer temperature (June, July, and August), and average winter temperature (December, January, and February). If modeled California climate-change trends are applied to the study area, one may anticipate that the temperature could increase up to 2.8°C during the permit term. Under the Plan, the following is considered changed circumstances for which remedial measures will be funded:

- A temperature increase greater than 2.8°C will be considered an unforeseen circumstance. Temperature increases will be measured for the three baseline periods measured as a 10-year running average.

BCAG's response to the changed circumstance of global climate change will vary by the character and magnitude of the physical and biological changes observed. Responses may include those listed below. All responses will occur within one year of identifying changed circumstances, unless the USFWS, NMFS, and CDFW concur on a case-by-case basis that specific remedial actions would require more time to initiate.

- Enhanced monitoring to detect ecological responses to climate change (see Chapter 5, *Conservation Strategy*).

- Identification of target species most vulnerable to climate change and increased monitoring for those species.

- Alterations to the conceptual ecological models for natural communities and covered species as a tool to devise improved management actions (see Chapter 5, *Conservation Strategy*).

- Altered or more intensive management actions on target/vulnerable species to facilitate shifts in species distribution (e.g., more active population management of covered species).

- More aggressive control of invasive species that respond positively to climate change.
- Implement other measures through the adaptive management process (see Section 7.3) in ways consistent with permit obligations and with the consent of BCAG.

Unforeseen Circumstances

Thresholds for events that are not reasonably foreseeable have been established for determining unforeseen circumstances. Unforeseen circumstances not funded by the BRCP include the following.

- A temperature increase greater than 2.8°C will be considered an unforeseen circumstance. Temperature increases will be measured for the three baseline periods measured as a 10-year running average.

Limits on the variation in other parameters (e.g., rainfall) are much more difficult to determine. Given the seasonality of rainfall in the study area, an increase in winter precipitation may be offset by increased evapotranspiration during the summer months (Intergovernmental Panel on Climate Change 2007). A decrease in winter precipitation would be exacerbated by increased summer temperatures, leading to increased drought. Therefore, it is not possible at this time to define limits of rainfall patterns that would qualify as unforeseen circumstances. Regardless of increases or decreases in precipitation, it is anticipated that the number of strong storm events would increase during the winter season. These events are more likely to result in flooding than in increased soil percolation or water storage recharge (California Natural Resources Agency 2009). Increased frequencies of flooding and drought are taken into account in the sections addressing these changed circumstances.

6. New Species Listings or Designation of New Critical Habitat

Nature of the Changed Circumstance

The USFWS, NMFS, or CDFW may list additional species as threatened or endangered under the ESA or California Endangered Species Act (CESA) (including designated CESA candidate species) that occur or could occur in the Plan Area and are not BRCP covered species. USFWS and NMFS may also designate or revise critical habitat. In the event that USFWS, NMFS, or CDFW lists a species not covered by the BRCP or designates or revises critical habitat, the provisions of this changed circumstance will be triggered.

Planned Response

BCAG will undertake the following measures in the event of the listing of a new species or designation/revision of critical habitat under state or federal endangered species laws that are present in the BRCP Plan Area:

- Evaluate the potential impacts of covered activities on the newly listed, proposed, or candidate species and on the primary constituent elements of newly designated critical habitat and conduct an assessment of the presence in areas of potential effect.

- Implement measures to avoid impacts to newly listed species until such time as the BRCP has been amended, if needed, to include the newly listed species as a covered species.

- If the designated critical habitat is for a BRCP covered species, implement measures to avoid impacts on the primary constituent elements of newly designated critical habitat until such time as the BRCP has been amended, if needed, to address any such impacts on the designated critical habitat.

- If the designated critical habitat for a newly listed species is not covered under the BRCP, implement measures to avoid impacts on the constituent elements of newly designated critical habitat until such time as the BRCP has been amended, if needed, to include the newly listed species as a covered species.

In the event that a species not covered by the BRCP becomes listed as threatened or endangered or critical habitat has been designated or is proposed or petitioned for listing/designation, BCAG may request that USFWS, NMFS, and CDFW add the species to the relevant ESA, NCCPA or CESA take authorizations issued pursuant to the BRCP. In determining whether to seek take coverage for the species, BCAG will consider, among other things, whether the species is present in the Plan Area and if the covered activities could result in take of the species. If such take coverage is sought, the BRCP and its authorizations will be amended. Alternatively, BCAG, on behalf of the Permittees, could seek new and separate take authorizations.

8.4.2.3 Changed Circumstances Not Addressed in the BRCP

For changed circumstances that have not been provided for in the BRCP, USFWS and NMFS regulations limit the extent to which the Permittees need to respond as follows.

> If additional conservation and mitigation measures are deemed necessary to respond to changed circumstances and such measures were not provided for in the plan's operating conservation program, the [USFWS] Director will not require any conservation and mitigation measures in addition to those provided for in the plan without the consent of the permittee, provided the plan is being properly implemented.[18]

8.4.3 Procedures for Addressing Unforeseen Circumstances

Under ESA regulations, if unforeseen circumstances arise during the term of the BRCP, USFWS and NMFS may "not require the commitment of additional land, water, or financial compensation, or additional restrictions on the use of land, water, or other natural resources

[18] 50 CFR §17.22(b)(5)(ii); see corresponding regulation for NMFS at 50 CFR §222.307(g)(3)(i).

beyond the level otherwise agreed upon for the species covered by the conservation plan" unless the BRCP Permittees consent.[19] Within these constraints, USFWS and/or NMFS may require additional measures under the following conditions.

> If additional conservation and mitigation measures are deemed necessary to respond to unforeseen circumstances, the [USFWS] Director may require additional measures of the permittee where the conservation plan is being properly implemented, but only if such measures are limited to modifications within conserved habitat areas, if any, or to the conservation plan's operating conservation program for the affected species, and maintain the original terms of the conservation plan to the maximum extent possible. Additional conservation and mitigation measures will not involve the commitment of additional land, water or financial compensation or additional restrictions on the use of land, water, or other natural resources otherwise available for development or use under the original terms of the conservation plan without the consent of the permittee.[20]

USFWS and NMFS bear the burden of demonstrating that unforeseen circumstances exist. A finding of unforeseen circumstances must be clearly documented, based upon the best available scientific and commercial information, and made considering certain specific factors[21]. If such a finding is made and additional measures are required, the BRCP Permittees will work with USFWS and/or NMFS to appropriately redirect resources to address the unforeseen circumstances.

The NCCPA provides that, in the event of unforeseen circumstances, CDFW shall not require "additional land, water, or financial compensation or additional restrictions on the use of land, water, or other natural resources…without the consent of the plan participants for a period of time specified in the implementation agreement." However, such assurances are not applicable in those circumstances in which CDFW determines that the plan "is not being implemented consistent with the substantive terms of the implementation agreement"[22]. If such a determination is made by CDFW and additional measures are required, the BRCP Permittees will work with CDFW to appropriately redirect resources to address the unforeseen circumstances.

8.5 FUTURE SECTION 7 CONSULTATIONS UNDER ESA

Other parts of the ESA may affect the implementation of the BRCP following the issuance of ESA section 10(a) permits, specifically future ESA section 7 consultations on proposed projects in the Plan Area that require other federal approvals or funding. An important goal of the BRCP is to provide a framework for ESA compliance for covered species for all covered activities in the Plan Area. Whether a covered activity occurs under section 7 or 10 of the ESA, the BRCP provides the framework for the conservation of all covered species. For some future projects,

[19] 50 CFR §17.22(b)(1)(5)(iii); 50 CFR §222.307(g)(3)(iii).
[20] 50 CFR §17.22(b)(5)(iii)(B); see corresponding regulation for NMFS at 50 CFR §222.307(g)(3)(ii).
[21] 50 CFR §17.22(b)(5)(iii)(C), 50 CFR §222.307(g)(3)(iii).
[22] Fish and Game Code §2820(f)(2).

with nexus to a federal action, ESA consultation under section 7 of the ESA will still be required even after the BRCP is complete.

Federal projects that are subject to section 7 of the ESA are evaluated under different standards than non-federal projects subject to section 10 of the ESA. Non-federal projects must obtain a permit for take of listed species, while federal agencies must consult with USFWS or NMFS whenever their actions have the potential to affect a listed species. For example, the definition of "affect" differs slightly from that of "take" and may be applied differently, depending on the species and the project.

The BRCP is not intended to alter the obligation of other federal agencies to consult USFWS or NMFS pursuant to section 7 of the ESA. Unless otherwise required by law or regulation, USFWS and NMFS will ensure that biological opinions issued for projects that are defined as covered activities under the BRCP are consistent with their intra-service biological opinions and the section 10 permits issued for the BRCP. Section 7 consultations under the ESA only apply to federally listed species, so only those covered species that are federally listed at the time of the consultation need be included in the consultation. Unless otherwise required by law or regulation, USFWS and NMFS will not impose measures on BRCP applicants (i.e., the Permittees and other project proponents under the BRCP) in excess of those that have been or will be required by the Implementing Agreement, the BRCP, and the federal permits.

No surprises assurances cannot be provided to federal agencies under the ESA section 7 process.[23] However, prior to completing a section 7 consultation for a covered activity in which USFWS or NMFS proposes to require a measure in excess of the requirements of the Implementing Agreement, the BRCP, or the federal permits, USFWS and NMFS will meet and confer with BCAG and the Permittee with jurisdiction over the affected project to discuss alternatives to the imposition of the measures that would meet the applicable legal or regulatory requirements. USFWS and NMFS will process ESA section 7 consultations for covered activities in accordance with the established regulatory process and deadlines.[24]

8.6 PERMIT DURATION AND RENEWAL, ADMINISTRATIVE CHANGES, PLAN AMENDMENTS, AND SUSPENSION AND REVOCATION

8.6.1 Permit Duration and Renewal

The Permittees are seeking permits from USFWS, NMFS, and CDFW to implement the BRCP and retain incidental take coverage under those permits for a term of 50 years. The term of the take authorizations under the BRCP would begin from the date of full BRCP authorization by federal, state, and local agencies and the issuance of federal and state permits. The Permittees may apply to USFWS, NMFS, and CDFW to renew their permits for an extended duration prior

[23] 50 CFR Section 17.22(b)(5)
[24] 50 CFR Section 402.14

to their expiration or develop a new HCP/NCCP. The rationale for the 50-year permit duration is provided in Section 1.3.6, *Permit Duration*.

8.6.2 Administrative Changes without Modification, Revision, or Amendment

Administrative changes are internal changes or corrections to the BRCP that do not require preauthorization from USFWS, NMFS, and CDFW. Administrative changes do not result in any changes to the impacts analysis, conservation strategy, or decision documents. Administrative changes will be made in writing and documented by BCAG. The USFWS, NMFS, and CDFW will be provided a summary of administrative changes in each annual report. Examples of administrative changes include, but are not limited to, the following:

- Corrections of errors in the BRCP text that do not change the intended meaning or obligations;
- Day-to-day implementation decisions, such as modifying irrigation schedules for restored habitats on the basis of observed water needs of planted vegetation;
- Adjustments to the design of directed studies;
- Adjustments to monitoring methods to incorporate new USFWS, NMFS, and CDFW monitoring protocols;
- Changes to the fees to address inflation and actual implementation costs;
- Changes in JPA members and Implementing Entity staff and roles; and
- Changes in the membership of BRCP advisory committees.

8.6.2.1 Procedures for Administrative Changes

Administrative changes will be made in writing and documented by BCAG. USFWS, NMFS, and CDFW will be provided a summary of administrative changes in each annual report.

8.6.3 Minor Modifications

To respond appropriately to new information, scientific understanding, technological advances, and other such circumstances, BCAG may need to make minor modifications to the BRCP. Minor modifications are primarily expected to address the need for technical updates. Minor modifications are changes that would not adversely affect covered species, the conservation strategy, the level of take or impacts on covered species, or the obligations of Permittees described in the BRCP. Minor modifications do not require an amendment to the BRCP permits or Implementing Agreement (see Appendix L). Minor modifications require pre-approval by

USFWS, NMFS, and CDFW. Minor modifications may include, but are not limited to, the following:

- Minor corrections to land ownership descriptions;
- Changes to survey, monitoring, reporting, and/or management protocols described in Section 7.3;
- Modification of existing or adoption of additional conservation measures that improve the likelihood of achieving covered species objectives;
- Transfers of habitat protection and restoration targets among the CAZs that do not affect the level of conservation benefits provided to the targeted covered species or preclude achieving the biological goals and objectives described in Section 5.3;
- Updates/corrections to the vegetation or other resource maps, species occurrence data, and other biological data; and
- Other proposed changes to the BRCP that USFWS, NMFS, and CDFW have determined to be appropriate for implementation as a minor modification.

8.6.3.1 Procedures for Minor Modifications

Minor modifications require pre-approval by USFWS, NMFS, and CDFW. The Implementation Entity, Permittees, USFWS, NMFS, and CDFW may propose minor modifications by providing a written request to each of these parties. Requests will include a description of the proposed change, an explanation of the reason for the proposed change, an analysis of the effects of the change on impacts to covered species and natural communities, and a description of why the effects of the proposed change would not differ from the biological effects described in the original BRCP, conflict with the terms and conditions of the original BRCP, or substantially affect BRCP implementation.

All minor modifications must first be approved by BCAG and then provided to USFWS, NMFS, and CDFW for final approval. To modify the BRCP without amending the permits, BCAG will submit to USFWS, NMFS, and CDFW a written description of the proposed change and an explanation of why its effects are not believed to be significantly different from those described in the original BRCP.

Upon receiving the proposal for a minor modification, USFWS, NMFS, and CDFW may authorize the modification, request additional information, or deny the modification. If USFWS, NMFS, and CDFW concur with the proposed change, they will authorize the modification in writing, and the modification shall be considered effective on the date of USFWS, NMFS, and CDFW's written authorization. If USFWS, NMFS, and CDFW determine that the proposed change lacks specific information, they may request additional information necessary to

authorize or deny the modification. If USFWS, NMFS, and CDFW deny the modification, they will provide a written explanation for the denial.

USFWS, NMFS, and CDFW will not approve minor modifications to the BRCP if they determine that the modifications would result in adverse effects on covered species or natural communities that are significantly different from those analyzed in the Plan. If USFWS, NMFS, or CDFW denies a proposed modification, it may be proposed as a formal amendment as described in Section 8.6.4, *Formal Amendments*. USFWS, NMFS, and CDFW will make every effort to respond to proposals from BCAG for minor modifications within 60 days of receipt.

8.6.4 Formal Amendments

Over the term of the BRCP, it may be necessary to substantially amend the BRCP to address new conditions not envisioned during the BRCP planning process. Such instances are expected to be infrequent or may not occur over the term of the BRCP. Any proposed changes to the BRCP that are not considered to be administrative changes or minor modifications will require a formal amendment. Formal amendments will also require corresponding amendments to the BRCP authorizations and permits, in accordance with applicable laws and regulations regarding permit amendments. BCAG will be responsible for submitting any proposed amendments to USFWS, NMFS, and CDFW.

Formal amendments include but are not limited to the following:

- Revisions to the Plan Area boundary;[25]
- Adding new covered species;
- Increasing the allowable take limits;
- Adding new covered activities;
- Changes to biological goals and objectives if monitoring or research indicate that they are not attainable because technologies to attain them are either unavailable or infeasible;
- Permit renewal; and
- Adjustments to BRCP implementation schedules that extend the scheduled implementation of conservation actions.

8.6.4.1 Procedures for Formal Amendment

Formal amendments will generally involve the same process that was required for the original approval of the BRCP ESA section 10(a)(1)(B) and NCCPA section 2835 permits. Amendments

[25] Synonymous with the BRCP Permit Area.

will require approval of BCAG and all Permittees affected by the amendment, prior to submission of any proposed amendments to USFWS, NFMS, and CDFW.

For the USFWS and NMFS section 10(a)(1)(B) permits, the formal amendment process would include a revised BRCP, a permit application form, any required fees, a revised Implementing Agreement, the required compliance documents under NEPA and section 7 of the ESA. The appropriate NEPA compliance process and document will depend on the nature of the proposed amendment. A new scoping process may be required, dependent upon the nature of the amendment. If additional scoping is deemed appropriate and necessary, USFWS and/or NMFS will publish a notice of intent in the Federal Register to initiate the scoping process. Upon submission of a completed application package, USFWS and/or NMFS will publish a notice of availability of the proposed application in the Federal Register, initiating the NEPA and HCP amendment review process. After public comment, USFWS or NMFS may approve or deny the permit amendment application.

For the section 2835 permit, the formal amendment process would include a revised BRCP, a revised Implementing Agreement, the required compliance documents under California Environmental Quality Act (CEQA) and NCCPA (e.g., NCCPA Determination). The appropriate CEQA compliance process and document will depend on the nature of the proposed amendment. A new scoping process may be required, dependent upon the nature of the amendment. If additional scoping is deemed appropriate and necessary, BCAG will publish a notice of preparation to initiate the scoping process. Upon submission of a completed application package, BCAG will conduct any necessary public review and public hearing processes under CEQA. After public comment, CDFW will make its NCCPA determination and may approve or deny the permit amendment application.

8.6.5 Permit Suspension or Revocation

USFWS, NMFS, and CDFW have the ability in accordance with applicable State and Federal law to suspend or revoke all or part of the BRCP permits in the event that the Permittees are out of compliance with the BRCP requirements, the Implementing Agreement, or the permits. USFWS and NMFS have the ability to suspend or revoke all or part of the ESA permits if continuation of covered activities appreciably reduces the likelihood of the survival and recovery of the species in the wild[26]. CDFW has the ability to suspend or terminate all or part of the NCCP permit if revocation or termination is required to avoid jeopardizing the continued existence of that portion of a covered species' range that occurs within the Plan Area and to fulfill a legal obligation of the CDFW under the NCCPA.[27] If such a situation arises, USFWS, NMFS, and CDFW will notify the Permittees of the actions they must take, if any, to prevent jeopardy to the listed species and maintain the permits, giving the Permittees a reasonable opportunity to implement such actions. If one or more of the permits are revoked, the Permittees have the obligation to fulfill all outstanding mitigation requirements, including management and

[26] 50 CFR §§13.28–13.29, 50 CFR§17.22(b)(8) and §17.32(b)(8).
[27] Fish and Game Code §2820 and §2823.

monitoring of the BRCP conservation lands system in perpetuity, for any take that occurs prior to the revocation.

8.7 PROCESS FOR BRCP IMPLEMENTATION

This section provides guidance and clarification on various aspects of the implementation of the BRCP. In most instances, Chapter 5, *Conservation Strategy*, provides sufficient detail to understand what actions are to be taken, but this section provides some important information that connects different components of the Conservation Strategy and focuses on some key implementation details and requirements.

8.7.1 Components of Implementation

Implementation of the BRCP will be driven by the following major components of the Conservation Strategy:

- Site surveys
- Impact avoidance and minimization
- Limitations on impacts
- Mitigation actions
- Ecological targets
- Conservation land assembly principles
- Monitoring
- Adaptive management
- Post-BRCP Permits Administration and Managment

Each of these components is described in Chapter 5, *Conservation Strategy*. Relevant information regarding plan implementation for each of these components is discussed below.

8.7.1.1 Site Surveys

Use of BRCP Land Cover GIS database information and on-ground surveys for natural communities, land cover types, species habitat, species occurrences, and jurisdictional wetlands and other waters of the United States are required to determine impacts of covered activities and to guide avoidance and minimization measure (AMM) implementation (see Chapter 6, *Conditions on Covered Activities*). Survey requirements for specific resources are described in the AMMs (Chapter 6, *Conditions on Covered Activities*). These surveys must be conducted and

potential impacts assessed by Permittees or third party project proponents for all project sites prior to approval for the use of the ESA and NCCPA Take Permits. Results of surveys must be submitted by project proponents to BCAG.

The amount and type of land cover that will be permanently and temporarily impacted at the proposed project site will be determined through surveys conducted by the project proponent. All calculations and other information provided in application packages will be verified by the Permittee authorizing the project or BCAG so that all impacts on land cover types can be tracked appropriately and appropriate fees paid. Surveys of land cover by the project proponent must use the same classification system used in the BRCP, unless otherwise approved by BCAG.

Calculations of land cover acreages can be performed through air-photograph analysis or field verification. Project proponents may request assistance from BCAG in this analysis. Field verification may need to be performed using a qualified biologist. Land cover type classification will be conducted in accordance with the descriptions provided in Section 3.4.4, *Land Cover Type Descriptions*. If the project site supports or may support wetland, pond, or stream land cover types that would be affected by the proposed project, a formal delineation will be conducted using appropriate methods under the CWA and verified by U.S. Army Corps of Engineers (USACE).

All land cover determinations provided by project proponents will be verified by BCAG. A project proponent may retain Implementing Entity staff to conduct this land cover mapping.

Lands considered for acquisition by BCAG to protect existing natural communities and species habitat or for restoration of natural communities and species habitat must be surveyed prior to and following acquisition to determine the species habitat and ecosystem functions. Requirements for these surveys are provided in Chapter 6, *Conditions on Covered Activities*.

Upon request, BCAG will provide a list of qualified biologists to conduct land cover mapping and other surveys required by the BRCP to project proponents, other Permittees, and Special Participating Entities. Biologists qualified to conduct wildlife surveys will have experience with surveying for the specific covered species with the potential to occur at the project site, will be experienced with required survey protocols, and will hold all necessary permits. Biologists qualified to conduct rare plant surveys will have experience with surveying for the specific covered species with the potential to occur at the project site, will be experienced with required survey protocols, and will hold all necessary permits. Biologists and other professionals qualified to conduct land cover mapping will have demonstrated experience conducting vegetation mapping in the field and from aerial photographs at the scale of the proposed project and in vegetation types similar to those on the project site. This list of qualified biologists will be updated regularly and will receive concurrence from USFWS and CDFW.

8.7.1.2 Impact Avoidance and Minimization

The BRCP includes specific actions to prevent and minimize adverse effects on covered species and natural communities. These actions are called AMMs and are described in Chapter 6, *Conditions on Covered Activities*. The necessity for AMMs is based on the presence of specific natural communities, species habitat, and species occurrences on and adjacent to a project site using existing information and the results of required BRCP site surveys. The use of appropriate AMMs must be identified and planned prior to project construction and must be implemented during the project construction. Project proponents are required to comply with all AMMs applicable to the specific project and to provide BCAG with a plan prior to project implementation describing how AMMs will be implemented.

For some covered species that are extremely rare and sensitive to the loss of even a small number of individuals (e.g., veiny monardella, hairy Orcutt grass, slender Orcutt grass), no take of individuals or occurrences is allowed under the BRCP, though unoccupied habitat may be removed. These species are identified in Table 6–3, *Take Limits for Covered Species and Avoidance and Minimization Criteria for Covered Species*. For some covered species with particularly vulnerable life stages (e.g., active raptor nest sites), impacts on those specific life stages must be avoided (see Table 6–3).

8.7.1.3 Limitations on Impacts

The BRCP includes limits to impacts on and to the level of take of individuals, occurrences, and habitat of covered species within each urban permit area (UPA) and within each CAZ outside the UPAs (see Table 4–9, *Maximum Extent of Permanent Direct Impacts on Modeled Covered Species Habitat Types and Known Occurrences by CAZ and UPA*) and additional limits to impacts on and take of covered species are identified in Table 4–6, *Take Limits for Covered Species*. The BRCP also includes limits to the acreage of natural community and land cover type removal (i.e., permanent direct effects) allowable within each UPA and within each CAZ outside of the UPAs (see Table 4–3, *Maximum Extent of Natural Communities and Land Cover Types Removed (Permanent Direct Effects) with Implementation of the Covered Activities in CAZs and UPAs*). Permittees are not authorized to exceed any of these limits within a given UPA or CAZ during BRCP implementation without an authorization by USFWS, NMFS, and CDFW via the minor modification process (see Section 8.6.3, *Minor Modifications*) or an amendment to the permit (see Section 8.6.4). Any loss of natural communities inside or outside of UPAs that result from actions that are not covered under the BRCP does not count toward the direct impact acreage limits under the Permits. Such activities would be covered under separate ESA and CESA authorizations and are addressed in the analysis of cumulative impacts (see Section 4.6, *Cumulative Effects*).

For the most sensitive natural communities (i.e., grassland with vernal swale complex, emergent wetlands, aquatic, and riparian natural communities) and some covered species habitats the limit

on impact acreage is less than the GIS-calculated[28] permanent direct impacts of planned future development under the various general plans. These impact limits are reflected in Table 4–3 and 4-9 and reductions from the GIS "footprint" are described in footnotes to these tables. While sufficient acreage of take has been provided under the BRCP to ensure implementation of the vast majority of likely general plan impacts, these impact limits for natural communities and species habitat will result in the cities and County having to work with project proponents in certain cases to avoid or reduce impacts to these sensitive natural communities and species habitats to remain under the allowable impact limit for each UPA and for CAZs outside the UPAs.

All impact acreage limits set for UPAs are based on planned future development under the general plans (see red-shaded areas inside UPAs in Figures 4–1 through 4–4). Note, however, that much natural habitat remains on parcels considered to be existing developed parcels (see gray-shaded areas inside UPAs in Figures 4–1 through 4–4). This condition exists because certain parcels that were considered to be developed by land use planning processes may still support largely undisturbed habitat and were considered to be developed because they have been built to their zoning limits or were infill parcels already surrounded by urbanized lands.[29] Any removal of habitat within a UPA, whether or not that impacted habitat is within a parcel identified as planned future development or existing development, is counted towards the direct impact acreage limit for the specific natural community for that UPA (the same applies to impacts and impact limits in CAZs outside UPAs).

Impacts of covered activities are not required to stay within the parcels identified as planned future development depicted as red-shaded areas inside UPAs in Figures 4–1 through 4–4, however, impacts must stay within the UPA. It is the amount of impact on each covered species habitat and land cover type that must be limited within the UPA.

BCAG must track the loss of natural communities and species habitat by UPA and CAZ working with information on development projects provided by the cities, County, or project proponent and ensure that impact limits for natural communities and covered species are not exceeded. More information on the tracking of impacts of covered activities is provided in Section 8.7.5, *Tracking Impacts and Conservation Targets*.

[28] The straight GIS calculation is based on the intersection of mapped biological resources (land cover types or species habitat model results) with parcels identified for planned future development. For certain biological resources, the allowable impact acreage was reduced from the GIS calculated impact acreage based on an evaluation of the distribution of these resources by parcel and the ability to avoid impacts.

[29] Note that assessor's parcels considered to be "developed" under the general plans and shown in gray shade in Figures 4–2, 4-3, and 4–4 include both developed land (i.e., sites where wildlife habitat has been removed) and undeveloped land (i.e., wildlife habitat). The presence of habitat on these parcels results from the fact that the land has been developed to its allowable use and that that use is often less than full removal of all habitat on the parcel. Developed parcels are not the same as the BRCP GIS classification "developed" (e.g., including land cover categories "urban," "ranchettes," and "disturbed ground"). The BRCP Land Cover GIS specifically identifies the location of developed land based on aerial image interpretation of land cover regardless of the parcel boundaries and theses lands are considered not to support wildlife habitat.

8.7.1.4 Mitigation Actions

The BRCP requires mitigation for impacts on natural communities and covered species habitat. Each natural community and covered species has a specified mitigation requirement for habitat protection and restoration based on the amount of the resource adversely affected by covered activities (see Table 5–11 for natural community mitigation requirements and Table 5–12, *Covered Species Mitigation Requirements for Permanent Direct Effects*, for covered species mitigation requirements). In all cases, the protected natural communities and species habitat must provide equal or higher function than the resources removed. BCAG will make a determination of whether the mitigation habitat must be of an equal or greater function than the affected natural community and habitat based on an assessment of the relative existing functions of the mitigation habitat to the affected habitat. Restoration of natural communities and species habitat is required to replace habitat. Mitigation is only necessary when a covered activity that would affect covered species or natural communities is planned for implementation. BCAG, however, may implement compensatory mitigation actions early to get a "jump start" on mitigation requirements prior to impacts (see Section 8.7.8*)*. This action would involve BCAG acquiring conservation lands or purchasing mitigation bank credits ahead of impacts to ensure that mitigation stays ahead of impacts per the Stay Ahead Provision.

Mitigation has geographic requirements by CAZ for all natural communities and covered species habitats. For vernal pool protection and restoration there is an additional requirement for mitigation to be provided on the same or similar geomorphic landform on which impacts are incurred. The geographic requirements for mitigation of each natural community and covered species are provided in Tables 5–11 and 5–12, respectively.

8.7.1.5 Ecological Targets for Conservation

The BRCP Conservation Strategy (Chapter 5, *Conservation Strategy*) includes specified protection and restoration acreage targets for natural community land cover types and covered species habitat to conserve ecosystem function and biodiversity and contribute to the recovery of species. These targets are reflected in the biological goals and objectives (Section 5.3.2, *Goal and Objective Statements*). The acreage targets are geographically based by CAZ. Protection targets for each CAZ are provided in Table 5–5, *Natural Community Protection Targets* for natural communities and Table 5–8, *BRCP Covered Species Modeled Habitat Protection Targets* for covered species habitat and restoration targets for natural communities are provide in Table 5–7. The acquisition targets presented in Tables 5–5 and 5–8 include both acquisition (i.e., protection) for mitigation and for conservation of natural communities and covered species. The conservation component and mitigation component of these targets are presented separately in Table 5–9 for natural communities and Table 5–10, *Covered Species Habitat Conservation and Mitigation Targets* for covered species. While the mitigation protection and restoration component will be implemented based on the timing of impacts of covered activities, the conservation protection and restoration components will be implemented in accordance with the implementation schedule presented in Table 8–1 and Table 8–3, respectively. All protection and

restoration for the conservation component must be completed on this schedule and all conservation targets must be met by Implementation Year 45. Mitigation must be completed commensurate with the actual level of impacts by the end of the permit term.

8.7.1.6 Conservation Land Assembly Principles

The acquisition of land to assemble the BRCP Conservation Land System will be conducted in an orderly manner following the precepts of conservation biology. Conservation land assembly principles are described in Section 5.2.3.4, *Spatial Considerations for Conservation Lands,* including principles for covered species occupied habitat, minimum patch size, community mosaics, watershed protection, ecological connectivity, and habitat corridors. These principles apply equally to lands acquired for mitigation and for conservation thus ensuring that the BRCP Conservation Lands System will be assembled as a single integrated preserve system based on the conservation land assembly principles.

8.7.1.7 Monitoring and Reporting

The BRCP includes a monitoring program that will provide information to ensure that the plan is being implemented successfully and to support adaptive management (see Section 7.2). The monitoring program includes compliance and effectiveness monitoring requirements and describes monitoring responsibilities.

BCAG's reporting requirements are described in Section 8.2, *Compliance and Progress Reporting Requirements.*

8.7.1.8 Adaptive Management

BCAG will use information collected from the BRCP monitoring program (Section 7.2) and relevant information from other sources (e.g., wildlife agency survey data, results of academic research), to adaptively manage conservation lands and protect covered species habitat and natural communities (see Section 7.3). The adaptive management program describes the decision making process whereby BCAG will adjust BRCP implementation based on new information that becomes available over the term of the BRCP to improve the effectiveness of management actions to achieve the biological goals and objectives (Section 5.3).

8.7.1.9 Post-BRCP Permits Administration and Management Activities

At the end of the BRCP permit terms, the BRCP conservation lands system will be fully assembled and all habitat enhancement and restoration conservation measures will have been implemented. Following the term of BRCP permits, BCAG will continue to perform ongoing administration and management activities necessary to maintain the intended ecological functions of BRCP conservation lands for natural communities and covered species in-perpetuity. Post-BRCP permit management activities will include the following.

- Maintenance of BRCP conservation land infrastructure (e.g., grading of roads, repair of fences, maintenance of fire breaks, maintenance of canals and ditches, repair/replacement of irrigation pumps);

- Management of conservation lands to maintain habitat functions (e.g., management of grazing uses, nonnative species control, delivery and management of water for managed wetlands);

- Implementation of adaptive management actions;

- Activities necessary to maintain restored giant garter snake habitat and greater sandhill crane wintering roost sites (e.g., maintenance of wetland berms, flooding of habitat areas);

- A continuation of some of the monitoring actions in the Monitoring Plan (see Section 7.2.5, *Post-BRCP Permit Monitoring Requirements*), including monitoring of restored habitat areas until fully functional; and

Administration of the BRCP (e.g., submittal of monitoring reports to USFWS, NMFS, and CDFW, review of conservation easements, coordination with local, state, and federal agencies and nongovernmental organizations involved in land conservation within and adjacent to the Plan Area).

8.7.2 Process for Use of Permits – ESA Section 10(a)(1)(B) and NCCPA Section 2835

BRCP Permittees (see Section 1.1, *Overview*), or third-party project proponents authorized by Permittees through certificates of inclusion, may take covered species under the ESA section 10(a)(1)(B) and NCCPA section 2835 permits (Permits) once compliance with the BRCP has been verified by the Permittee and BCAG. The following steps must be taken by project proponents (whether Permittees or third-party applicants) with each use of the Permits:

1. Verification by BCAG or Permittee that activities under a proposed project are included in the BRCP covered activities. The activities proposed by the project proponent must be included in Chapter 2, *Covered Activities,* and must be described by the project proponent in their application for use of the Permits.

2. Completion of required biological surveys (see Chapter 6, *Conditions on Covered Activities*, e.g., surveys for jurisdictional wetlands, fairy shrimp habitat, and Swainson's hawk nests) and submittal of survey reports to BCAG. Project proponents are responsible for conducting these surveys and preparing survey reports following all of the BRCP requirements. Project proponents may contract with and provide funding to BCAG to conduct the surveys and prepare survey reports. Project proponent must provide a map of the land cover types on the project site using the same classification

system as the BRCP Land Cover GIS (see Table 3–4, *Land Cover Type Mapping Criteria*), or a compatible classification system approved by BCAG.[30]

3. Determination of impacts. Calculation must be provided to BCAG of the impacts of the project's covered activities on BRCP land cover types in acres (or linear feet for stream channels), covered species habitat in acres (or linear feet for covered species with stream channel habitat) using the habitat modeling methods and classification (e.g., breeding habitat, foraging habitat) for each species presented in Appendix A, *Covered Species Accounts*, species occurrences in units appropriate to the species (e.g., occurrences of plants, nests of raptors), jurisdictional wetlands in acres, and other jurisdictional waters in acres or stream linear feet. See Section 8.7.5 for appropriate data sources for impact calculations.

4. Evaluate if impacts can be avoided. If the project proponent wishes to avoid impacts and reduce BRCP mitigation fee costs, they must identify such lands supporting natural communities or covered species habitat at the project site that are avoided to meet BRCP requirements for conservation lands (e.g., natural community type, species habitat, assembly rules, connectivity) at full project build out (i.e., avoided habitat would not sustain indirect impacts). For additional information on optional step of dedication of lands and how fee payment is affected, see Section 10.2.1.1.3, *Calculation of Fees for Individual Projects.*

5. Submission of a plan for implementation of AMMs. Based on the results of steps 1 and 3, applicable AMMs must be identified by the project proponent and included in an AMM implementation plan submitted to BCAG. Project proponents may prepare this plan or may contract with and provide funding to BCAG to prepare the AMM implementation plan for them.

6. Confirmation by Implementing Entity that all BRCP requirements have been met. BCAG will review, for the Permittees, all applications from project proponents to confirm that all BRCP requirements have been met.

7. Completion by the project proponent of all project specific environmental compliance (e.g., CEQA), permitting, and local authorizations.

8. Approval of the project by the authorizing entity (one of the Permittees), typically a city or the County.

9. Payment of mitigation fees (Section 10.2.1.1.3) to the city or County jurisdiction by the project proponent to be passed on to BCAG. Cities and the County may elect to have

[30] A compatible classification system (to be provided by the project proponents) can be cross-walked to all BRCP Land Cover classes without loss of information content. Compatible classifications systems may have more classification categories and levels and greater resolution and accuracy than the BRCP Land Cover Classification, but may not have fewer categories or lower resolution or accuracy.

project proponents pay their fees directly to BCAG. All other Permittees, such as water districts and Caltrans, will pay fees directly to BCAG.

10. Project proponent is authorized to use Permits by the Permittee with conditions and time limit specified by the Permittee and in full compliance with the BRCP.

Figure 8–1, *Process for Project Proponents Use of Permits* (see separate file) provides a graphical depiction of the process described above.

8.7.3 Payment of Fees

The method for calculating mitigation fees for individual proposed projects is described in Section 10.2.1.1.3. Fees include the Base Fee charged on all GIS mapped natural communities and covered species modeled habitat removed for the project. Section 10.2.1.1.4, *Avoidance of Resources to Reduce Fee,* provides a description and examples of fee requirements where habitat lands within a project site are dedicated to the BRCP as conservation lands.

The mitigation requirements for wetland resources (vernal pools and other seasonal wetlands, riparian land cover types, and permanent emergent wetlands) include protection and restoration components as presented in Table 5–11. The following is a summary of mitigation requirements (from Table 5–11) and fee payment requirements (Section 10.2.1, *Local Share Funding Sources*) for wetland resources.

Mitigation and fee requirements for impacts on vernal pools and other seasonal wetlands:

- Vernal pools and other seasonal wetlands removed by a project: mitigation requires 3:1 protection and 1:1 restoration; payment of Base Fee and Vernal Pool Restoration Fee required.

Mitigation and fee requirements for impacts on riparian land cover types:

- Cottonwood-willow riparian forest, valley oak riparian forest, dredger tailings with riparian forest (stream-associated), and willow scrub removed by a project: Mitigation requires 2:1 protection and 1:1 restoration; payment of Base Fee and Riparian Restoration Fee required.

- Dredger-tailings with riparian forest (not stream associated) removed by a project: Mitigation requires 1:1 protection and no restoration; payment of Base Fee required.

Mitigation and fee requirements for impacts on permanent emergent wetlands:

- Permanent emergent wetlands removed by a project: Mitigation requires 1:1 protection and 2:1 restoration; payment of Base Fee and Emergent Wetland Fee required.

Mitigation and fee requirements for impacts on USACE jurisdictional portions of managed seasonal wetlands:

- Jurisdictional portions of managed seasonal wetland removed by a project: Mitigation requires no protection and 0.5:1 restoration of vernal pool and swale wetlands; payment of Base Fee and one-half Vernal Pool Fee required.

Mitigation and fee requirements for impacts on managed wetlands:

- Managed wetlands removed by a project: Mitigation requires no protection and 1:1 restoration of either managed wetland or emergent wetland; payment of Base Fee and one-half Emergent Wetland Fee required.

Mitigation and fee requirements for impacts on USACE jurisdictional wetlands within agricultural lands (e.g., rice, irrigated cropland, and irrigated pasture):

- Jurisdictional wetlands within agricultural lands removed by a project: Mitigation requires 2:1 protection for entire acreage of same crop type within giant garter snake habitat or 1:1 protection for entire acreage of same crop type outside giant garter snake habitat and 0.5:1 restoration of permanent emergent wetland; payment of Base Fee and one-quarter Emergent Wetland Fee required.

The calculation of the acreage of natural communities and species habitat on which fees must be paid for a proposed project is as follows:

- For jurisdictional wetlands and other waters of the United States (including vernal pools, other seasonal wetlands, and emergent wetland),[31] the calculation of acreage is based on the results of the required on-ground jurisdictional delineation approved by USACE for the project site. The Vernal Pool Restoration Fee and the Emergent Wetlands Restoration Fee are calculated from these acreages.[32]

- For all other natural communities,[33] the calculation of acreage is based on planning surveys conducted by the project proponent. The Base Fee and the Riparian Restoration Fee are calculated from these acreages.[34]

[31] Note that portions of riparian forest and scrub communities meet jurisdictional wetland criteria under Section 404 of the Clean Water Act (CWA). For BRCP implementation, the full extent of all riparian mapped in the BRCP GIS land cover database is included in the riparian natural community calculation for impacts and conservation. If the USACE jurisdictional area for a riparian natural community should extend beyond the area mapped in the BRCP GIS land cover database, that additional area will be included in the fee calculation for the Riparian Restoration Fee.

[32] Fees for mitigation of impacts on vernal pools, other seasonal wetlands, and permanent emergent wetlands provide compliance for both endangered species impacts under ESA and NCCPA and wetlands impacts under CWA Section 404.

[33] Includes all agricultural lands that are identified in the BRCP as providing habitat for covered species.

[34] Fees for mitigation of impacts on riparian habitats provide compliance for both endangered species impacts under ESA and NCCPA and wetlands impacts under CWA Section 404 for those portions of the riparian habitat that meet the jurisdictional standard under CWA.

More information on the use of the BRCP GIS land cover database in BRCP implementation is provided in Section 8.7.5.

8.7.4 Land Acquisition

BCAG will acquire lands that meet BRCP site selection criteria (see Section 5.4.1.1.2, *Site Selection Criteria*) with the concurrence of USFWS and CDFW (protection of stream channels supporting covered fish species habitat will also include concurrence of NMFS). Lands may be acquired through various means to implement the BRCP and create the system of BRCP Conservation Lands. The Implementing Entity may acquire Conservation Lands via fee title, permanent conservation easement on private land, or land dedication to the Implementing Entity. In most instances, permanent conservation easement acquisitions are preferred, as they allow for continued land use practices in the working landscapes of Butte County (e.g., farming, ranching, and other land uses) and can be less costly to acquire and maintain compared to fee title acquisitions. In some instances, fee title acquisition will be necessary, such as for conservation lands where habitat will be restored, for conservation lands that require frequent access and more intensive habitat management, and instances where landowners are only interested in fee title sale of the land. In all cases, the BRCP JPA's Board of Directors must approve lands acquired for conservation in fee title.

All acquisition of land by BCAG will be with willing sellers whether the acquisition is via fee title or conservation easement.

BRCP Conservation Lands may also be acquired by the Permittees or other appropriate entities (e.g., state government agencies, local agencies, land trust or conservancy) as long as the property owner provides BRCP-level protection and management requirements and implements all applicable BRCP conservation measures, monitoring, and adaptive management.

Improving the level of protection and management of habitat on public and easement habitat lands (PEHL's) Category 2 (Figures 5–2 and 5–3, *Decision Matrix for Assigning Public and Easement/Habitat Lands (PEHL) Categories*) up to BRCP-level protection and management requirements is a means by which natural community and species habitat conservation targets can be met. For example, existing private easements, such as certain easements that are not as protective as permanent conservation easements or existing conservation easements that do not meet all of the BRCP protection criteria for conservation lands, may be augmented to meet BRCP standards (see Appendix M, *Conservation Easement Template*, for the minimum requirements for BRCP conservation easements). Similarly, state lands, that are in PEHL Category 2, implementation of changes in land designations by the state agency within the context of their respective agency regulations and mission may be used to bring the level of protection and management up to BRCP standards and qualify those lands as part of the BRCP Conservation Lands System and counted toward conservation component targets (but not mitigation component targets) for natural communities and covered species habitat. Conservation actions that are implemented on existing protected lands (i.e., Category 1 PEHL),

but that do not meet BRCP management, monitoring, and adaptive management standards, even though some level of natural community and covered species benefits are provided, will not be counted towards achieving conservation component targets.

All land included in the BRCP Conservation Lands System must have a permanent conservation easement the purpose of which is natural community and species conservation and management. Conservation easements on working lands (e.g., rice land, irrigated cropland, irrigated pasture, and rangeland) will be designed to protect species and habitats, while allowing certain compatible agricultural and grazing operations; keeping these viable for future generations of agriculturalists. Conservation easements requirements are described in Appendix M.

8.7.5 Tracking Impacts and Conservation Targets

Over the 50-year implementation period, BCAG will track the amount of take of covered species; the amount of impacts on natural communities, land cover types, and covered species habitat; and the achievement of conservation targets, both mitigation and conservation, for natural communities, covered species occurrences, and covered species habitat. This section describes required tracking of impacts and conservation by BCAG and some specific methods that must be used.

8.7.5.1 Tracking of Impacts

All individual proposed project (covered activities) sites under the BRCP must be surveyed for resources using a combination of remotely sensed and field surveyed information. Requirements for planning surveys are described under AMM1 in Section 6.2.1.1.1, *Biological Surveys and Evaluations*, and implementation requirements for project site surveys are described in Section 8.7.1.1, *Site Surveys*.

All individual projects implemented under the BRCP will be evaluated for the following.

1. **Impact Fee Calculation.** Measure the impacts on BRCP land cover types and Butte County meadowfoam habitat to determine the types and amounts of impact fees required (e.g., the Base Fee and additional specific fees on riparian habitats, vernal pools, emergent wetlands, and Butte County meadowfoam).

2. **Mitigation Requirements.** Measure the impacts on BRCP land cover types, covered species habitat, and covered species occurrences to determine the types and amounts of protection and restoration mitigation required.

3. **Tracking the Loss of Resources.** Measure the impacts on BRCP land cover types, covered species habitat, and covered species occurrences to track the loss of these resources by UPA, CAZ, and the Plan Area.

For some of these evaluations, the amount of impact on a particular resource may be measured in different ways for the different purposes listed above. For example, while individual project impact fee calculations will be based on results of project-specific mapping and field surveys of the acreage of impacts on the various land cover types present, the loss of each land cover type for the purpose of tracking impacts within the given UPA, CAZ, and the Plan Area will be calculated using the BRCP GIS data base at baseline conditions (i.e., October 31, 2011).

8.7.5.1.1 Impact Fee Calculation

The methods for calculating impact fees are provided in Section 10.2.1.1.3. Impact fee calculations are based on the results of acreage calculations from planning surveys at the time the project is proposed, and not on the BRCP GIS database at October 31, 2011 baseline conditions. The mapped boundaries of land cover types and jurisdictional wetlands by project proponents at the time of the proposed project will be used.

8.7.5.1.2 Mitigation Calculations

The methods for calculating protection and restoration mitigation for each land cover type are provided in Table 5–11 and for each covered species in Table 5–12. Mitigation calculations are based on the amount of the resource adversely affected by covered activities. Implementation requirements for mitigation are described in Section 8.7.1.4, *Mitigation Actions*. Mitigation calculations are based on the results of acreage calculations from planning surveys, and not on the BRCP GIS database for October 31, 2011 baseline conditions. The mapped boundaries of land cover types and jurisdictional wetlands by project proponents at the time of the proposed project will be used.

8.7.5.1.3 Tracking of the Loss of Resources

To ensure that the covered activities do not exceed the allowable take of covered species or the limit on impacts on land cover types, covered species habitat, and covered species occurrences under the BRCP, BCAG will track the cumulative amount of these impacts as each covered activity is approved. Limits on the amount of permanent direct effects (i.e., removal by covered activities) for each natural community and land cover type allowable by UPA, CAZ, and the Plan Area under the BRCP are provided in Table 4–3. The limits on the amount of permanent direct effects (i.e., removal by covered activities) for each covered species modeled habitat and occurrences allowable by UPA, CAZ, and the Plan Area under the BRCP are provided in Table 4–9 and additional limits on take of covered species are provided in Table 4–6. Implementation requirements for limiting impacts are described in Section 8.7.1.3, *Limitations on Impacts*.

The tracking of impacts to assess compliance with BRCP impact limits will be based on the BRCP "baseline conditions," which are the existing ecological conditions as of October 31, 2011. The purpose of identifying a date of baseline conditions is to allow for an analysis of changes in land cover types and modeled species habitat based on a fixed point in time. The date

of October 31, 2011 is used because this is the date of the BRCP Land Cover GIS database used to develop the BRCP.

To ensure an "apples-to-apples" comparison of project impact acreage to the baseline conditions acreage of land cover types and modeled covered species habitat, the calculation of the acreage of the permanent direct loss of land cover types and modeled covered species habitat resulting from the implementation of covered activities will be based on land cover information in the BRCP Land Cover GIS database. The footprint impacts identified in each project application will be overlain with the BRCP Land Cover GIS data to determine the acreage of each land cover type that will be removed by the project. Similarly, the footprint elements of each project will be overlain with each covered species habitat model and known plant species occurrences to determine the acreage of each covered species modeled habitat and plant species occurrences that will be removed by the project.

The amount of land cover type and modeled covered species habitat loss may be modified following project completion if actual impacts differ from impacts calculated based on the project design. If the BRCP Land Cover GIS is clearly in error as to land cover type of a specific polygon intersecting a proposed project site (e.g., a polygon that is clearly oak woodland is attributed as grassland in the database), then the BRCP Land Cover GIS database may be corrected and the correct land cover type identified in the impacts tracking. The BRCP October 31, 2011 baseline mapping of land cover types will only be revised by BCAG if, based on results of planning surveys, obvious errors are identified in the original mapping.

Changes in land cover from baseline conditions in October 31, 2011, may result from activities not covered or tracked under the BRCP. For example, agricultural practices that convert cropland to orchard would affect the extent of habitat for several covered species. Such changes in land cover would be captured in the regular monitoring of land cover changes in the Plan Area every 5 years under the Monitoring Plan (see Section 7.2 and specifically Table 7–2, *Landscape-Level Effective Monitoring Actions and Example Monitoring Approaches and Metrics*, LLM3). If a covered activity is proposed for a site in which baseline conditions have changed, BCAG will track the impacts on land cover type and covered species habitat from the baseline condition, but project-specific fees and mitigation will be calculated based on the conditions at the time of the project.

The reason for using the BRCP Land Cover GIS to track compliance with BRCP impact limits and planning surveys to calculate impact fees and mitigation requirements relates to the comparable data for BRCP compliance at the regional scale and data resolution and accuracy at the project scale. The BRCP Land Cover GIS was developed at a scale and resolution to meet the regional planning needs for developing the BRCP and the impact analysis was conducted using this database. Continuing to use the BRCP Land Cover GIS to track impacts against the originally calculated impact limits ensures a comparison of data at the same scale and resolution and therefore an accurate depiction of change over time for each land cover type and modeled covered species habitat. Note that the species habitat models developed for the BRCP generally

overestimated the extent of species habitat to provide a higher level of certainty that impacts on actual species habitat would be captured in the analysis. Carrying forward the use of the species habitat models and underlying BRCP Land Cover GIS used in the models ensures that impacts tracking will capture the proportion of habitat lost, even if the actual amount is embedded within the total acreage calculated.

In contrast to impact tracking at the regional scale, project specific impact calculations can be based on high resolution data on land cover types and species habitat gathered from planning surveys. These more refined data can then be used to more accurately and fairly calculate impact fees and mitigation requirements.

For the purpose of tracking impacts on covered species modeled habitat removed by covered activities, covered species habitat will be based on the habitat models presented for each covered species in Appendix A, except in cases of species habitats for which the BRCP requires measurement based on field surveys (e.g., covered plant species occurrences).

For the purpose of tracking impacts on CWA jurisdictional wetlands and other waters of the United States removed by covered activities, calculations of acreages will be made using specific USACE delineation protocols.

BCAG will track the cumulative amount of impacts approved under the BRCP for land cover types, modeled covered species habitats, and covered species occurrences and ensure that those amounts do not exceed the authorized impact limits for UPAs, CAZs, and the Plan Area described in Tables 4–6, 4–7, *Avoidance and Minimization Measures that Reduce the Level of Impact of the Covered Activities on Natural Community Land Cover Types and Covered Species*, and 4–9. The cumulative acreage of these impacts must be tracked continuously by BCAG for each UPA and areas of CAZs outside of UPAs. As use of the Permits is approved for each successive project the cumulative impact acreage is calculated. New projects cannot be approved that would affect one of these resources for which the impact limit has been reached within a given UPA or areas of the CAZ outside the UPA.

8.7.5.2 Tracking of Conservation Targets

Natural community land cover type conservation acreage targets by CAZ and the Plan Area for land protection are provided in Table 5–5 and for habitat restoration in Table 5–7. The mitigation portion of the conservation protection targets are presented in Table 5–9. The required timing for achieving conservation target acreages is described in Section 8.1. Targets by CAZ for covered species modeled habitat and covered plant species occurrences are provided in Table 5–8. Implementation requirements for conservation targets are described in Section 8.7.1.5, *Ecological Targets for Conservation*. Surveys required of properties under consideration for acquisition as BRCP conservation lands are described in Section 5.4.1.1.1, *Pre-Acquisition Surveys*. Additional surveys of BRCP conservation lands required to determine baseline conditions are described in CM5, Enhance Protected Natural Communities for Covered Species

(see Section 5.4.2, *Natural Community Conservation Measures*). The results of these surveys will be used by BCAG in tracking conservation targets.

BCAG will track the achievement of protection conservation targets for acreages of land cover types (or linear miles of channel for covered aquatic species), modeled covered species habitat, and covered species occurrences by CAZ. Conservation targets were established using the acreages and distribution of natural community land cover types in the BRCP Land Cover GIS (October 31, 2011 baseline conditions). Consequently, BCAG will use the BRCP Land Cover GIS (October 31, 2011 baseline conditions) and modeled covered species habitat data from Appendix A to cumulatively sum the protection of each resource relative to the BRCP baseline conditions as conservation lands are acquired. Only the target resources that are present on properties at the time of acquisition will be credited towards fulfillment of the protection targets. For example, if a land cover type present in October 31, 2011, no longer exists on a property acquired as BRCP conservation land, only the land cover type that is actually present on the property at the time of acquisition may be credited towards fulfillment of a conservation target.

The timing of protection and restoration of land cover types to achieve the conservation component of the BRCP will be tracked by BCAG to ensure that the acreage protection schedule provided in Table 8–1 and acreage restoration schedule are achieved. The time of protection and restoration of land cover types and species habitat for mitigation of impacts will be tracked by BCAG to ensure that the timing requirements as described in Section 8.1.1 are achieved and also to track any Jump Start and Stay Ahead acreage (see Section 8.7.8).

Conservation lands will be acquired through application of the conservation land assembly principles (see Section 5.2.3.4) to ensure that the highest functioning habitats available at the time acquisitions are made are protected by BCAG.

Tracking of the achievement of natural community and covered species habitat restoration targets will be based on the measured acreage of the completed restoration projects (i.e., all grading completed and plantings installed).

8.7.6 Use of Mitigation and Conservation Banks

BCAG may elect to use USFWS, CDFW, and USACE approved private or public mitigation and conservation banks within the Plan Area to help implement conservation measures and achieve the goals and objectives of the BRCP. Credits in mitigation and conservation banks may be purchased to contribute to achieving targets for the protection and restoration of natural communities and covered species occurrences and habitat. For BCAG to use a mitigation or conservation bank for BRCP purposes, the conditions at the bank must meet all of the BRCP criteria (e.g., level of land protection, quality of habitat, conservation land assembly principles, management plans, monitoring) for the natural communities and covered species or must be brought up to BRCP standards to be credited to the BRCP.

To ensure a level playing field for all mitigation and conservation bank owners and competitive pricing, BCAG will establish a process for purchasing mitigation bank credits towards fulfilling BRCP goals and objectives. This purchasing process will include a "request for proposals" step such that all mitigation and conservation banks have an opportunity to bid.

8.7.7 Voluntary Nature of BRCP for Project Proponents

A project proponent of a covered activity will not be required to comply with the conditions in the BRCP or pay any BRCP fees if the project proponent:

1. Provides written confirmation to BCAG that the USFWS, NMFS, CDFW, and USACE have determined that the activity is not subject to ESA, CESA, and CWA, or

2. Has already received the necessary authorizations under ESA, CESA, and CWA, or

3. Has otherwise complied with ESA, CESA, and CWA.

An activity will be deemed to be in compliance with the ESA, CESA, and CWA by BCAG and thus be exempt from the conditions in the BRCP if the proponent provides the following:

1. Letters from USFWS, NMFS, and CDFW that specifically refers to the activity and states that the activity is not likely to result in take of any federally or state listed species and will not preclude successful implementation of the BRCP conservation strategy for any and all of the covered species, or

2. A copy of an incidental take permit issued by CDFW for the activity, and copies of incidental take statements or incidental take permits issued by USFWS and NMFS that authorize the incidental take associated with the proposed activity.

An activity will be deemed to be in compliance with the CWA by BCAG and thus be exempt from the conditions in the BRCP if the proponent provides the following:

1. Letter from USACE that specifically refers to the activity and states that the activity will not result in the placement of dredge or fill material into waters of the United States, including wetlands, and will not preclude successful implementation of the BRCP conservation strategy, or

2. A copy of a CWA section 404 permit issued by USACE for the activity that authorizes the fill of jurisdictional wetlands and other waters of the United States.

8.7.8 Jump Start and Stay Ahead Provisions

NCCPA requires that the timing and extent of mitigation actions be roughly proportional to the impacts. The BRCP will meet these requirements of the NCCPA, in part, through Jump Start and Stay Ahead provisions (see also Section 8.1.1).

"Jump Start" refers to initiation of habitat conservation (both protection and restoration) prior to impacts of covered activities on those habitats or covered species. "Stay Ahead" refers to maintaining at least some of the Jump Start to ensure that the conservation of each habitat and covered species at a given time is always adequate to achieve the mitigation requirements for the specific habitat and covered species prior to the implementation of covered activities that impact that habitat or covered species. BCAG will ensure that all natural communities and species habitat is conserved in roughly proportional timing in order to stay ahead of impacts on natural communities and species habitat.

The BRCP implementation schedule (see Table 8–1 for habitat protection, Table 8–2 for special species actions, and Table 8–3 for habitat restoration) requires that natural community protection and restoration actions contributing to the conservation of covered species be implemented by specified points in time during BRCP implementation. Habitat and natural community mitigation actions are required to be implemented in accordance the timing described in Section 8.1.1.

BCAG will seek to implement protection and restoration of habitat early in BRCP implementation to achieve a Jump Start. Once the Jump Start is achieved, BCAG will strive to Stay Ahead of impacts of covered activities. As allowable and appropriate,[35] BCAG may use habitat protected and restored for the purpose of natural community conservation and species conservation for the purposes of Jump Start and Stay Ahead for the impacts of covered activities on natural communities and covered species habitat until mitigation actions to protect and restore natural communities and habitat can be implemented. At a minimum, BCAG will meet the requirements for the timing of mitigation identified in Section 8.7.1.4.

8.8 ALLOWABLE ACTIVITIES IN BRCP CONSERVATION LANDS

Certain activities will be conducted on BRCP conservation lands which will involve both the continuation of ongoing activities on properties (activities that have been ongoing prior to being protected under the BRCP) and new activities related to implementation of BRCP conservation measures. Within the restrictions on allowable uses detailed in conservation easement deeds (see Appendix M), the following are examples of activities that may be allowable on BRCP conservation lands at the discretion of BCAG with concurrence from the USFWS and CDFW.[36] This list is not inclusive of all possible allowable activities.

- Habitat restoration and management activities as provided for in CM4, Develop and Implement Site Specific Wetland and Riparian Restoration Plans;
- CM5, Enhance Protected Natural Communities for Covered Species

[35]For example, conservation funded with ESA section 6 grant funding cannot be credited as mitigation, even temporarily.

[36]This list is intended to provide examples of potentially allowable activities and is not inclusive of all possible allowable activities.

- Biological and physical resources monitoring as described in Section 7.2;
- Controlled recreational uses (e.g., hiking, bird watching, non-commercial fishing and hunting) and educational tours as developed and approved within Conservation Lands Management Plans and BRCP approved conservation easements (no development for recreational amenities such as parking and restrooms may be on conservation lands);
- Use of non-public roads on conservation lands to provide land manager, local landowner, and recreational access to adjoining lands as approved by BCAG;
- Ongoing agricultural and grazing practices and other land uses as allowable under BRCP approved conservation easements;
- Crop rotations involving non-rice crops (e.g., row crops) and other agricultural practices in BRCP rice conservation easements are permissible with implementation of the practices identified in CM5, Enhance Protected Natural Communities for Covered Species (see Section 5.4.2.2.6, *Agricultural Habitats*); and
- Educational tours of conservation lands (e.g., school science classes) as authorized by BCAG.

The above list of allowable activities on conservation lands provides potentially allowable activities that must be approved by BCAG with concurrence from USFWS, and CDFW, and in cases of easements on private lands, must also be approved by the land owner. BCAG must, in all cases, maintain the intended conservation benefits of the conservation lands as stated in the BRCP Conservation Strategy.

8.9 NEIGHBORING LANDOWNER ASSURANCES

The BRCP requires the development of a conservation lands system that will eventually encompass over 90,000 acres of lands in the Plan Area. Habitat within these conservation lands will be protected, restored, enhanced, and managed for the benefit of ecosystem functions, natural communities, and covered species. BRCP implementation is expected to result in the expansion of populations of covered species and individuals or populations of these species could move to and colonize adjacent ("neighboring") lands not within the conservation lands system. In recognition of this potential effect, the BRCP includes a process by which neighboring landowners may receive assurances through certificates of inclusion under the BRCP ESA section 10 and NCCPA section 2835 permits. The neighboring landowner assurances process provides for take of covered species above the baseline conditions on neighboring lands. The assurances do not provide for take of existing populations or occupied habitat prior to the establishment of adjacent conservation lands and, therefore, would not result in impacts relative to baseline conditions.

8.9.1 Eligible Lands and Estimated Enrollment

BCAG will provide certificates of inclusion for incidental take by neighboring landowners engaged in agricultural activities that agree to participate, i.e., it is an "opt-in" process and landowners that do not wish to participate would not be required to do so. All agricultural lands within 0.5 mile of any BRCP conservation lands may qualify for the neighboring landowner assurances. Neighboring landowner agreements can only extend take coverage to eligible parcels or portions of parcels in the Plan Area (i.e., not adjacent counties or portions of Butte County that are outside of the Plan Area). Landowners with parcels that lie partly within the Plan Area or partly within the 0.5 mile eligible radius may enroll only that eligible portion of their parcel in the neighboring landowner assurances program. For the purpose of the Neighboring Landowner Assurance program under the BRCP, agricultural lands include all lands in the following BRCP land cover classifications:[37]

- Agriculture, including rice, irrigated cropland, irrigated pasture, and orchard/vineyard,
- Grassland and oak woodland and savanna used for livestock grazing, and
- Wetland, riparian, aquatic, nonnative woodland communities (e.g., stock ponds, agricultural irrigation and drainage channels) within the communities above.

A simple method was used to estimate the extent of cultivated agricultural lands within 0.5 miles of existing or restored natural communities that could become part of the BRCP conservation lands. The Plan Area was divided by a north-south line that separates the mostly agricultural west side from the natural community dominated east side of the Plan Area. The acreage of all agricultural lands within 0.5 miles west of this line was calculated. An additional acreage of agricultural lands within 0.5 acres of giant garter snake habitat and emergent wetland that will be restored within rice lands was calculated based on one square-shaped habitat restoration of 69 acres and four square-shaped habitat restorations of 125 acres each totaling the 569-acre restoration target. Based on these two calculations, the total area of cultivated agricultural lands within 0.5 miles of protected and restored natural communities is approximately 21,050 acres. This is likely an overestimate, since not all BRCP conservation lands will abut cultivated agriculture.

While some agricultural growers will opt into the neighboring landowners assurances program, others are likely not to opt-in for various reasons including deciding that the adjacent conservation lands will not affect their property or not wanting to meet the survey and other requirements of the program. It is assumed that up to 25 percent of eligible lands will enter into neighboring landowner agreements, or no more than 5,255 acres (25 percent of the 21,050 acre estimate). This estimated level of participation is expected to be sufficient to provide for the

[37] Note that this definition of "agricultural lands" differs from the more narrow definition used in all other parts of the BRCP which identifies agricultural lands only as rice, irrigated cropland, irrigated pasture, and orchard/vineyard and does not include rangelands.

level of actual landowner participation within the Plan Area based on participation levels to date in other counties with approved HCPs (e.g., approximately 10 percent in San Joaquin County).

Take of covered species associated with ongoing activities on neighboring cultivated lands is expected to be limited to covered vertebrate species because it is highly unlikely that covered vernal pool shrimp and plant species will expand their populations onto adjacent lands as a result of BRCP conservation actions as these species have limited mobility and cultivated agricultural lands are unlikely to support suitable habitat for these species. Impacts of agricultural activities on covered species could include direct mortality of covered reptile and amphibian species by farming equipment, ongoing noise and visual disturbances associated with operation of farming equipment that could preclude use of habitat, changes in crop types that lower or remove foraging habitat for covered species, and construction of infrastructure (e.g., access roads) that remove habitat or create barriers to movement of covered species.

Though eligible to be enrolled in neighboring land agreements, ongoing activities on rangelands supporting grassland and oak woodland and savanna used for livestock grazing are unlikely to result in take of covered species beyond the baseline condition of those lands. Impacts of ranching activities on covered species could include trampling of covered reptile and amphibian species by livestock, ongoing noise and visual disturbances associated with operation of ranching equipment that could preclude use of habitat, disking of grasslands that lower or remove foraging habitat for covered species, and construction of infrastructure (e.g., access roads) that remove habitat or create barriers to movement of covered species.

8.9.2 Neighboring Land Agreement Requirements

The following are requirements of the process for acquiring certificate of inclusion under the BRCP neighboring landowner assurances program.

- Only private landowners may apply for neighboring landowner assurances through the voluntary application process. Landowner will apply to BCAG for a certificate of inclusion under the BRCP Permits. BCAG will determine whether the applicant's lands qualify for neighboring landowner assurances and will issue the certificate of inclusion where specific conditions are met.

- Only agricultural practices on agricultural lands within 0.5 mile of BRCP conservation lands boundaries may be covered by certificates of inclusion to the BRCP Permits.

- For the purpose of the neighboring landowner assurances, agricultural lands include all lands on which normal agricultural practices are conducted such as crop planting and production, irrigation and fertilization, soil tilling, crop harvesting, fallowing in accordance with normal crop-rotation, animal production, forage production, and grazing activities, and other associated activities such as fence construction and maintenance, vehicle or horse use, and construction and maintenance of typical farm outbuildings.

Agricultural practices must be occurring at the time the adjacent BRCP conservation lands are established. For example, if agricultural lands used for crop production lie fallow in accordance with normal crop-rotation practices at the time the neighboring preserve is established, those lands would be considered to be actively used for agricultural purposes.

- Certificates of inclusion may continue, subject to the terms and conditions of the BRCP, the Implementing Agreement, and the Permits, for as long as the neighboring lands are actively used for agricultural purposes consistent with baseline use (see below) and the BRCP Permits remain in effect. Take authorization under the certificates of inclusion shall not include conversion of agriculture to other uses. Coverage will not be offered to neighboring lands devoted to non-farmland purposes at the time the neighboring BRCP conservation lands are established.

- Certificates of inclusion may only be extended to landowners for the purpose of incidental take of covered species that colonize or expand onto neighboring lands after the adjacent BRCP conservation lands are established. Take coverage will not be provided for individuals or populations of covered species that inhabit neighboring lands prior to the establishment of adjacent BRCP conservation lands, as identified in a baseline survey (see below).

- Upon establishment of lands within the BRCP conservation lands system, BCAG will notify owners of parcels that are actively used for agricultural purposes within 0.5 mile of the conservation lands boundary. The notice will explain the landowner's potential eligibility for coverage under BRCP neighboring landowner assurances. Interested landowners may apply to BCAG for certificates of inclusion up to the time that the BRCP Conservation Lands System is fully established.

- Prior to receiving coverage under a certificate of inclusion, the landowner must determine the environmental baseline for covered species on their property and prepare a map that includes the location of occupied habitat, location and number of occurrences, and estimate of number of individuals within each occurrence. Landowners will have the option of either funding BCAG to employ a qualified biologist to survey their property or hiring a qualified biologist, approved by BCAG, on their own to conduct the surveys. Survey costs associated with applying for and maintaining a certificate of inclusion are the responsibility of the landowner.

- No take of covered fish species may be included in certificates of inclusion to neighboring landowners and therefore NMFS need not be involved in certificate of inclusion approval.

- Allowances for take of certain covered species, including newly discovered occurrences, are limited under the BRCP (see Table 6–3). Certificates of inclusion that provide

neighboring landowner assurances may not violate the requirements of the BRCP Conservation Strategy (including biological goals and objectives, conservation measures, and AMMs) for protecting newly discovered occurrences of these species.

- BCAG, USFWS, and CDFW will review the baseline biological conditions map and any supporting documentation provided by the landowner. The certificate of inclusion must be approved by USFWS, CDFW, and BCAG and signed by the landowner before it becomes effective and provides take authorization. BCAG, USFWS, and CDFW may add specific conditions to the certificate of inclusion for individual landowners depending on specific circumstances.

BCAG will maintain a record of all correspondence and certificates of inclusion provided to neighboring landowners under this neighboring landowner assurances program, and any signed certificates of inclusion returned by landowners. BCAG will notify USFWS, NMFS, and CDFW annually of the number, location, and size of neighboring lands covered under certificates of inclusion. Copies of the certificates of inclusion will be provided to the USFWs, NMFS, and CDFW upon request.

8.10 PARTICIPATING SPECIAL ENTITIES

This section describes the process by which Participating Special Entities may receive coverage under the BRCP. Certain entities that desire to implement projects or ongoing activities that could affect ESA or CESA listed species in the Plan Area may request coverage under the BRCP during the term of the Permits. These entities are referred to as "Participating Special Entities," and could include State and local agencies, special districts, and other entities not subject to the jurisdiction of the Permittees, or whose project is not specifically identified and not precluded as a covered activity (Chapter 2, *Covered Activities*).

Examples of entities in the Plan Area that may partake in this process are:

- California State University, Chico,
- Butte College,
- Various public school districts under the Butte County Office of Education,
- Butte County Resource Conservation District,
- California Department of Water Resources,
- Pacific Gas & Electric Company,
- Various gas and electric transmission companies, and

- Entities that conduct species or habitat management or monitoring.

The prospective Participating Special Entity will submit a complete application for the proposed activity to BCAG with copies to USFWS, NMFS, and CDFW, as well as the County or city in which the activity would occur. This application will contain all of the following components.

- A map of the proposed activity area;
- A detailed description of and rationale for the activity proposed for coverage under the BRCP including detail as to what portions of the activity fall under the covered activities described in Chapter 2. *Covered Activities*;
- Proposed BRCP avoidance and minimization measures to be applied to the activity (see Chapter 6, *Conditions on Covered Activities*) or avoidance and minimization measures in addition to those that apply in Chapter 6, *Conditions on Covered Activities* that are specific to the proposed activity;
- A GIS map of natural communities and jurisdictional delineation of waters of the U.S.;
- Completion of report describing results of all required BRCP species and habitat surveys;
- An analysis of the potential impacts of the proposed activity on covered species and their habitats, natural communities (using the BRCP land cover classification system and habitat classifications and categories used in BRCP species habitat models), and jurisdictional waters of the U.S.;
- Completion of all requirements identified in the steps in the BRCP application process described Section 8.7.2, *Process for Use of Permits – ESA Section 10(a)(1)(B) and NCCPA Section 2835*; and
- Estimate of fees to be assessed by Implementing Entity.

To grant use of the take authorization under the Permits to a Participating Special Entity, BCAG must enter into a legally enforceable contractual relationship with the Participating Special Entity. BCAG will issue, at its discretion, a Certificate of Inclusion to the Participating Special Entity that will allow the proposed activity to be covered under the BRCP if it finds that the following conditions are met.

- The Participating Special Entity signs a contract with BCAG binding the Participating Special Entity to the relevant terms of the Permits, Implementing Agreement, and BRCP;[38]

[38] In the event of failure to uphold the terms of the Permits, the Implementing Agreement, and the BRCP, the contract gives BCAG the ability to force action by the Participating Special Entity through legal means.

- The proposed activity complies with all terms and requirements of the BRCP, the Permits, and the Implementing Agreement;
- The impacts of the proposed activity fall within those analyzed in the BRCP impact analysis, the ESA section 7 biological opinion for the BRCP, and the environmental impact report/environmental impact statement in general type, location, magnitude, and effects;
- The impacts of the proposed activity do not deplete the amount of take coverage to such an extent that not enough is available for anticipated future covered activities by the Permittees during the remainder of the term of the Permits;
- The proposed activity does not conflict with the BRCP Conservation Strategy or the ability of BCAG to meet the BRCP biological goals and objectives;
- USFWS, NMFS, and CDFW have concurred with the inclusion of the Participating Special Entity's activity under the Permits; and
- Required fees have been paid to BCAG.

The Participating Special Entity must follow all of the steps in the process described in Section 8.7.2.

BCAG will determine the appropriate impact fees to be paid by Participating Special Entities to cover the costs of BCAG to process the application and administer and implement mitigation for the activities covered including ongoing costs for actions such as monitoring, adaptive management, changed circumstance response, and building of the endowment. BCAG may require Participating Special Entities to pay fees over and above those specified in Chapter 10, *Implementation Costs and Funding Sources*, to cover costs of extending permit coverage under the BRCP, including the costs of Implementing Entity staff time to assist with permit coverage, and a portion of the costs of the initial preparation of the BRCP. The Certificate of Inclusion will be issued to the Participating Special Entity by BCAG upon payment of the fee specified in the contract and completion of any other steps required by the contract to occur prior to issuance of the Certificate of Inclusion.

The Certificate of Inclusion will include an attached map depicting the parcel number, acreage, and owner of lands to which the take authorization(s) would apply. Also see the Implementing Agreement (Appendix L) for additional details and procedures that apply to Participating Special Entities. BCAG will track the amount of take authorization extended to Participating Special Entities (as described in Section 8.7.5.1, *Tracking of Impacts*) against the total allowable take authorized under the BRCP.

CHAPTER 9. IMPLEMENTATION STRUCTURE

This chapter describes the organizational structure that will be established to implement the Butte Regional Conservation Plan (BRCP) and the roles, functions, and responsibilities of the entities that will participate in its implementation. BRCP implementation commences with execution of the BRCP Implementing Agreement with the U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), and California Department of Fish and Wildlife (CDFW); issuance of section 10(a)(1)(B) incidental take permits (USFWS, NMFS) and Natural Community Conservation Planning Act (NCCPA) section 2035 permit; and passage of local authorizing ordinances.

9.1 OVERVIEW OF IMPLEMENTATION STRUCTURE

The structure of the BRCP Implementing Entity and the organizational structure for BRCP implementation are presented in Figure 9–1, *Organizational Structure for the BRCP Implementing Entity* and Figure 9–2, *Implementation Structure for Coordination and Consultation* (see separate files). The structure includes a newly created Joint Powers Authority (JPA) developed specifically for implementation of the BRCP and the existing Butte County Association of Governments' (BCAG) Executive Director who will serve as the Executive Director for BRCP implementation with responsibility for the direct day-to-day BRCP administration. A BRCP Stakeholder Committee will be established composed of representatives of interest groups and the public to provide input to BRCP implementation. Coordination by the Executive Director and BCAG staff with the permitting issuing agencies (USFWS, CDFW, NMFS, U.S. Army Corps of Engineers [USACE], and others), the Permittees, the BRCP Stakeholder Committee, and science advisors will be a regular component of implementation.

9.2 BRCP IMPLEMENTING ENTITY

BRCP implementation will be directed by the BRCP JPA, an Implementing Entity that will be created as a new JPA among the County of Butte, City of Chico, City of Oroville, City of Gridley, and City of Biggs specifically for implementation of the BRCP. The BRCP JPA will be led by a Board of Directors derived from elected officials of the member local agencies (see Section 9.2.1, *BRCP JPA Board of Directors*) and will oversee implementation of the BRCP through the Executive Director of BCAG who will serve as the Executive Director of the BRCP (hereafter referred to as "Executive Director"). The Executive Director will expand BCAG staff, as needed, to meet the expanded BCAG mission in implementing the BRCP (see Section 9.2.2, *Executive Director*). For the purpose of cost estimation and funding analyses, the BRCP has estimated that 4.5 full-time equivalent (FTE) BCAG staff persons will be required to manage and implement the BCRP between Year 10 and Year 50, with a slightly lower staff requirement of 4.0 FTEs in the first 10 years of implementation (see Section 9.2.2 and Appendix F, *Implementation Cost Supporting Materials*).

Based on a comparative review of other HCP/NCCPs throughout Northern California, JPAs are the most common type of arrangement for implementation among entities developing and implementing habitat conservation plans/national community conservation plans (HCP/NCCPs). Seven out of eight Northern California HCP/NCCPs currently use, or expect to use, a JPA for HCP/NCCP implementation. Use of a JPA governance body provides the Implementing Entity with the land use authority that will be necessary to effectively implement the BRCP Conservation Strategy. The use of the BCAG Executive Director to serve as the BRCP Executive Director takes advantage of an existing entity with regional expertise and experience in the Plan Area. BCAG is currently responsible for development of federal and state transportation plans and programs and is also the administrative and policymaking agency for the region's public transit service. In addition to these responsibilities, BCAG has served as the lead agency in directing the development of the BRCP, the environmental review of the BRCP under the California Environmental Quality Act (CEQA), and additional permit processes related to the BRCP (e.g., Clean Water Act [CWA] section 404 permitting and section 401 certification).

9.2.1 BRCP JPA Board of Directors

BRCP implementation will be directed by a new BRCP JPA developed specifically for implementation of the BRCP. The BRCP JPA will identify a BRCP Board of Directors (Board) to be comprised of the Butte County Supervisors representing Districts 1 through 5 and a single city council member representative from each of the cities of Biggs, Chico, Gridley and Oroville. Because Caltrans District 3 and the participating water and irrigation districts do not hold land use authority and cannot approve fees, they would not be on the BRCP Board, but will provide recommendations to the board via the Permittees Committee (see Section 9.3.2, *Permittees and the Permittees Committee*).

The BRCP JPA will identify the BCAG as the entity responsible for management of BRCP implementation that will be carried out by the BCAG Executive Director (see Section 9.2.2), BRCP Program Manager, appointed staff, and consultants working at the direction of the Executive Director. The structure of the Implementing Entity is presented in Figure 9–1.

The roles and responsibilities of the BRCP JPA Board are as follows:

1. The Board will select the Executive Director for the BRCP.
2. The Board will establish and appoint members to a Stakeholder Committee to provide a venue for receiving input from public stakeholders with interest in BRCP implementation.
3. The Board will elect and approve the BRCP JPA Board Chair.
4. The Board will be responsible for the review and approval of annual plans and budgets (see Section 8.2, *Compliance and Progress Reporting Requirements*) prepared by the Executive Director.

5. The Board will act to resolve disputes between the Executive Director and the Stakeholder Committee, Permittees Committee, and Science Advisors where resolution cannot be reached in other forums within the BRCP implementation process.

Board meetings will follow the same public meeting rules as the current BCAG Board of Directors and will be available for public comment at their meetings. The Board will hold public meetings at least twice per year.

9.2.2 Executive Director

The BCAG Executive Director will serve as the BRCP Executive Director and will report to the BRCP JPA Board. The Executive Director is responsible for directing the activities of the Implementing Entity and the administration and management of BRCP implementation under the authority granted by the Board. The Executive Director's responsibilities include overseeing the successful implementation of the BRCP through staff and consultant management, budget development, and coordination with external advisors and agencies. The Executive Director will hire additional staff at BCAG with expertise, as needed, to assist in the implementation of the BRCP. The Executive Director will serve as a primary link between Implementing Entity staff, Permittees, Stakeholder Committee, regulatory agencies, other decision makers, and the general public.

By using the Executive Director and existing staff at BCAG for BRCP implementation, start-up costs will be significantly reduced compared with initiating an entirely new organization with separate office expenses. Increased costs required to establish a new implementation office would include separate office rent, utilities, copiers, fax machines, computers, printers, software licenses, plotters, office furniture, and other such operating expenses. Continued use of BCAG also ensures that the existing staff responsible for developing the BRCP can be carried forward into implementation, benefitting the Permittees by ensuring that those responsible for implementation are intimately familiar with the details of the BRCP, and have established positive working relationships with all Permittees, USFWS, CDFW, NMFS, USACE, and various diverse interest groups throughout the Plan Area.

The Executive Director will hire and manage a staff to support implementation of the BRCP (see Appendix F for a detailed discussion of staffing assumptions). These staff will include the following:

1. Program Manager (senior planner to assistant Executive Director),
2. Lead Biologist (senior biologist to lead biological staff and science coordination),
3. Real Estate Specialist (lead land acquisition program),
4. Geographic Information System (GIS)/Database Manager (lead data input, maintenance, and analysis),
5. Chief Financial Officer (manage all aspects of the budget), and

6. Administrative Assistant (administrative services).

The Executive Director will appoint a BRCP Program Manager/Assistant Director to be responsible for the majority of the day-to-day tasks associated with BRCP implementation, including managing staff; grant application completion and monitoring; compilation of annual reports to USFWS, NMFS, and CDFW; reporting to the BRCP JPA Board; coordinating activities with the Permittees and BRCP participants that may be charged with implementing conservation measures (e.g., nonprofit conservancies and similar organizations); and oversight of implementation of BRCP adaptive management and monitoring programs.

9.2.2.1 Responsibilities of the Executive Director

The Executive Director is responsible for ensuring implementation of all conservation measures, monitoring, and other measures described in the BRCP. As noted above, many of these tasks will be delegated to an appointed Program Manager/Assistant Director. These responsibilities include the following:

- Developing budgets and work plans;
- Securing grant funding and collecting, receiving, and expending funds;
- Identifying land acquisition opportunities and acquiring lands;
- Monitoring landowner compliance with terms of conservation easements;
- Coordination with and among and training of Permittees to ensure covered activities are implemented in compliance with provisions of the Plan;
- Monitoring implementation progress to assure that mitigation and conservation measures are being implemented roughly proportional in time and extent to the impact on habitat or covered species authorized under the Plan;
- Implementing the adaptive management and monitoring plans;
- Conducting public outreach and education;
- Maintaining implementation tracking databases and GIS (e.g., conservation agreements, fee-title acquisitions, management actions, monitoring data, expenditures, and mitigation);
- Coordinating implementation with agencies, NGOs, and private entities;
- Implementing and overseeing implementation of habitat restoration and enhancement conservation measures;
- Managing BRCP conservation lands;
- Coordinating Plan amendments; and

- Regular reporting of Plan implementation status to the Permitting Agencies (see Chapter 8, *Plan Implementation*).

As indicated in Figure 9–1, the Executive Director will be responsible for eight categories of functions necessary to effectively implement the BRCP.

9.2.2.1.1 Financial Management

The Executive Director will be responsible for ensuring the successful management of BRCP finances and, to do so, will establish and maintain internal accounting procedures for monitoring expenditures and cash flow. Financial management responsibilities include developing and monitoring budgets, processing invoices, managing financial reserves, identifying cost savings, and managing administrative contracts (e.g., liability insurance).

9.2.2.1.2 Real Estate Activities

The Implementing Entity will hold title or easements to lands it acquires to implement the BRCP. The Executive Director will ensure the successful conduct of relevant financial and legal analyses to guide selection and acquisition of conservation lands. These functions may be fulfilled by a staff specialist retained by the Executive Director for this purpose, partnering with local jurisdictions to provide this service, or through consultant services.

As described in Section 5.4.1.1, *CM1: Acquire Lands*, the Implementing Entity will need to acquire lands that support the ecological characteristics that will, through habitat protection, enhancement, restoration, and management actions, achieve the biological goals and objectives (see Section 5.3, *Biological Goals and Objectives*). Lands may be acquired through conservation easements or in fee title. The Executive Director will ensure the establishment of a process for prioritizing land acquisition opportunities, and the completion of all pre-acquisition surveys, title searches, and review of existing encumbrances to ensure there are no restrictions that conflict with BRCP implementation; and will conduct other tasks that may be necessary to confirm that lands considered for acquisition support the ecological characteristics necessary to fulfill one or more of the biological goals and objectives.

9.2.2.1.3 Grant Development and Administration

The Executive Director will be responsible ensuring the successful management of all grants, contracts, and other funding sources during BRCP implementation. The Executive Director will be responsible for establishing and executing procedures that meet the accounting and reporting requirements of entities providing grant funds. The Executive Director will be responsible for identifying and pursuing grant funds available for implementing the BRCP and preparing grant applications necessary to secure these funds. These functions may be fulfilled by a staff specialist retained by the Executive Director for this purpose, partnering with agencies and organizations that provide this service, or through consultant services.

9.2.2.1.4 Scientific Oversight

The Executive Director is responsible for ensuring scientific oversight of key technical aspects of BRCP implementation, including biological evaluations for selection of conservation lands, implementation of conservation measures, and the monitoring and adaptive management program. This oversight will be conducted by a senior staff biologist or qualified consultant retained for this purpose. The Executive Director will also be responsible for being informed of new relevant scientific information and conservation approaches as they become available over the term of the BRCP and for seeking external science advice and assembling science advisor panels as needed to better inform implementation.

9.2.2.1.5 Preserve Management and Monitoring

The Executive Director has primary responsibility for ensuring the day-to-day management of the BRCP acquired conservation lands in accordance with the provisions of Chapter 5, *Conservation Strategy*. In addition to directing the management of BRCP conservation lands, the Executive Director will ensure that activities are coordinated with managers of other conserved lands (e.g., land trusts, mitigation banks, CDFW, DWR) to synergistically improve the collective ecological benefits provided by all conserved lands within the Plan Area. These activities include periodic patrols to evaluate the status and function of infrastructure (e.g., fences, roads, and fuel breaks) and any necessary repair and maintenance activities. The Executive Director will also be responsible for implementing the management plans prepared for specific or groups of BRCP conservation land parcels (see Section 5.4.2.2, *CM6: Enhance Protected Natural Communities for Covered Species*) and conducting the applicable monitoring activities described in Section 7.1, *Monitoring Program*.

9.2.2.1.6 Public Outreach

The Executive Director will be responsible for ensuring the preparation of informational materials, preparing for and conducting public informational meetings/workshops and presentations in public venues, posting information related to implementation on the BRCP website, preparing informational materials for public distribution, and other such functions that serve to keep the general public aware of BRCP implementation activities and to promote public interest and participation.

9.2.2.1.7 GIS/Database Maintenance and Analysis

The Executive Director will ensure the existing or modified BRCP website is maintained and will ensure GIS and other database systems to collect, store, and use spatial and other data necessary for BRCP implementation and document implementation progress are maintained and kept up-to-date (see Section 8.2). The Executive Director will ensure that the Implementing Entity will use GIS to guide preserve design and monitoring programs and continue to build from the existing GIS database used to develop the BRCP.

The Executive Director will ensure the coordination of database systems, procedures, and formats with systems used by the Permittees for activities reporting and with USFWS, NMFS, and CDFW procedures to streamline database management activities to the extent practicable.

The Executive Director will be responsible for ensuring the analysis of data collected through the monitoring program and coordination with science advisors to implement the adaptive management program.

9.2.2.1.8 Administrative Services

The Executive Director will be responsible for maintaining administrative services in support of all Implementing Entity functions, including procurement of office supplies, equipment, software, computers, and other materials; hiring and training of staff; payroll services; and any other activities necessary to conduct the business of the Implementing Entity. These services may be staffed by the Executive Director or provided externally through cooperative agreements with partner agencies or through consultant services.

9.2.2.2 Retaining Consultants, Contractors, Financial and Legal Services

To effectively discharge all responsibilities, the Executive Director may retain the services of qualified consultants to address any technical or scientific needs that cannot be effectively addressed through other resources available to the Executive Director. The use of consultants is expected to be greater early in BRCP implementation and to lessen as the Implementing Entity's implementation experience increases. Contractors will be retained as needed to undertake tasks related to biological monitoring, preparation of compliance documents and permit applications, maintaining and improving conservation land infrastructure (e.g., grading roads and maintaining fences), implementing habitat restoration and enhancement actions, and similar types of physical activities necessary for BRCP implementation.

The Implementing Entity may retain financial and legal services on an as-needed basis. It is anticipated that financial analysis assistance will be periodically required to review the program's cost/revenue balance and ensure that sources of implementation funding are adjusted with changing land costs and inflation.

It is anticipated that legal counsel may also be periodically required to provide services related to drafting and reviewing conservation easements, reviewing of land purchases, assisting with land transaction negotiations, and assisting with easement violations should they occur.

9.2.2.3 Environmental Compliance and Permitting

The Executive Director will have the authority and responsibility to serve as the lead agency for CEQA compliance and environmental and other necessary permitting for the implementation of conservation projects under the BRCP.

9.2.2.4 Relationship with Permittees and other Entities Involved in Implementation

The Executive Director is responsible for training and review of Permittees in their processing of applications for coverage under the federal and state permits and will conduct periodic audits of the Permittees to ensure compliance with the terms of the Plan.

The Executive Director will coordinate communications and the flow of information between the Implementing Entity, Permittees, regulatory agencies, the Stakeholder Committee, and the general public.

9.3 OTHER ENTITIES INVOLVED IN BRCP IMPLEMENTATION

As indicated in Figure 9–2, the Executive Director and staff will coordinate with various federal, state, local, and private entities to effectively implement the BRCP.

9.3.1 BRCP Stakeholder Committee

The BRCP JPA Board will establish and appoint members to a BRCP Stakeholder Committee to provide a venue for receiving input from public stakeholders with interest in Plan implementation. A Chair will be selected by the Stakeholder Committee members and approved by the Board. The Stakeholder Committee will be charged with providing input to the Board and the Executive Director regarding all aspects of BRCP implementation. It will be comprised of representatives from the same interests that comprised the Stakeholder Committee that developed the BRCP, as well as other groups that have in interest in implementation actions. Committee members will be appointed by the Board to represent the following interests:

- Developers seeking permits under the BRCP;
- Landowners with resources relevant to BRCP success;
- Conservation advocacy groups;
- Agricultural interests; and
- Private residents, both rural and urban;

The size of the Stakeholder Committee will be determined by the Board, but will be not less than 10 and not more than 24 individuals. Should more than 24 individuals desire to be members of the Stakeholder Committee, the Board will insure that the 24 members selected are representative of all major interests in the Plan Area.

Staff from participating local jurisdictions and USFWS, NMFS, and CDFW may also participate in Stakeholder Committee meetings to ensure Stakeholder Committee deliberations are coordinated with those responsible for BRCP implementation. They will also serve as a source

of information regarding the relationship of BRCP implementation to other relevant ongoing planning activities in the Plan Area.

The Chair of the Stakeholder Committee will prepare meeting agendas with input from the Executive Director, will facilitate the meetings, and will ensure that meeting outcomes are transmitted to the Executive Director and the Board.

The frequency of Stakeholder Committee meetings will be determined by the Stakeholder Committee, but at least one meeting must be held each year of BRCP implementation. Committee meetings will be open to the public and public participation in Committee discussions will be encouraged. The Executive Director or an Implementing Entity representative designated by the Executive Director will attend all Stakeholder Committee meetings.

9.3.1.1 Technical Advisory Committees

The Stakeholder Committee and the Executive Director may establish one or more technical advisory committees to better inform implementation of conservation measures and coordinate habitat enhancement and land management activities with other entities. For example, if the Executive Director enters into agreements with other land management entities to implement management actions on behalf of the Implementing Entity (see Section 9.3.5, *Delegated Implementation*), then it may be desirable to establish a technical advisory committee comprised of land management staff from the entities and Implementing Entity staff, with USFWS, NMFS, and CDFW representatives participating as advisors, to ensure that relevant BRCP actions are appropriately implemented. Additional committees may be established to inform the BRCP staff and Board of key issues effecting BRCP implementation.

9.3.2 Permittees and the Permittees Committee

The following entities are anticipated to be Permittees on the Endangered Species Act (ESA) section 10(a)(1)(B) incidental take permit and the NCCPA section 2835 permit providing authorization for take that results from covered activities within their respective jurisdictions (see Chapter 2, *Covered Activities*):

- Butte County,
- City of Chico,
- City of Oroville,
- City of Gridley,
- City of Biggs,
- BCAG (as a lead agency and as the BRCP Implementing Entity),
- Western Canal Water District,

- Butte Water District,
- Biggs West Gridley Water District,
- Richvale Irrigation District, and
- California Department of Transportation District 3.

The Implementing Entity will be responsible for implementing the BRCP on behalf of the Permittees. The Permittees, however, will ultimately be responsible for compliance with all the terms and conditions of the BRCP permits and the Implementing Entity's performance in implementing the BRCP in conformance with the terms and conditions.

The local jurisdictions receiving permits will be responsible for determining the completeness of applications for coverage of projects received from private developers and departments within the local jurisdiction. Each local jurisdiction will grant use of the take authorization under the ESA and NCCPA take permits as part of its normal project review process, once it has made a determination that the application is complete and the applicant has complied with all the requirements of the BRCP HCP/NCCP. As described in Chapter 8, *Plan Implementation*, each of the local jurisdictions will also be responsible for reporting the relevant details of approved projects to the Executive Director, for monitoring the applicant's compliance with the applicable avoidance and minimization measures described in Chapter 6, *Conditions on Covered Activities*, and for collecting any fees required under the BRCP.

The Permittees may elect to meet as a Permittee Committee and confer with and receive reports from the Executive Director. The Executive Director will attend all meetings of the Permittee Committee for which the Executive Director's presence is requested. The Permittees will determine the individual membership of and need for meetings of the Permittee Committee.

9.3.3 Science Advisors

Science advisors, comprised of technical specialists with expertise in conservation biology, management of local natural communities and agricultural lands, habitat enhancement and restoration design, and the ecology of covered species will be consulted, as needed, by the Executive Director, with input from USFWS, NMFS, and CDFW, to provide guidance for BRCP implementation. The primary purpose of periodic consultation with the science advisors is to provide technical advice and help gather the best available scientific data for assembling the conservation lands, interpreting monitoring results and the analysis of data, and providing advice through the adaptive management decision-making process (see Section 7.2, *Adaptive Management Plan*).

9.3.4 Planning Directors Committee

The Executive Director will meet regularly with the City/County Planning Directors Committee to ensure continued coordination with local city and county planning department staff

responsible for certain implementation tasks. This committee will include both planning directors and staff from the cities of Biggs, Gridley, Oroville and Chico and the County of Butte.

9.3.5 Delegated Implementation

Certain implementation tasks may be delegated to other entities by the Executive Director through mechanisms such as agreements with local, state, and federal agencies and with the private nonprofit (e.g., land trusts and conservancies) and for-profit (e.g., mitigation banks and farming and ranching operations) entities. Such delegation may include, but is not limited to, conservation lands management, habitat enhancement and restoration, and monitoring activities. The Executive Director will oversee any cooperative agreements that may be entered into with other entities that own and/or manage conservation lands in fulfillment of BRCP commitments.

9.3.5.1 Private Land Trusts, Agricultural Operations, and Mitigation Banks

Coordination of BRCP implementation with land trusts, local land management entities and mitigation banks is an important consideration for successful BRCP implementation. In conformance with the conservation land assembly principles, BRCP conservation lands will often be located adjacent to protected lands managed by local and private entities (e.g., lands managed by local park districts, local land trusts, and private mitigation banks). The Executive Director will coordinate with these land management entities to seek potential partnerships that are mutually beneficial where possible.

The Executive Director may choose to contract with land trusts to assist with aspects of BRCP implementation, including preserve management and monitoring activities on lands owned by the Implementing Entity.

The Executive Director may enter into agreements with farm and ranch owners and operators to implement BRCP conservation actions on private agricultural lands. Such agreements must meet the biological goals and objectives and be related to specific conservation measures in the BRCP (see Chapter 5, *Conservation Strategy*).

The Executive Director may purchase credits from existing mitigation banks, provided their lands are managed in a manner that is compatible with, meets the biological goals and objectives of, and complies with specific conservation measures and monitoring requirements of the BRCP (see Chapter 5, *Conservation Strategy*).

9.3.5.2 Federal, State, and Local Land Management Agencies

Coordination of BRCP implementation with federal, state, and local land management entities is an important consideration for successful BRCP implementation. In conformance with the conservation land assembly principles, BRCP conservation lands will often be located adjacent to protected lands managed by federal, state, and local land management entities (e.g., city-owned parks such as Bidwell Park, USFWS Refuges, CDFW Refuges, and DWR lands

associated with Oroville Reservoir and Dam and other facilities along the Feather River). The Executive Director will coordinate with and may enter into agreements (e.g., Memoranda of Agreement, Memoranda of Understanding, Cooperative Management Agreements) with federal, state, and local land management entities to ensure that land and habitat management practices and species and habitat protection on these lands is compatible with, meets the biological goals and objectives of, and complies with specific conservation measures and monitoring requirements of the BRCP (see Chapter 5, *Conservation Strategy*).

9.4 REGULATORY AGENCIES INVOLVED IN BRCP IMPLEMENTATION

9.4.1 USFWS, NMFS, and CDFW

USFWS, NMFS, and CDFW are the regulatory agencies that will issue the federal and state permits for incidental take of protected species and regulate implementation of the BRCP. As described in Chapter 8, *Plan Implementation*, the Executive Director will submit annual reports to these agencies describing each year's implementation activities. The USFWS, NMFS, and CDFW will provide guidance to the Executive Director, the Board, and the Permittees to ensure that the BRCP remains in compliance with terms and conditions of the permits. Representatives of these agencies will serve in an advisory role to the BCAG JPA Board and any technical advisory committees that may be established by the Board and Stakeholder Committee. USFWS, NMFS, and CDFW will also assist the Executive Director in efforts to secure state and federal funding (e.g., funding under ESA section 6) for BRCP implementation (see Chapter 10, *Implementation Costs and Funding Sources*).

CDFW will serve in an advisory role to the Executive Director, the Board, and the Permittees regarding the Master Streambed Agreement under California Fish and Game Code section 1602.

9.4.2 U.S. Army Corps of Engineers (USACE)

The USACE will serve in an advisory role to the Executive Director, the Board, and the Permittees regarding the regional general permit (RGP) under section 404 of the CWA.

9.4.3 Central Valley Regional Water Quality Control Board (CVRWQCB)

The CVRWQCB will serve in an advisory role to the Executive Director, the Board, and the Permittees regarding the regional certification under section 401 of the CWA and compliance with the Porter-Cologne Act and the Basin Plan. More detail on CWA authorizations and certifications and the relationship between BCAG and CVRWQCB is provided in separate documents that establish the Aquatic Resources Program (ARP). The ARP will be implemented in parallel with the BRCP.

9.5 PUBLIC INPUT

Public input will be provided through various means under BRCP implementation. The BRCP Executive Director will be responsible for continuing public outreach efforts that were initiated as part of the development of the BRCP. This includes maintaining a publicly accessible website, producing and distributing newsletters, brochures and press releases, and holding periodic public workshops to present BRCP implementation findings and results to the general public. All Stakeholder Committee meetings will be open to the public. Board meetings will be open to the public following the public meeting rules that govern the existing BCAG JPA Board.

9.6 PARTICIPATING SPECIAL ENTITIES

Certain entities that desire to implement projects or ongoing activities that could affect ESA or CESA listed species in the Plan Area may request coverage under the BRCP during the term of the Permits. These entities are referred to as "Participating Special Entities," and could include State and local agencies, special districts, and other entities not subject to the jurisdiction of the Permittees, or whose project is not specifically identified and not precluded as a covered activity (Chapter 2, *Covered Activities*). The process by which Participating Special Entities may receive coverage under the BRCP is described in Section 8.10, *Participating Special Entities*.

To grant use of the take authorization under the Permits to a Participating Special Entity, the Implementing Entity must enter into a legally enforceable contractual relationship with the Participating Special Entity. The Implementing Entity may issue, at its discretion, a Certificate of Inclusion to the Participating Special Entity that would allow the proposed activity to be covered under the BRCP. Detail on requirements for this process is provided in Section 8.10.

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CHAPTER 10. IMPLEMENTATION COSTS AND FUNDING SOURCES

10.1 INTRODUCTION

The Endangered Species Act (ESA) requires that habitat conservation plans specify "the funding that will be available to implement" actions that minimize and mitigate impacts on covered species.[1] The Natural Community Conservation Planning Act (NCCPA) requires that natural community conservation plans (NCCPs) contain "provisions that ensure adequate funding to carry out the conservation actions identified in the plan."[2] In compliance with ESA and NCCPA, this chapter identifies Butte Regional Conservation Plan (BRCP) costs and the sources of funding that will be relied upon for BRCP implementation, the mechanisms that will be used to secure such funds, and the basis for the assurances provided by the Permit Applicants that adequate funding will be available to support the implementation of the Plan. To comply with the NCCPA, the BRCP Permit Applicants are committed to the implementation of the BRCP in its entirety, including actions to mitigate impacts and actions to contribute to the conservation of natural communities and covered species. The BRCP includes considerably greater conservation for covered species than is require by the federal ESA requirement for mitigation. This chapter identifies the anticipated division of sources of funding between the Permittees and federal, state, and other sources. The BRCP Permittees are committed to acquiring the funding necessary to implement the BRCP.

This chapter provides a description of the costs and sources of funding to implement the BRCP. BRCP implementation costs are separated between the "mitigation component" and the "conservation component" of the BRCP.

- **Mitigation Component of Costs:** The mitigation component of costs includes the costs to implement mitigation measures that address the impacts of BRCP covered activities (see Chapter 2, *Covered Activities*). Covered activities include implementation of city/county general plans, Butte County Association of Governments (BCAG) and California Department of Transportation (Caltrans) District 3 transportation projects, and participating water/irrigation district maintenance activities. These costs include administration, land acquisition, habitat restoration, land and habitat maintenance and management, monitoring, changed circumstances responses, endowment building, and adaptive management necessary to implement the mitigation measures.
- **Conservation Component of Costs:** The conservation component of costs includes the costs of all actions under the Conservation Strategy that are implemented to conserve natural communities and contribute to the recovery of covered species above and beyond the mitigation measures. These costs include administration, land acquisition, habitat restoration, land and habitat maintenance and management, monitoring, changed

[1] United States Code (U.S.C.) §1539(a)(2)(A).
[2] California Fish and Game Code § 2820(a)(10).

circumstances responses, endowment building, and adaptive management necessary to implement the mitigation measures.

Funding sources are separated between the "local share" and the "federal/state share" of plan implementation (identified in Table 10–6, *BRCP Cost and Funding Overview* in Section 10.2.1.2, *Conservation Component of Local Share Funding* as "Fee Funding", "Other Local Funding" and "Non-Fee Funding").

- **Local Share of Funding**: The Local Share of implementation funding sources comprises all of the mitigation component of the BRCP and a portion of the conservation component of the BRCP. The Local Share funding will be derived from impact fees assessed on individual projects as those projects are implemented in the Plan Area and additional moneys sought from various sources to fund a portion of the conservation component (see "Fee Funding" and "Other Local Funding" in Table 10–6). Local Share funding sources are detailed in Section 10.2.1, *Local Share Funding Sources*.
- **Potential Federal/State Funding**: All remaining actions to implement the conservation component of the BRCP not addressed by the Local Share (see "Non-Fee Funding" in Table 10–6) will be derived from various federal, state, and private sources. Some specific funding components will be borne only by the State of California. Potential Federal/State funding sources are detailed in Section 10.2.2, *Federal/State Funding Sources*.

The Local Share funding ensures that the effects on biological resources of the Permittees' actions and the actions the Permittees authorize others to conduct (i.e., the covered activities) are minimized and mitigated and also ensures a contribution to conservation of natural communities and species. Funding of additional contributions to the conservation of natural communities and the recovery of covered species under the BRCP will come from a variety of sources, including local, state and federal sources. For simplicity, this funding category is referred to in the BRCP as the Federal/State Share of funding. The Federal/State Share of funding derives from sources other than fees or in-lieu lands (i.e., generally not the Permittees, project proponents, or Participating Special Entities). BCAG as the Implementing Entity is responsible for securing both the Local Share (including the collection of impact fees) and Federal/State Share funding (see Section 10.2.3, *Funding Assurances*) through various public and private funding opportunities as described in Section 10.2.1 and Section 10.2.2.

Section 10.3, *Estimate of Implementation Costs*, outlines the approach used to estimate the costs associated with implementation of the BRCP over its proposed 50-year permit duration and ongoing costs beyond the permit term. Implementation costs are estimated for each of the BRCP's primary components, such as conservation measures, monitoring, and administration. Implementation costs are divided into the mitigation and conservation components based on the primary purpose of BRCP conservation actions, i.e., mitigation of impacts resulting from covered activities or contribution to recovery of covered species in the Plan Area. The cost estimates are used as the basis for

determining the funding needs. Details on methods used and results for implementation cost calculations are provided in Appendix F, *Implementation Cost Supporting Materials.*

10.2 FUNDING SOURCES AND ASSURANCES

10.2.1 Local Share Funding Sources

This section describes the Local Share sources of funding. Local Share funding will be used to implement the entire mitigation component of the BRCP and a portion of the contribution to the conservation of natural communities and covered species. The Local Share funding will be derived from impact fees assessed on individual projects implemented in the Plan Area as described in Section 10.2.1.1, *Mitigation Component of Local Share Funding*; additional moneys sought from various sources to fund a portion of the BRCP conservation component described in Section 10.2.1.2; and Permittee-derived funds to support shortfalls, if any, in endowment returns to support post-permit implementation activities as describe in Section 10.2.1.3, *Funding Post-Permit Land Management*.

10.2.1.1 Mitigation Component of Local Share Funding

This section describes the Local Share sources of funding to implement the mitigation component of the BRCP that will serve to mitigate the impacts of covered activities (see Chapter 2, *Covered Activities*) on covered species and natural communities. These funds will be used by BCAG to protect existing natural communities and species habitat and to restore natural communities and species habitat as mitigation for impacts on natural communities and species habitat as described in Chapter 5, *Conservation Strategy* (see Tables 5–11, *Natural Community Mitigation Requirements for Permanent Direct Effects* and 5–12, *Covered Species Mitigation Requirements for Permanent Direct Effects*). The description of the implementation costs (Section 10.3 and Appendix F) provides the details and rationale for the breakdown of BRCP Conservation Strategy component costs between mitigation and conservation components of total costs.

The funding for mitigation relies on development-based mitigation fees. As individual projects are proposed and approved in the Plan Area, public and private land developers will be required to pay a mitigation fee for land that is developed and removes natural communities and covered species habitat (e.g., to construct residential, commercial, industrial, and other structures; construct, improve, and maintain transportation infrastructure; and to install and maintain other infrastructure such as sewer and utility lines).[3] Mitigation fee funds will be used to acquire lands identified for habitat protection and restoration and to implement applicable conservation measures and monitoring for the purpose of mitigation.[4] Under the BRCP, payment of the

[3] Habitat removal is defined as habitat that is physically removed (e.g., graded, paved over) or is isolated by the project from other areas of habitat such that the remaining land no longer functions as habitat for covered and other native species. The process for determining the extent of habitat that will be removed by a proposed project for the purpose of determining mitigation fees is described in Section 6.7, *Process for BRCP Implementation*.

[4] The Implementing Entity may opt to use mitigation fees to purchase credits at an existing private or public mitigation bank rather than implementing the mitigation actions directly – for more details, see Section 6.7, *Process for BRCP Implementation*.

mitigation fees by project applicants provides for part of their compliance with the BRCP and their authorization to use the Permits.[5] The mitigation fees do not address the cost of implementing the applicable BRCP avoidance and minimization measures (including field surveys for specific habitats, covered species, and U.S. Army Corps of Engineers [USACE] jurisdictional wetlands and waters) described in Chapter 6, *Conditions on Covered Activities*, that are the responsibility of and the costs are borne by project applicants.

The BRCP includes a "Base Mitigation Fee (Base Fee)," a "Riparian Restoration Mitigation Fee" (Riparian Fee), a "Vernal Pool Restoration Mitigation Fee" (Vernal Pool Fee), an "Emergent Wetland Restoration Mitigation Fee" (Emergent Wetland Fee), a "Butte County Meadowfoam Habitat Fee (Meadowfoam Habitat Fee)," and a "Water and Irrigation District Channel Maintenance Fee" (Water District Fee). The Base Fee is applied to all natural community and species habitat acres removed by proposed projects (see Section 10.2.1.1.3, *Calculation of Fees for Individual Projects*). The Base Fee will be used to pay for land acquisition costs, administrative costs, monitoring costs, costs for implementation of responses to changed circumstances,[6] and endowment-building costs necessary to satisfy the mitigation requirements of the BRCP.

The Riparian, Vernal Pool, and Emergent Wetland Fees apply to the specific amounts of riparian, vernal pool, and emergent wetland removed by covered activities. The Riparian Fee, Vernal Pool Fee, and Emergent Wetland Fee cover habitat restoration implementation costs, environmental compliance costs of restoration projects, restoration establishment-stage monitoring, and costs for responses to changed circumstances related to habitat restoration. The Riparian Fee, Vernal Pool Fee, and Emergent Wetland Fee are additive to the Base Fee (i.e., charged in addition to the Base fee on the overlapping areas of land) and are applied only to projects that will remove riparian, vernal pool (and other seasonal wetlands),[7] and emergent wetland natural communities.

The Meadowfoam Habitat Fee was developed to address impacts on Butte County meadowfoam primary habitat within the Chico Urban Permit Area (UPA). This fee is needed because land values in Chico, where the central populations of Butte County meadowfoam occur and where this fee applies, are higher than elsewhere in the Plan Area. The Meadowfoam Habitat Fee is charged in addition to the Base Fee for each acre of primary habitat directly and permanently impacted within the Chico UPA. If vernal pools or other seasonal wetlands occur within Butte County meadowfoam primary habitat to be removed, the Vernal Pool Fee must be paid in addition to the Meadowfoam Habitat Fee and the Base Fee for each acre of delineated wetland.

[5] Note, however, that avoidance and minimization measures apply in specific circumstances and to specific species and habitat survey requirements under the BRCP.

[6] The Base Fee addresses only changed circumstances responses that are not related to habitat restoration (e.g., changes that result in the loss of existing habitat, including already established restored habitat, protected under the BRCP). Changed circumstances responses that are related to habitat restoration are paid for through the Vernal Pool, Emergent Wetland, and Riparian Fees.

[7] Other seasonal wetlands are jurisdictional wetlands under section 404 under the CWA that are seasonally inundated or saturated but do not support plant species indicative of vernal pools. Funding of compensatory mitigation (restoration) of other seasonal wetlands is included in the Vernal Pool Fee. Impacts on other seasonal wetlands are charged the same fee (the Vernal Pool Fee) as impacts on vernal pools.

The Water District Fee will be paid annually by the four water and irrigation district Permittees to address impacts on emergent wetland habitat in water conveyance channels that result from regular channel maintenance activities.

All mitigation fees will be set and adjusted by BCAG.

10.2.1.1.1 Determination of Mitigation Fees

The primary BRCP mitigation fee is the Base Fee. This fee covers the costs of implementing required mitigation for habitat impacts attributable to new development in the Plan Area, except for habitat restoration-related mitigation actions (i.e., riparian, vernal pools, and emergent wetland) (Table 10–1, *Mitigation Fee Calculations*). The per acre Base Fee is calculated by dividing the total estimated non-habitat restoration-related mitigation costs (less additional costs for Butte County meadowfoam habitat supplemental costs for land acquisition and water/irrigation district administrative costs) by the allowable total number of acres of habitat removed as a result of implementation of all the covered activities. The initial amount for the BRCP Base Fee per acre of impact is provided in Table 10–1. The process for adjusting this fee is described in section 8.2.1.1.6 *Mitigation Fee Adjustment Process*. The process and assumptions used to develop the Base Fee mitigation cost estimate by cost category is described in Appendix F.

Table 10–1. Mitigation Fee Calculations

Mitigation Fee	Mitigation Cost [1]	Basis Acres [3]	Fee Per Impact Acre [1]
Base Fee	$108,716,886	24,624	$4,415
Riparian Fee [2]	$10,522,575	189	$55,675
Vernal Pool Fee [2]	$12,997,350	306	$42,475
Emergent Wetland Fee [2]	$5,906,250	63	$93,750
Butte County Meadowfoam Habitat Fee [4]	$705,000	282	$2,500
Water/Irrigation District Fee [5]	$68,958		
Total	$138,917,020		

[1] Note that these fee calculations use mitigation cost estimates calculated to the nearest dollar from the Microsoft Excel cost model, whereas cost estimates quoted in other parts of this chapter may use numbers rounded to the nearest thousand.

[2] Mitigation costs for Riparian, Vernal Pool, and Emergent Wetlands are based on the cost of restoration (CM4) and the cost of environmental compliance for all restoration projects over the entire 50-year term of the BRCP.

[3] Base Fee basis acres are the sum total of all acres of impacts on natural communities and agricultural habitat allowable under the BRCP (Table 4-4). Riparian Fee basis acres are the total projected acres of riparian forest and riparian scrub restoration for mitigation (190 acres). Emergent Wetlands Fee basis acres are the total projected acres of emergent wetlands restoration for mitigation (126 acres) divided by 2 (126/2 = 63) to account for 2:1 mitigation ratio requirement. The Vernal Pool Fee basis acres are the total projected acres of vernal pool restoration for mitigation (306 acres). See Table 5-11 for details on mitigation requirements.

[4] Butte County Meadowfoam Habitat Fee applies only to Chico UPA,

[5] Water and irrigation district covered activities include channel maintenance in approximately 39 acres of giant garter snake habitat. Fee is based on mitigation administrative costs of BCAG and the proportionality of 39 acres of impacts to the total giant garter snake mitigation habitat area (6388 acres). Fee is $1,379 per year for the four water/irrigation districts combined (total mitigation cost of $68,957 divided by 50 year permit term).

The habitat restoration mitigation fees will be applied in addition to the Base Fee to projects that remove riparian, vernal pool (and other seasonal wetlands), and emergent wetland natural communities and other wetlands (e.g., agricultural wetlands, managed wetlands, managed seasonal wetlands) on a per-acre-removed basis. The restoration mitigation fees are applied to pay for costs that are incurred to restore riparian, vernal pool, and emergent wetland land cover types in addition to the protection of existing habitat for mitigation that is addressed through the Base Fee. The process and assumptions used to develop the restoration mitigation cost estimates is described in Appendix F in Section F.2.4, *CM4: Develop and Implement Site Specific Wetland and Riparian Restoration Plans and CM8: Restore Giant Garter Snake Habitat*. The per acre restoration mitigation fee for riparian, vernal pool, and emergent wetland is calculated by dividing the total estimated habitat restoration-related mitigation costs for each of the land cover types by the total number of "basis acres" for mitigation of impacts on each of these land cover types and other wetland types removed by implementation of all the covered activities (Table 10–1). The basis acres in Table 10–1 are calculated based on the mitigation ratio for other wetland types of lower function (e.g., agricultural wetlands and managed seasonal wetlands) relative to the mitigation ratio for the vernal pools and emergent wetlands (see Table 10–1 footnote). The initial amounts for the Riparian Fee, Vernal Pool Fee, and Emergent Wetland Fee per acre of impact are provided in Table 10–1. The process for adjusting these fees is described in section 8.2.1.1.6 *Mitigation Fee Adjustment Process*.

10.2.1.1.2 Butte County Meadowfoam Habitat Fee

Due to the higher cost of land within and near the City of Chico relative to other parts of the Plan Area, an additional fee of $2,500 will be charged for each acre of primary habitat of Butte County meadowfoam removed within the Butte County meadowfoam population groupings Chico A, Chico B, and Chico C (see Figure A.30–2, *Butte County Meadowfoam Population Groupings, Occurrences, Modeled Habitat, and Population Estimates* in Appendix A.30, *Butte County Meadowfoam*). This fee applies to impacts on mapped Butte County meadowfoam primary habitat in the Chico UPA (Table 4-9, *Maximum Extent of Permanent Direct Impacts on Modeled Covered Species Habitat Types and Known Occurrences by CAZ and UPA*). This fee is in addition to the Base Fee and Vernal Pool Fee (where applicable) that would be paid on the same acres of land for a given project. The determination of the presence of primary habitat for Butte County meadowfoam will be based on the definition of primary habitat provided in Appendix A.30. This fee does not apply to primary habitat for Butte County meadowfoam in other population groupings, as the Base Fee is sufficient to address the implementation of mitigation measures in those areas. The process for adjusting this fee is described in section 8.2.1.1.6 *Mitigation Fee Adjustment Process*.

10.2.1.1.3 Calculation of Fees for Individual Projects

The Base Fee must be paid for the entire area of the proposed project site that impacts BRCP natural communities and covered species habitat (including agricultural lands that support covered species habitat). Mapped BRCP land cover types that are not considered covered

species habitat and therefore not included in the Base Fee calculation are orchard/vineyard, non-native woodland, dredger tailings with herbaceous vegetation, urban, ranchettes-wooded, ranchettes-open, and disturbed ground.[8] Table 10–2, *Mitigation Fees by Land Cover Type*, provides a summary of fees required for different land cover types, including jurisdictional wetlands. Figure 10–1, *Calculation of Fees – Examples* (see separate file) provides some hypothetical project examples for how the Base Fee and restoration mitigation fees will be calculated. The process for determining the acreage of impacts used in the calculation of fees is described in Section 8.7.5, *Tracking of Impacts and Conservation Targets*.

Table 10–2. Mitigation Fees by Land Cover Type

Land Cover Type/Wetland Type	Pay Base Fee (yes or no)	Additional Fees	Comments
Grassland	Yes	See comment	Vernal Pool Fee and Emergent Wetland Fee as additional fees for wetland acres present within this land cover type.
Grassland with Vernal Swale Complex	Yes	See comment	Vernal Pool Fee and Emergent Wetland Fee as additional fees for wetland acres present within this land cover type.
Vernal Pools and Other Seasonal Wetlands	See comment	Vernal Pool Fee	Base Fee paid for the overall lands in which the wetlands occur (including the delineated wetland area). Vernal Pool Fee based on delineated wetland area.
Stock Ponds	See comment	No	Base Fee paid for the overall lands in which the ponds occur.
Cottonwood-Willow Riparian Forest	Yes	Riparian Fee	
Valley Oak Riparian Forest	Yes	Riparian Fee	
Willow Scrub	Yes	Riparian Fee	
Herbaceous Riparian and River Bar	Yes	No	
Dredger Tailings with Riparian Forest and Scrub (stream associated)	Yes	Riparian Fee	
Dredger Tailings with Riparian Forest and Scrub (not stream associated)	Yes	No	
Dredger Tailings with Sparse Herbaceous Vegetation	No	No	
Emergent Wetland	Yes	Emergent Wetland Fee	Emergent Wetland Fee based on delineated wetland area.
Managed Wetland	Yes	½ Emergent Wetland Fee	Emergent Wetland Fee based on ½ delineated wetland area.
Managed Seasonal Wetland	Yes	½ Vernal Pool Fee	Vernal Pool Fee based on ½ delineated wetland area.
Open Water	Yes, but see comment	No	No impacts projected for mapped open water (e.g., Lake Oroville, Thermalito Forebay and Afterbay). Impacts not covered by BRCP.

[8] Some amount of chaparral and conifer dominated forest communities may be affected by BRCP covered activities. These communities and any listed species that may use them are not covered by the BRCP; therefore, additional mitigation under CEQA or other regulations may be required on a project-by-project basis.

Table 10–2. Mitigation Fees by Land Cover Type (continued)

Land Cover Type/Wetland Type	Pay Base Fee (yes or no)	Additional Fees	Comments
Major Canal	Yes, but see comment	No	No impacts projected for Cherokee Canal, impacts not covered by BRCP.
Chaparral	No, but see comment	No	Not covered under BRCP; may be costs for mitigation if required under CEQA or NEPA compliance.
Blue Oak Woodland	Yes	No	
Blue Oak Savanna	Yes	No	
Interior Live Oak Woodland	Yes	No	
Mixed Oak Woodland	Yes	No	
Conifer-Dominated Forest	No, but see comment	No	Not covered under BRCP; may be costs for mitigation if required under CEQA or NEPA compliance.
Nonnative woodlands	No	No	
Orchards / Vineyards	No	No	
Rice	Yes	No (yes, if wetlands present – ¼ Emergent Wetlands Fee)	Emergent Wetland Fee based on ¼ delineated wetland area.
Cropland (Non-Rice)	Yes	No (yes, if wetlands present – ¼ Emergent Wetlands Fee)	Emergent Wetland Fee based on ¼ delineated wetland area.
Irrigated Pasture	Yes	No (yes, if wetlands present – ¼ Emergent Wetlands Fee)	Emergent Wetland Fee based on ¼ delineated wetland area.
Urban	No	No	
Ranchettes – Wooded	No	No	
Ranchettes – Open	No	No	
Disturbed Ground	No	No	
Jurisdictional Wetlands – Any Seasonal Type [1]	Yes, but included in fee paid on land cover type acreage	Vernal Pool Fee	Vernal Pool Fee based on delineated jurisdictional acreage for seasonal wetland types within any of the larger land cover types, except riparian types for which Riparian Fee is paid (no additional fee).
Jurisdictional Wetlands – Any Permanent Type [1]	Yes, but included in fee paid on land cover type acreage	Emergent Wetland Fee	Emergent Wetland Fee based on delineated jurisdictional acreage for permanent wetland types within any of the larger land cover types, except riparian types for which Riparian Fee is paid (no additional fee).

[1] For all section 404 jurisdictional wetlands delineated within any land cover type and affected by a project, the Vernal Pool Fee must be paid for impacts on vernal pools, swales, and other seasonal wetlands (see fee proportions for various wetland types), the Emergent Wetland Fee paid for impacts on permanent wetland types (see fee proportions for various wetland types); and the Riparian Fee paid for impacts on riparian forest and scrub habitats (both section 404 jurisdictional and non-jurisdictional).

The Vernal Pool Fee must be paid for the total acreage of all jurisdictional vernal pools and other seasonal wetlands permanently directly and indirectly[9] affected by the proposed project. One-half of the Vernal Pool Fee is paid for impacts on jurisdictional portions of managed seasonal wetlands (see Table 10–2). The affected jurisdictional wetlands acreage will be determined by a jurisdictional field survey that is verified by the USACE or other proper authority. If impacts on vernal pools and other seasonal wetlands are avoided through project design (i.e., no permanent direct or indirect impacts) and the avoided vernal pools and other seasonal wetlands meet the BRCP requirements for conservation lands, then this fee is not required. See examples in Figure 10–1. Avoidance and minimization measures are described in Chapter 6, *Conditions on Covered Activities*. BRCP requirements for conservation lands are provided in Section 5.2.3, *Assembly of Conservation Lands*, and CM1, *Acquire Lands*.

The Emergent Wetland Fee must be paid for the total acreage of all jurisdictional permanent emergent wetlands directly and permanently affected by the proposed project. One-half of the Emergent Wetland Fee is paid for impacts on managed wetlands and one-quarter for impacts on jurisdictional wetlands portions of agricultural lands (see Table 10–2). The effected jurisdictional wetlands acreage will be determined by a jurisdictional field survey that is verified by the USACE or other proper authority. If impacts on emergent wetlands are avoided through project design (i.e., no permanent direct or indirect impacts) and the avoided emergent wetlands meet the BRCP requirements for conservation lands, then this fee is not required. Avoidance and minimization measures are described in Chapter 6, *Conditions on Covered Activities*. BRCP requirements for conservation lands are provided in Section 5.2.3 and CM1. Acquire Lands.

The Riparian Fee must be paid for the total acreage of all BRCP mapped cottonwood willow riparian forest, valley oak riparian forest, and willow scrub, and stream-associated dredger tailings riparian forest and scrub land cover types that are directly and permanently affected by the proposed project. The Riparian Fee is not required for the removal of non-stream-associated dredger tailings riparian forest and scrub land cover type; however, the Base Fee must be paid for the removal of non-stream-associated dredger tailings riparian forest and scrub land cover type. The effected extent of riparian habitat will be based on the overlap between the proposed development and the location of riparian natural communities. If riparian habitat impacts are avoided through project design, then this fee is not required. See examples in Figure 10–1 for examples of fee calculations. Avoidance and minimization measures are described in Chapter 6, *Conditions on Covered Activities*.

The Meadowfoam Habitat Fee must be paid for the total acreage of all primary habitat of Butte County meadowfoam directly and permanently affected by the proposed project. The affected primary habitat acreage will be determined using the definition of primary habitat provided in Appendix A.30. If primary habitat is avoided through project design, then this fee is not required. Project proponents must comply with all requirements of CM12, Conserve Butte County Meadowfoam and avoidance and minimization measures described in Chapter 6,

[9] Isolation of vernal pools and other seasonal wetlands within a development area is considered an indirect impact and the Vernal Pool Fee must be paid for all acres of vernal pools and other seasonal wetlands caused to be isolated by a project.

Conditions on Covered Activities (see Table 6-3, *Take Limits for Covered Species and Avoidance and Minimization Criteria for Covered Species*).

For transportation and utility projects, the Base Fee will be paid for all acres of natural communities and covered species habitat within the entire width of the project, including the area of project direct footprint development and adjacent lands on which temporary impacts occur or vegetation will be maintained (e.g., mowing, vegetation trimming, mechanical removal of vegetation). See diagram in Figure 10–2, *Mitigation Fee Area for Transportation and Utility Projects* (see separate file). The Vernal Pool Fee, Emergent Wetland Fee, and Riparian Fee will be paid for all acres of respective wetland and riparian resources within the direct footprint and the temporary/maintenance areas of transportation and utility projects (Figure 10–2).

10.2.1.1.4 Avoidance of Resources to Reduce Fee

Project proponents may avoid land supporting covered species habitat and natural communities to reduce their impact fee payments at the discretion of BCAG. Avoided lands with natural communities and covered species habitat that meet the requirements for BRCP conservation lands are not included in the calculation for the Base Fee, Vernal Pool Fee, Emergent Wetlands Fee, Riparian Fee, or Meadowfoam Habitat Fee. BRCP requirements for conservation lands are provided in Section 5.2.3 and CM1, Acquire Lands. These impact fees may only be waived where habitat lands meet the requirements of the BRCP Conservation Strategy (see Chapter 5, *Conservation Strategy*).

10.2.1.1.5 Water and Irrigation District Channel Maintenance Fee

Water and irrigation district covered activities include the maintenance of approximately 49 miles of channels that could result in periodic removal of an estimated 39 acres[10] of habitat that supports covered species (particularly giant garter snake). Western Canal Water District, Biggs-West Gridley Water District, Butte Water District, and Richvale Irrigation District will collectively pay an annual fee to BCAG. This fee supports BCAG's administration of the permit compliance on behalf of the water districts. The annual water district fee is based on the per acre apportionment of BCAG's estimated administration and management costs (see Section 10.3.2.4, *Administration and Management Cost Estimation Methods* and Appendix F, Section F.5, *Administration and Management Costs*). Based on the total annualized estimated BRCP administration and management costs over the 50-year term of the BRCP, the annual Water District Channel Maintenance Fee is $1,379 per year for all four districts combined (Table 10–1). Apportionment of this fee among the four water and irrigation districts will be at their discretion, but the fee must be paid by January 1 each year. Fee payments will be discontinued following expiration of BRCP permits.

[10] Assumes that 66 percent of the channels support habitat comprised of, on average, a 10-foot-wide band of emergent vegetation along either or both sides of channels that could be periodically removed or disturbed by maintenance activities.

10.2.1.1.6 Mitigation Fee Adjustment Process

Land costs in many areas of California have historically increased well above the rate of inflation. The significant demand for housing in several areas of California and the more limited housing supply have often increased housing prices significantly, in turn increasing the value of developable land. Other BRCP costs, including the cost of staff, supplies, and equipment involved in managing, operating, restoring, and maintaining the BRCP conservation lands system, will more closely follow the general rate of inflation. These factors coupled with the often dynamic nature of the costs associated with implementation of regional habitat conservation plans (HCPs) and NCCPs over long timeframes—including land acquisition, habitat restoration, management, monitoring, and administration costs—requires a flexible approach to funding and mitigation fee adjustment through time. To avoid mitigation fees becoming outdated, a process of regular fee adjustment is critical. The mitigation fee adjustment process will involve two primary updating mechanisms that BCAG will use for adjusting fee levels:

1. Automatic Fee Increases through Cost Index – An automated increase through the specified cost index will be applied in all years, except those for which a detailed cost/fee review is conducted.
2. Periodic Detailed Cost/Fee Review – At specified intervals (Years 3 and 6, and every four years thereafter; timing adjustable by BCAG), a thorough evaluation of BRCP implementation costs will be conducted and used to recalculate the mitigation fee levels required to cover mitigation costs.

This dual approach will be used to adjust funding levels during BCRP implementation as described below.

Automatic Fee Adjustment

The variation in the cost of land due to site-specific factors means that it is difficult to develop land cost indices. However, given the link between the housing market, housing prices, and land costs, housing prices generally provide a more accurate index for land cost inflation than measures of general inflation, especially for land whose value is primarily generated by its development value. The index to be used to adjust the land acquisition cost portion of fees is the annual House Price Index (HPI) from the Federal Housing Finance Agency for the Chico, CA Metropolitan Statistical Area for the prior calendar year. The index to be used to adjust the non–land cost portion of fees is the Consumer Price Index (CPI) from the U.S. Bureau of Labor Statistics for the Chico, CA Metropolitan Statistical Area. BCAG may decide to use other indices during Plan implementation if other indices are developed that better predict the costs of the Plan.

On April 1 of each year following issuance of BRCP permits, the BRCP Implementing Entity will adjust all mitigation fees based on changes in these indices. BRCP Joint Powers Authority (JPA) Board of Directors will then approve and adopt the revised fee schedule by July 1 of the

same year. This refinement will allow for an annual inflationary or deflationary adjustment of the fees.[11]

Automatic fee adjustments will be applied in all years when the periodic detailed cost/fee adjustments are not conducted (see the following section, *Period Cost Review and Fee Adjustment*). Following periodic cost/fee reviews, the next year's automatic fee adjustment will be based on the new fee approved in the year of the review.

BCAG may change the index applied for fee adjustments if alternative indices are identified that better reflect cost changes.

Periodic Cost Review and Fee Adjustment

A detailed review of actual implementation costs will be conducted periodically during BRCP implementation. Mitigation fee adjustments may be made by BCAG based on this cost review. The cost/fee review process will include a review of the cost estimates that underpin the current fee schedule (see Section 10.3 and Appendix F).

To conduct detailed cost/fee reviews, the BRCP Implementing Entity will review its actual cost expenditures as well as other indicators of cost changes. This review will include the assembly and analysis of data associated with actual land transactions after the start of implementation as well as the actual costs of habitat restoration, management, maintenance, monitoring, and administration. Actual Implementing Entity cost experience may be supplemented with other relevant cost information where appropriate (e.g., other land transactions data). Once the revised cost estimates are completed, the mitigation fees will be recalculated to determine the fee level necessary to cover mitigation costs and ensure sufficient funding is available to meet the BRCP's mitigation obligations. These mitigation fee estimates will then be compared with the current fee level to determine what fee adjustments are required. The BRCP JPA Board of Directors must approve fee adjustments.

The administrative burden of conducting detailed cost/fee reviews every year along with the limited new information developed over the course of a single year makes annual reviews impractical. Consequently, detailed reviews will be conducted in implementation years 3 and 6 and then every four years thereafter through Year 50. BCAG will initiate the technical cost/fee review on January 1 of the relevant year with completion of the proposed revised fee schedule expected by April 1. The Board of the Implementing will then approve and adopt the revised fee schedule by July 1 of the same year.

In between the detailed reviews, annual indexed inflationary or deflationary adjustments will be made to the fee schedule (see section above, *Automatic Fee Adjustment*). BCAG may adjust the schedule for detailed reviews if deemed necessary to better track changing costs. Changes in the review schedule may be needed in periods of significant cost change, for example when land values are rapidly increasing or decreasing, fee levels may quickly become outdated.

[11] There is no ideal cost index for habitat mitigation costs. An inflationary index provides an interim adjustment process to adjust costs until sufficient new data is available to conduct a detailed cost review.

10.2.1.1.7 Mitigation Fee Context

The existing project-by-project process of compliance with federal and state endangered species laws and regulations requires permit applicants to incur a range of costs associated with species and habitat surveys, impact analyses, mitigation planning, negotiations with the regulatory agencies (e.g., U.S. Fish and Wildlife Service [USFWS], National Marine Fisheries Service [NMFS], California Department of Fish and Wildlife [CDFW], and Regional Water Quality Control Board [RWQCB]), document preparation, permit application review and processing, project delays, habitat set-asides and acquisition, habitat restoration, and short-term and long-term monitoring. The mitigation fees associated with implementing BRCP covered projects would replace most of these project-by-project costs.[12]

Mitigation costs for individual projects resulting from the existing state and federal endangered species, wetlands, and other biological regulatory compliance processes are uncertain due to the lack of data on such costs and the wide variety of project size and complexity, but these additional costs are currently incorporated into the overall pricing of new homes and commercial buildings as well as new infrastructure.[13] With the BRCP, overall biological resources mitigation costs are expected to be lower for a typical new project than under the existing permitting process.

Compared with base mitigation fees applied under existing approved HCPs and NCCPs in California, the proposed BRCP Base Fee is at the low end of the mitigation fee spectrum (Table 10–3, *"Base" Mitigation Fees (per acre) for Approved HCPs and NCCPs*). While comparisons across plans are imperfect due to varying fee structures, land costs, and habitat categories, a review of existing mitigation fees from a number of approved HCPs and NCCPs indicates that the per acre base mitigation fees on residential development fall in the range of $5,500 to $38,000 in comparison to the BRCP base fee of $4,415 per acre.

[12] Note that the BRCP includes requirements for specific species and habitat surveys and impact avoidance and minimization measures to be implemented by the project applicant at their own expense in addition to the payment of mitigation fees.

[13] Federal ESA, California ESA, California Environmental Quality Act (CEQA), National Environmental Policy Act (NEPA), CWA sections 404 and 401, Fish and Game Codes such as Streambed Alternation Agreements, and other regulations can all drive requirements for biological resources mitigation that add the costs of project implementation.

Table 10–3. "Base" Mitigation Fees (per acre) for Approved HCPs and NCCPs

Western Riverside County MSHCP (FY 2010–2011)	Coachella Valley MSHCP (2011)	East Contra Costa County HCP/NCCP (2011)	San Joaquin MSCP (2012)	Natomas Basin HCP (2011)	Santa Clara Valley NCCP (2012)
Residential (density < 8 Dwelling Unit/acre)[1]	Residential (density < 8 Dwelling Unit/acre)[2]	Fee Zone 2[3]	Natural/Agricultural Lands	Authorized Development Sites	Land Cover Fee: Zones A, B, and C
$9,690	$5,490	$21,324	$14,372	$37,547	$3,905-15,416

[1] Assumes five units at a per-unit fee of $1,938.
[2] Assumes five units at a per-unit fee of $1,098.
[3] Includes development fee. Excludes potential wetland mitigation fee and temporary fee.
Key: FY = Fiscal Year; MSHCP and MSHP = multi-species habitat conservation plan.

For habitat restoration mitigation fees added to the base fee, BRCP restoration mitigation fees are generally comparable with those under existing approved HCPs and NCCPs (Table 10–4, *Restoration Mitigation Fees (per acre) Comparison*). A review of the current restoration mitigation fees from approved HCPs and NCCPs indicates that the per acre restoration fees are in the range of $64,500 to $191,500, a range that overlaps with the BRCP restoration fee range of $42,470 to $93,741.

Table 10–4. Restoration Mitigation Fees (per acre) Comparison

Restoration Fee Category	BRCP Restoration Fee[1]	East Contra Costa County HCP/NCCP (2011)[2]	San Joaquin MSCP (2012)	Santa Clara Valley NCCP (2012)[4]
Riparian	$55,670	$64,570	Not applicable[3]	$139,708
Vernal Pools	$42,470	$191,445	$81,989	Not applicable
Emergent Wetland	$93,741	$88,359	Not applicable[3]	$171,322

[1] Fees based on: riparian at 1:1 mitigation ratio; vernal pools at 1:1 mitigation ratio; and emergent wetland at 2:1 mitigation ratio.
[2] Fees based on: riparian at 1:1 mitigation ratio; seasonal wetlands (assumed equivalent to BRCP vernal pools) at 2:1 mitigation ratio; and perennial wetlands (equivalent to BRCP emergent wetland) at 1:1 ratio.
[3] Addressed by the base fee for all "Natural/Agricultural Lands" ($14,372).
[4] Fees based on willow riparian forest and mixed riparian (equivalent to BRCP riparian) at mitigation ratio of 1:1 and freshwater marsh (equivalent to BRCP emergent wetland) at a 1:1 mitigation ratio.

Per acre restoration mitigation fees are driven both by the estimated restoration cost per acre as well as by the plan's habitat restoration mitigation ratios. For example, the emergent wetland mitigation fees for BRCP and East Contra Costa County HCP/NCCP are similar, but the mitigation ratio for BRCP is 2:1 while for East Contra Costa County HCP/NCCP it is 1:1; this outcome is the result of an estimated restoration cost per acre of emergent wetland under the BRCP that is substantially lower.

It should be noted that different plans include different sets of costs within their base fees and their restoration fees. For example, in BRCP the restoration fees include only the costs of planning, compliance, and implementing restoration projects with monitoring for the establishment period; while other plans often include in restoration fees the costs for land acquisition, long term monitoring, and endowment funding. All of these other costs are included in BRCP's base fee rather than in restoration fees.

10.2.1.2 Conservation Component of Local Share Funding

1. As a regional joint HCP/NCCP the BRCP must provide for the conservation of species within the biological and geographic context of the Plan Area; as such BRCP biological goals and objectives go beyond the mitigation of impacts that result from covered activities and include contributions to the conservation and recovery of covered species and the conservation of natural communities, including ecological processes, habitat gradients, and biodiversity. This section describes the Local Share sources of funding to implement components of the BRCP that exceed mitigation requirements and contribute to the conservation and recovery of covered species and provide for the conservation of natural communities in the Plan Area. The total area for land acquisition under the BRCP to achieve the BRCP biological goals and objectives is 90,417 acres (see Table 5-9, *Natural Community Conservation and Mitigation Targets for Protection and Restoration*). The acreage split by Local Share and Federal/State Share funding sources for the acquisition of conservation lands, including the conservation and mitigation components of the BRCP, is presented in Table 10–5, *Funding Sources for Conservation Lands by Acreage*. The sources of Federal/State Share BRCP funding are described in Section 10.2.2.

Table 10–5. Funding Sources for Conservation Lands by Acreage

	BRCP Conservation Lands (Protection and Restoration)				
Funding Source	**Non-Fee Funded[1] (acres)**	**Percent Split**	**Fee Funded[2] (acres)**	**Percent Split**	**Total (acres)**
Local Share	29,699	50%	31,018	100%	60,717
Federal/State Share	29,700	50%	0	0%	29,700
Total	59,399	100%	31,018	100%	90,417

[1]Non-fee funds derived from conservation component funding sources.
[2]Fee-funds are derived from mitigation fees.

The following are BRCP conservation components that will be funded through Local Share funding sources.

- The acquisition of 29,699 acres of oak woodland and savanna, grassland, grassland with vernal swale complex, riparian habitats, emergent wetlands, managed wetlands, streams, ponds, rice, irrigated pasture, and irrigated cropland land cover types and associated covered species habitats;
- Restoration of 250 acres of giant garter snake habitat;
- Screening of up to 12 water diversions on streams;
- Placement of up to 15,000 cubic yards of salmonid spawning gravels;
- 50 percent of costs associated with removal of impediments to fish passage (removal of debris from BRCP protected channels and repair of the Iron Canyon Fish Ladder); and

- Implementation of all habitat management, monitoring, changed circumstance remedial measures, post-BRCP permit management and monitoring actions, and administration of the BRCP associated with the above actions.

An estimate of the cost and funding share between the Local Share and the Federal/State Share is provided in Table 10–6.

Table 10–6. BRCP Cost and Funding Overview

Funding Source	Projected Amount	% of Funding	Share Source
Development Fees			
Base Fee	$108,716,886	28.8%	Local
Vernal Pool Fee	$12,997,350	3.5%	Local
Wetland Fee	$5,906,250	1.6%	Local
Riparian Fee	$10,522,575	2.8%	Local
Butte County Meadowfoam Habitat Fee	$705,000	0.2%	Local
Water/Irrigation District Fee	$68,958	0.0%	Local
Total Fee Funding	$138,917,020	37%	Local
Non-Fee Funding			
Other Local Funding			
Land Acquisition by Local Land Agencies, Non-Profits, and Foundations[1]	$108,965,214	29%	Mixed[2]
Butte County Agricultural Mitigation Ordinance[3]	$10,102,100	3%	Local
Total Other Local Funding	$119,067,314	32%	Mixed[2]
State and Federal Funding			
New State and Federal Funding	$119,067,314	32%	Mixed[2]
Total Non-Fee Funding	$238,134,628	63%	
Total Funding and Plan Costs			
Total Funding	$377,051,648	100%	

[1]Land acquisition by local land agencies, non-profits, and foundations are assumed to total 29,699 acres over the 50-year period of implementation. Acquisition costs based on average per acre costs for Plan including transaction costs, etc.
[2]Funding sources may be a mix of local sources, state grants, and federal grants.
[3]Assumes 2,500 total acres protected via Butte County agricultural mitigation ordinance over 50-year period of implementation

The following subsections describe the various funding sources that may be used to support the Local Share of funding for the conservation component of the BRCP.

10.2.1.2.1 Regional and Local Government Funding Sources

There is a broad range of local and regional funding sources that have been used to support habitat conservation and agricultural land preservation in California. Many of these funding sources require voter-approval and, hence, must be compelling and popular to pass. Some funding sources represent an alternative way to acquire funding from development rather than via mitigation fees, and so are an alternative to mitigate fees rather than a distinct set of funding

for the conservation component. While these sources are not currently proposed in the BRCP, examples are provided below of local and regional government funding sources that are currently in effect elsewhere in California including: 1) sales tax measures in San Diego County that fund transportation and open space; 2) sales tax measures in Sonoma County that fund open space and agricultural land preservation; 3) property tax assessments and parcel taxes in Alameda County that fund parks and open space preservation and development; 4) property tax assessments and parcel taxes in Contra Costa County that fund parks and open space preservation and development; 5) tipping fees in Riverside County; 6) Mello-Roos Community Facilities District special taxes in Solano County for open space preservation; and 7) homeowner's association fees on development in areas surrounding San Bruno Mountain in San Mateo County. These examples of local and regional fee funding sources are not proposed or required to support BRCP implementation and are provided here only as examples of possible approaches that the Permittees may decide, individually or collectively, to use in funding the BRCP during implementation.

10.2.1.2.2 Private Foundation Grant Programs

There are a number of private foundations and non-profits that have provided significant funding for open space and habitat acquisition and restoration. Foundations and non-profits with major presences in California and applicable missions include: 1) David and Lucile Packard Foundation; 2) The Columbia Foundation; 3) William and Flora Hewlett Foundation; 4) The Irvine Company; and 5) the National Fish and Wildlife Foundation. BCAG will seek grant funding for the conservation component of the BRCP from these and other similar organizations.

10.2.1.2.3 Land Trust and Conservation Partner Activities

The activities of regional and national land trusts often provide substantial support to the achievement of conservation goals. Examples of land trusts and other non-profit conservation partners in Butte County are the Northern California Regional Land Trust, the Nature Conservancy, and the Chico State University Chico Research Foundation.

The Northern California Regional Land Trust was founded in 1990 and incorporated as a nonprofit tax exempt organization under section 501(c)(3) of the Internal Revenue Service to assist northern California landowners and public agencies in the voluntary protection of land and other natural resources. The organization is dedicated to promoting the conservation and preservation of northern California's open spaces, agricultural lands and natural resources with cooperation between the community, private landowners, public agencies and other nonprofit groups. The Northern California Regional Land Trust currently holds 27 conservation easements in Butte and Tehama counties covering over 15,500 acres.[14] Between 1998 and 2013, the Northern California Regional Land Trust has protected over 4,700 acres of habitat in Butte County.

[14] http://www.landconservation.org/ncrltpreserves.php

The Nature Conservancy is one of the World's leading conservation organizations working to protect ecologically important lands and waters for nature and people and addresses the most pressing conservation threats at the largest scale. The Nature Conservancy has historically preserved vernal pool grasslands in Butte and Tehama counties. Between 1999 and 2013, The Nature Conservancy has protected over 1,000 acres of habitat in Butte County.

The Chico State University Chico Research Foundation was incorporated in 1997 as a private non-profit corporation that is self-financed and receives no state appropriations. The Chico Research Foundation is also active in acquiring conservation lands to protect natural communities for basic research purposes and funds and manages various existing ecological preserves. Between 1997 and 2013, the Chico Research Foundation has acquired approximately 4,100 acres of conservation lands in Butte County.

Since 1997, the combined efforts of the Northern California Regional Land Trust, The Nature Conservancy, and the Chico Research Foundation have resulted in the protection of 9,800 acres of conservation lands in Butte County averaging about 640 acres per year.[15] Based on this historic track record for just these three conservation partners (and the assumption that additional conservation partners are likely to participate during the 50-year period of BRCP implementation), the BRCP could acquire 32,000 acres over 50 years, or over 2,000 acres more than needed to achieve the full 29,699-acre BRCP Local Share funded conservation land acquisition. In addition, an estimated 2,500 acres of agricultural lands will be acquired under the Butte County Agricultural Mitigation Ordinance over the BRCP implementation period, most or all of which are expected to meet BRCP conservation requirements.

The prior and future conservation efforts of land trusts and other conservation organizations in Butte County will contribute directly to the conservation goals of the BRCP and will indirectly fund BRCP implementation through the raising and investment of their own funding. Lands acquired and protected or restored for the conservation of species and habitats within the Plan Area by nongovernmental organizations such as land trusts and conservancies and other non-profit conservation partners, will be counted toward the Local Share contribution to the conservation component of the BRCP.

10.2.1.2.4 Other Mechanisms for Land Conservation and Local Share Funding

There are a number of additional mechanisms through which land conservation can be achieved in the Plan Area. In many California counties, private donations of conservation easements or fee title ownership to land tracts of valuable open space and conservation land have made important contributions to conservation efforts. These donations carry potential tax-benefits for the donor, though are often driven by individual preferences and values rather than financial concerns.

[15] Estimated as 4,700 acres by the Northern California Land Trust over 15 years for 313 acres/year; 1,000 acres over 14 years by The Nature Conservancy for 71 acres/year; and 4,100 acres over 16 years by the Chico Research Foundation for 256 acres/year. The sum is 313 + 71 + 256 = 640 acres/year and 640 acres/year x 50 years = 32,000 acres.

Additional regulatory conservation tools, such as clustering ordinances and transfer of development rights programs, have sometimes been successful in California (e.g., Livermore, San Luis Obispo), though care must be taken to avoid overlap with and duplication of mitigation requirements.

In addition to the direct Local Share funding sources described above, support for the operation of BCAG may also be provided indirectly through the in-kind provision of staff support by BCAG and other Permittees.

10.2.1.3 Funding Post-Permit Land Management

At the end of the 50-year permit period, ongoing annual costs will remain that will require funding in perpetuity. All habitat protection, enhancement, and restoration will have been completed and therefore the ongoing costs will be substantially less than costs during the permit period with the primary focus on conservation land management and a reduced level of administrative, legal, and monitoring activities. Funding of the operations of BCAG to manage and monitor the BRCP conservation lands system after the 50-year permit period will be provided through the returns on an endowment fund built during the 50-year permit period. The endowment fund is described in Section 10.3.2.6, *Post-BRCP Permit Endowment Cost Estimation Methods* and in Section F.7, *Post-BRCP Permit Implementation Costs*. While the endowment will be built from various funding sources, all post permit funding is the responsibility of BCAG and the Permittees. Any shortfalls in returns from the endowment to meet the funding requirements for managing the BRCP conservation lands will be the responsibility of and addressed by BCAG and the Permittees.

10.2.2 Federal/State Funding Sources

As a regional joint HCP/NCCP the BRCP must provide for the conservation of species within the biological and geographic context of the Plan Area; as such BRCP goals go beyond the mitigation of impacts that result from covered activities and include contributions to the conservation and recovery of covered species and the conservation of natural communities, including ecological processes, habitat gradients, and biodiversity. This section describes the Federal/State sources of funding to support implementation of the components of the BRCP that contribute to the conservation and recovery of covered species and provide for the conservation of natural communities in the Plan Area. Funding from these sources will be used by BCAG to protect, enhance, restore, and manage species occurrences, species habitat, and natural communities as described in Chapter 5, *Conservation Strategy*.

The total area for land acquisition under the BRCP to achieve the BRCP biological goals and objectives is 90,417 acres (see Table 5-9). The acreage split by funding sources for the acquisition of conservation lands to protect and restore habitat, including the conservation and mitigation components, is presented in Table 10–5. The Local Share of BRCP funding, separated by mitigation and conservation components, is described in Section 10.2.1. All Federal/State Share funding supports the implementation of BRCP conservation components only. An estimate of the cost and funding between the Local Share and potential Federal/State

funds is provided in Table 10–6. The description of the implementation costs (Section 10.3 and Appendix F) provides the details and rationale for the breakdown of implementation costs between the conservation component and mitigation component of BRCP Conservation Strategy. Funding of the BRCP conservation component will be shared between the Local Share of funding (see Section 10.2.1.2) and the Federal/State Share of funding described here.

The following are BRCP conservation components that will be funded through Federal/State Share funding sources.

- The acquisition of 29,700 acres of oak woodland and savanna, grassland, grassland with vernal swale complex, riparian habitats, emergent wetlands, managed wetlands, streams, ponds, rice, irrigated pasture, and irrigated cropland land cover types and associated covered species habitats;
- Restoration of 250 acres of giant garter snake habitat;
- Screening of up to 13 water diversions on streams;
- Placement of up to 15,000 cubic yards of salmonid spawning gravels;
- 50 percent of costs associated with removal of impediments to fish passage (removal of debris from BRCP protected channels and repair of the Iron Canyon Fish Ladder); and
- Implementation of all habitat management, monitoring, changed circumstance remedial measures, post-BRCP permit management and monitoring actions, and administration of the BRCP associated with the above actions.

The total conservation component of the BRCP costs is estimated at about $238.1 million in 2011 dollar terms over the 50-year permit term (see Section 10.3 and Appendix F). BCAG is responsible for acquiring sufficient funding to implement the conservation actions within the timeframes presented in Section 8.1, *BRCP Implementation Schedule*. BCAG will work with federal and state agencies to identify and secure funding for non-mitigation conservation activities. Support for securing funding from the following agencies will be particularly important: USFWS, NMFS, CDFW, Natural Resources Conservation Service (NRCS), U.S. Environmental Protection Agency (EPA), and USACE. Similar to the implementation of other HCPs and NCCPs, a broad range of funding sources will be required over the period of BRCP implementation. The following subsections provide more detail on potential federal and state funding sources.

10.2.2.1 Federal Grants and Legislation

Federal grant sources have played a critical role in funding the preservation of habitat nationwide, including supporting the implementation of HCPs and NCCPs. The largest federal funding sources for HCP and NCCP implementation over the last 20 years include the ESA Section 6 Grants for habitat land acquisition, the Land and Water Conservation Fund, and the North American Wetlands Conservation Act Grant Program. Funding for all these programs has

or may be reduced in the face of the current economic downturn and fiscal challenges, but may rebound as stronger economic conditions return. Highlights of these funding sources include the following:

- **ESA Section 6 Grants**. Land acquisition grants provided under section 6 of the ESA have been the most important source of conservation funding for HCP implementation in recent years. Between 2001 and 2004, California received an average of about $24 million annually, amounting to about 50 percent of the total nationwide funding. In 2010, land acquisition grant funding for California was about $20 million; in 2011, it was $16.4 million and in 2012 it was $7.0 million.[16] Declines in funding due to federal budget cut backs resulting from the Great Recession are expected to continue in the short term, but improvements in funding could result as stronger economic conditions return. HCP and NCCPs throughout California have received significant funding from this source, including plans in San Diego County, Riverside County, Sacramento County, and Contra Costa County, among others.
- **The North American Wetlands Conservation Act Grants.** The North American Wetlands Conservation Act program is also administered by the USFWS. This program provides matching grants to private or public organizations or to individuals who have developed partnerships to carry out wetlands conservation projects. Nationwide annual funding availability has varied, generally between $40 million and $100 million.
- **Land and Water Conservation Fund.** Additional potential federal grant funding sources include the Land and Water Conservation Fund that provides matching grants to state and local governments for the acquisition and development of public outdoor recreation areas and facilities, as well as funding for shared federal land acquisition and conservation strategies.

Additional potential sources of federal funding and support for BRCP implementation include the following programs. Some of these programs have not been authorized every fiscal year, but may be reauthorized again sometime in the future; they are identified here as examples of past funding sources associated with HCP/NCCPs in California.

- **Environmental Quality Incentives Program**. Administered by the NRCS, this program provides financial assistance to plan and implement conservation practices that address natural resources concerns and for opportunities to improves soil, water, plant, animal, air or related resources on farm land and non-industrial private forestland.
- **Farm and Ranch Land Protection Program.** Also administered by the NRCS, the Farm and Ranch Land Protection Program utilizes funds provided by the U.S. Department of Agriculture (USDA) for up to 50 percent of conservation easement value.

[16] California Department of Fish and Wildlife website, www.dfg.ca.gov; U.S. Fish and Wildlife Service website, http://www.fws.gov/endangered/esa-library/pdf/Section6_grants.pdf)

- **Wildlife Habitat Incentive Program.** The Wildlife Habitat Incentive Program is administered by the NRCS and provides technical assistance to landowners and others to develop habitat that supports fish and wildlife populations of national, state, tribal and local significance.
- **Wildlife Restoration Program Grants.** This Wildlife Restoration Program was authorized under the Pittman-Robertson Act and is used for the selection of restoration, rehabilitation, and improvement of wildlife habitat, wildlife management research and distribution of information produced by projects. The Wildlife Restoration Program is administered by the USFWS.
- **Landscape Conservation Cooperatives.** Administered by the USFWS, the Landscape Conservation Cooperatives program was established to improve science and management decisions in response to climate change. The program is intended to apply strategic habitat conservation through partnerships with other federal agencies, states, tribes, non-governmental organizations and stakeholders.
- **General Challenge Grants.** Administered by the National Fish and Wildlife Foundation. General Challenge Grants provide funding up to $150,000 for projects that foster cooperative partnerships to conserve fish, wildlife, plants, and their habitats. In addition, the National Fish and Wildlife Foundation administers the Five Star Restoration Challenge Grant for projects that support community-based wetland, riparian, and coastal habitat restoration projects. These grants, however, are modest in size and are limited to $20,000 or less.
- **Habitat Conservation Fund.** The Habitat Conservation Fund is administered by the California Department of Parks and Recreation, requires dollar-for-dollar match from non-state source for wetlands, riparian, trails, and anadromous fish/trout categories.
- **Recreation Trail Fund.** The Recreation Trail Fund provides federal dollars for non-motorized trail projects and can provide up to 80 percent of total project cost. The fund is administered by the California Department of Parks and Recreation.
- **Clean Water State Revolving Fund.** Administered by the EPA, the Clean Water State Revolving Fund provides low-interest loans for projects that improve water quality and reduce nonpoint source pollution, including the preservation, restoration, and creation of wetlands. Loans can cover 100 percent of the project costs.

Finally, funding for the conservation of habitat has been and can be acquired directly through federal legislation. The Permittees and Implementing Entity have the ability to lobby Congress for funding to support implementation of the BRCP. Additionally, BRCP is a member of the

Northern California Conservation Planning Partners[17] that can lobby collectively to attain federal funds for implementation of HCPs and NCCPs in Northern California, including the BRCP.

10.2.2.2 State Grants and Legislation

State bond funding and the state's general fund have funded major investments in natural resources, along with parks and recreation, over the last four decades. The state administers the bond programs and funding, typically through competitive (e.g., Non-motorized Trails Grant Program, California Heritage Fund Grant Program, and the Environmental License Plate Fund) and noncompetitive (e.g., per capita) grant programs. The noncompetitive grants are allocated to local and regional jurisdictions for use at the discretion of the jurisdiction for projects that meet state guidelines. Other state grant programs include:

- California Wildlife Conservation Board Grants
- California Farmland Conservancy Program (California Department of Conservation)
- Habitat Conservation Fund (California Department of Parks and Recreation)
- Watershed Coordinator Grant Program (California Department of Conservation)
- Resources Trust Fund (California State Lands Commission)
- CALFED Water Program Grants (California Bay-Delta Authority, California Department of Water Resources)

Between 1970 and 2003, Californians approved 27 of 37 natural resource bonds measures to fund $15.3 billion in park and water-related programs, an overall 73 percent approval rate. During the 1970s and 1980s, 90 percent of bond referenda were approved though minimal parks bonds passed during the 1990s. After 2000, however, some of the largest natural resource bonds were passed by California voters, including the following:

- **Proposition 12**, 2000 Safe Neighborhoods, Clean Water and Coastal Protection Act, $1.2 billion
- **Proposition 13**, 2000 Safe Drinking Water, Watershed Protection, and Flood Control Bond, $505 million
- **Proposition 40**, 2002 bond for clean water, air, parks and coastal protection, $2.3 billion
- **Proposition 50**, 2002 bond to fund a variety of water projects, including coastal land protection, $1.5 billion
- **Proposition 84**, 2006 parks and water bond to improve drinking water, flood control, protection of coastlines, and state parks, $5.4 billion

[17] A consortium of counties that have completed or are preparing HCPs and NCCPs in Northern California, including BRCP, East Contra Costa HCP/NCCP, Yolo Natural Heritage Program, Placer County Conservation Plan, Natomas Basin HCP, South Sacramento County HCP, San Joaquin County HCP, Solano County HCP, Yuba-Sutter Regional Conservation Plan, and Santa Clara Valley Habitat Plan.

Revenues from most of these bonds have been fully exhausted or allocated, though Proposition 84 still has some revenues remaining. Other natural resource bonds with funds still available include Proposition 117, often referred to as the "Mountain Lion Fund," that was approved by California voters in 1990 and provided $30 million per year for 30 years (through 2020).

It is expected that as the economy recovers from the Great Recession, future state bonds will provide a strong potential funding source for conservation efforts in California. There should be substantial opportunities for additional bond funding over the 50-year implementation term of the BRCP.

Funding for the conservation of habitat has been and can be acquired directly through state legislation. The Permittees and Implementing Entity have the ability to lobby the California Legislature for funding to support implementation of the BRCP. Additionally, BRCP is a member of the Northern California Conservation Planning Partners that can lobby collectively to attain state funds for implementation of HCPs and NCCPs in Northern California, including the BRCP.

10.2.3 Funding Assurances

The Permittees, led by BCAG, are committed to securing sufficient funds within the required timeframe to implement the BRCP Conservation Strategy in its entirety. Funding for the mitigation component of the BRCP (i.e., payment of impact fees) will be provided by project applicants to BCAG under the process described in Section 8.7, *Process for BRCP Implementation.* Funding for the conservation component of the BRCP will be sought by BCAG and the Permittees from the sources identified in Section 10.2.1 and Section 10.2.2, and other appropriate sources. BCAG and the Permittees will secure sufficient funds within the timeframe identified in the BRCP implementation schedule (section 6.1, *BRCP Implementation Schedule* and specifically Tables 8–1, *BRCP Land Acquisition Schedule for Natural Communities for Species Conservation Component* and 8–2, *BRCP Schedule for Conservation Component (i.e., Non-Mitigation) of Specified Biological Resources*) to implement the conservation component of the program.

It is anticipated that state and federal agencies, including the USFWS, NMFS, and CDFW, will contribute to the conservation component of the BRCP. The Permittees recognize that state and federal funds cannot be guaranteed in advance of the approval of yearly budgets, nor can they be guaranteed by agency staff without the authority to commit these funds. However, the Permittees assume and request the assurance that the USFWS, NMFS, and CDFW will make every effort to assist BCAG in securing the funding outlined in this chapter to contribute to species recovery and to help implement the conservation component of the BRCP.

10.3 ESTIMATE OF IMPLEMENTATION COSTS

10.3.1 Scope and Purpose of the Implementation Cost Analysis

The BRCP identifies conservation actions that will be implemented over the 50-year implementation period to meet the biological goals and objectives and to comply with the

requirements of the ESA and the NCCPA (see Sections 5.3, *Biological Goals and Objectives* and Section 5.4, *Conservation Measures*). Among those actions are measures to avoid, minimize, and mitigate impacts of the covered activities (described in Chapter 2, *Covered Activities*) on natural communities and covered species (described in Chapter 3, *Existing Ecological Conditions*, and Appendix A, *Covered Species Accounts*) and to provide for the conservation of natural communities and covered species. In addition, the BRCP includes the implementation of monitoring and adaptive management actions (Section 7.2, *Monitoring Program* and Section 7.3, *Adaptive Management Plan*) and steps to respond to changed circumstances (Section 8.4, *Changed Circumstances and Unforeseen Circumstances*).

The BRCP implementation cost analysis quantifies the estimated total cost to implement the BRCP over 50 years and subdivides those costs between the mitigation component and conservation component of specific BRCP actions. The implementation cost estimates are used to establish the Local Share and Federal/State Share funding requirements for BRCP implementation (Section 10.2, *Funding Sources and Assurances*). Cost estimates are provided for the mitigation component and conservation component for each of the following cost categories.

- **Conservation Measures**. Cost estimates are provided for each of the 12 conservation measures described in Section 5.4. The cost estimates for conservation measures only include, except where noted otherwise, costs directly associated with implementation of the actions required to physically implement each measure, including any associated avoidance and minimization measures (see Chapter 6, *Conditions on Covered Activities*). Costs associated with planning, permitting, monitoring, conducting surveys, and related actions that support the physical implementation of conservation measures are, except as noted in Appendix F, included under other cost categories in this chapter.
- **Environmental Compliance**. This category includes costs associated with complying with other laws and regulations and obtaining associated permits necessary to implement some of the conservation measures. Conservation measures that are expected to require such compliance are those that require vegetation and ground disturbing activities such as restoring habitat (e.g., riparian and wetlands habitat restoration) or require disturbance of streams to enhance existing habitat, such as in-channel placement of spawning gravels.
- **Monitoring and Other Surveys**. This category includes costs associated with implementing the monitoring plan (see Section 7.2) and conducting pre-land acquisition and other surveys related to the management of conservation lands.
- **Administration and Management**. This category includes costs necessary to administer implementation of the BRCP, including hiring of personnel and the ongoing costs of personnel expenses, office equipment and supplies, contracted services, and other overhead and related expenses. A description of the BRCP Implementing Entity and administrative functions is provided in Chapter 9, *Implementation Structure*.

- **Changed Circumstances**. This category includes costs of implementing measures to respond to changed circumstances. The range of measures to address changed circumstances is described in Section 8.4.2.2, *Changed Circumstances Addressed by the BRCP*.
- **Post-BRCP Permits**. This category includes the costs associated raising an endowment that would fund ongoing management of conservation lands after the expiration of BRCP incidental take permits 50 years following their issuance.

The estimate of costs is for the purpose of projections of necessary funding to implement the BRCP, however, should costs be greater or less than the estimates provided the commitment to funding the full implementation of the BRCP as described under Section 10.2 is unchanged.

10.3.2 Cost Estimation Methods

This section summarizes the methods and assumptions used to estimate implementation costs for each of the cost categories. Detailed descriptions of methods and assumptions used to estimate costs for each of the cost categories are presented in Appendix F. Implementation cost estimates represent average planning-level cost estimates in 2011 dollars. Specific investments (such as specific land acquisitions, restoration projects, or monitoring efforts) are expected to show significant unit cost volatility around the assumed averages, given the unique effects of parcel-specific characteristics on costs. The implementation cost estimates are considered best estimates in 2011 dollar terms given the information available and current market conditions.

Major considerations and assumptions used to estimate total implementation and per unit costs included the following parameters:

- **Land Protection and Restoration Goals**. Total BRCP costs are driven by the natural community and covered species habitat protection and restoration objectives (Tables 5–5, *Natural Community Protection Targets*, 5–7, *BRCP Restoration Targets*, and 5–8, *BRCP Covered Species Modeled Habitat Protection Targets*) which will require protection of approximately 90,416 acres, mainly through permanent conservation easement acquisitions but also including fee title acquisition as necessary.
- **Acquisition Approach**. Land can be acquired for habitat protection through either fee title or permanent conservation easement. In most instances, permanent conservation easement acquisitions are preferred, as they allow for continued land use practices in the working landscapes of Butte County (e.g., farming, ranching, and other land uses) and can be less costly to acquire and maintain compared to fee title acquisitions. In some instances, fee title acquisition will be necessary, such as areas where habitat will be restored, conservation lands requiring frequent access and more intensive habitat management, and instances where landowners are only interested in fee title sale of the

land. In all cases, the BRCP JPA Board will need to approve fee title acquisitions of land (see Section 10.7).[18]

- **Acquisition Size**. Some cost estimates are determined on a per transaction basis rather than a per acre basis. Larger area acquisitions will generally be preferred, but smaller parcels with particularly high biological value will be pursued. Based on a review of the available parcel sizes, an average transaction size of 160 acres was assumed for cost estimating purposes.
- **Implementation Schedule**. The term of the BRCP is 50 years and includes the full range of conservation activities and investments. The BRCP includes a timeline for implementation of the conservation component activities divided into five periods, each a decade long (Tables 8–1, 8–2, and 8–3, *BRCP Schedule for Restoration of Natural Communities for Conservation Component*). The cost estimates used the BRCP timeline to subdivide estimated costs by 10-year period. Mitigation actions are required to be conducted as covered activities occur and, since there is no set schedule for covered activities, there is no set schedule for implementation of mitigation actions and costs.[19] In the absence of a mitigation implementation schedule, the cost analysis used the assumption that the acquisition of lands to protect and restore habitat for mitigation would be implemented proportionately on the same schedule as land acquisitions for the conservation component (Tables 8–1 to 8–3).
- **Unit Cost Research**. Unit cost research (including additional estimates of unit cost drivers, e.g., number of conservation land management contractors required) was conducted as necessary to ensure that total cost estimates could be developed for all conservation measures and cost categories. In general, the unit cost driver and unit cost estimates were based on one or a combination of the following approaches:
    - **County-Specific Data**. In some cases, most notably for land values, per acre values were developed primarily based on information directly from Butte County examples. Land value estimates were developed based on information on land transactions in Butte County as provided by recent appraisals, County assessor information, commercial land value databases, and interviews with selected appraisers, brokers, and land trust operators active in the area.
    - **Literature Review and Case Studies**. A number of the conservation measure implementation and monitoring costs were developed based on a review of available literature and personal communications on the costs of planning, implementing, and monitoring different conservation activities. Some of these case studies provided unit costs from Butte County cases, though literature from other locations where the conservation activity and habitat characteristics were similar was also considered.

[18] The Implementing Entity will coordinate with USFWS and CDFW on land acquisitions.

[19] Mitigation actions must be initiated prior to or concurrent with the impacts of the covered activities, but the timing of most covered activities will be determined by specific markets within the regional economy (e.g., housing market, commercial markets, transportation needs and funding, etc.).

- **Existing Conservation Plans**. While all regional conservation plans are different, experiences associated with administration and management of approved HCPs and NCCPs provide useful cost indications for the BRCP. Cost assumptions used in several other California regional conservation plans were considered while developing the cost estimates in this analysis. Information from the East Contra Costa HCP/NCCP, San Joaquin County HCP, and Natomas Basin HCP proved useful to costing the aspects of the BRCP where activities were similar. Experiences in other plans with ongoing endowments and other costs where circumstances are sufficiently similar provided useful cost indications.
- **BRCP-Specific**. BCAG, as the BRCP Implementing Entity, will be responsible for undertaking all necessary tasks to implement the BRCP (Chapter 9, *Implementation Structure*). The specific activities required under the BRCP as well as the existing capabilities and capacities of BCAG were taken into account when estimating the additional needs for staffing and equipment.

In instances where a cost could be included in more than one cost category, that cost was allocated to the most appropriate cost category as described in Appendix F. All costs are expressed in 2011 dollar terms to allow for better comparability of real costs through time and to avoid the impact of making specific assumptions about the uncertain rate of inflation.

The following sections provide a general overview of the methods and assumptions used to prepare cost estimates for each of the BRCP cost categories. Detailed descriptions of methods and assumptions are provided in Appendix F.

10.3.2.1 Conservation Measure Cost Estimation Methods

Conservation measure CM1, Acquire Lands requires acquisition of lands that support existing habitat and lands that are suitable for habitat restoration to achieve natural community and covered species habitat objectives (see Section 5.4.1.1, *CM1: Acquire Lands* and Tables 5–5, 5–7, and 5–8). Available lands meeting BRCP natural community protection and restoration requirements will be acquired through conservation easement or in fee title ownership at fair market value. The values of fee title ownership and conservation easement on land is based on land value research on transactions in Butte County. The average per acre values used were based on information on land transactions as provided by recent appraisals, County Assessor information, commercial land value databases, and interviews with selected appraisers and brokers active in the Plan Area. Estimated costs for CM1, Acquire Lands also capture all land acquisition costs associated with implementation of conservation measures CM12, Conserve Butte County Meadowfoam and CM13, Conduct Surveys to Locate and Protect New Occurrences of Butte County Checkerbloom, and survey costs for these conservation measures are addressed under administrative costs for Implementing Entity biologists.

Cost estimates for conservation measures CM2, CM4 through CM9-CM11, and CM14 are based on actual or estimated costs of similar conservation actions implemented or planned under other conservation programs and conservation measure-specific assumptions regarding how each of

these conservation measures will be implemented in the Plan Area (see Appendix F). Costs for implementing conservation measures CM3 is strictly administrative and are included in the Administration and Management cost category.

10.3.2.2 Environmental Compliance Cost Estimation Methods

Environmental compliance costs are applicable to BRCP terrestrial and aquatic habitat restoration projects (see Section 5.4.2.1, *CM4: Develop and Implement Site Specific Wetland and Riparian Restoration Plans*) and encompass costs necessary to prepare NEPA, California Environmental Quality Act (CEQA), Clean Water Act (CWA), National Historic Preservation Act (NHPA), and other environmental compliance documents and secure associated permits and authorizations. The cost estimates included in this analysis assume an average restoration project size of about 40 acres. The average environmental compliance cost per restoration project is estimated at $115,000, including $60,000 for NEPA and CEQA, $25,000 for CWA, $15,000[20] for NHPA, and $15,000 for other environmental compliance laws and regulations. The NHPA costs only include the cost of a cultural inventory; if significant cultural resources were found, the NHPA compliance cost could increase considerably. It is assumed that other BRCP implementation actions, such as land acquisition, ongoing maintenance and habitat management, and monitoring and other survey work, will not require environmental compliance and therefore would not incur any environmental compliance costs.

10.3.2.3 Monitoring and Other Surveys Cost Estimation Methods

Surveys and other activities associated with BRCP monitoring requirements are described in Section 7.2. Other survey costs include surveys necessary to evaluate lands for acquisition into the BRCP conservation lands system, baseline surveys of BRCP protected lands, and surveys necessary to locate spawning gravel replenishment sites, and to collect seed from and monitor effects on plant occurrences from which seed is collected to establish new plant occurrences.

Most costs for this cost category are labor costs, since equipment needs are assumed to be minimal. The monitoring and other survey cost estimates included in this cost analysis represent planning-level "best estimates" based on standardized assumptions. These assumptions may not fully encompass the inherent flexibility and variability of each parameter considered. Landscape-level monitoring involves monitoring the overall status of the covered species over the term of the BRCP and is conducted specifically to inform adaptive management decisions.

10.3.2.4 Administration and Management Cost Estimation Methods

The structure of and responsibilities for implementing the BRCP program are described in Chapter 9, *Implementation Structure*. BCAG will be the Implementing Entity and will be responsible for implementation of the BRCP, including all costed elements of the mitigation and conservation components. To carry out the responsibilities associated with implementing the

[20] CWA section 404 wetland delineation costs are included in monitoring costs described in Section 10.3.2.3, *Monitoring and Other Surveys Cost Estimation Methods*.

BRCP, BCAG will require funding to support additional staff, expense/supply costs, and legal and other advisory services provided by outside professional services organizations. Costs were estimated based on current BCAG operating costs and expenditures for advisory services reported by other approved HCP/NCCP implementing entities in California. Specific assumptions used to calculate administration and management costs are presented in Appendix F.

10.3.2.5 Changed Circumstances Cost Estimation Methods

Changed circumstances are described in Section 8.4.2. Changed circumstances for which costs are estimated are those that affect covered species habitat conditions on BRCP conservation lands. Any costs associated with changed circumstances that require only an administrative response (e.g., coordination with the permitting agencies) are included in administration and management costs. In the event that changed circumstances affecting habitat conditions on conservation lands occur, BCAG may implement, as appropriate, the planned responses identified for each of the changed circumstances described in Section 6.4.2.2. Conservation measures that address habitat conditions on conservation lands are:

CM4: Develop and Implement Site Specific Wetland and Riparian Restoration Plans CM5: Enhance Protected Natural Communities for Covered Species The cost analysis assumes that the cost for implementing responses to changed circumstances will be 10 percent of the total implementation costs for the conservation measures listed above. This assumption is considered reasonable because it effectively assumes that the intended habitat functions for covered species on up to 10 percent of all BRCP conservation lands (9,042 acres) could be affected by changed circumstances. Any greater magnitude of habitat failure would be considered catastrophic and beyond the financial resources of BCAG to address.

10.3.2.6 Post-BRCP Permits Endowment Cost Estimation Methods

In the post-BRCP permits period (i.e., when BRCP incidental take permits expire 50 years following their issuance), the management and maintenance of BRCP conservation lands will continue in perpetuity (see Section 8.7.1.9, *Post-BRCP Permits Administration and Management Activities*, for a full description of post-BRCP permits activities). To pay for these ongoing costs in the post-BRCP permit period, a non-depleting endowment will be built over the 50 years of the BRCP implementation period. This endowment will be sufficient to generate interest payments that annually support BRCP administration and management and conservation land management and maintenance costs in perpetuity. The cost estimate for funding the endowment is based on an assumed real interest rate of 2 percent.

To determine the necessary size of the endowment, an estimate was developed for conservation land maintenance, management, and administration costs on an ongoing annual basis in the post-BRCP permit period. Specific assumptions are described in Appendix F. By the end of the BRCP permits period, all conservation measures will have been implemented and compliance and effectiveness monitoring requirements achieved. Consequently, there are no post-BRCP permits

implementation costs associated with land acquisition, habitat restoration, environmental compliance, most monitoring/surveys, and changed circumstances categories. Administration and management costs during the post-BRCP permit period are assumed to be substantially reduced from such costs during BRCP implementation due to greatly reduced responsibilities of BCAG. Conservation land management and maintenance costs in the post-BRCP permit period include labor and material and supply costs necessary to maintain conservation land infrastructure (e.g., fences, fire breaks, roads), land management practices (e.g., grazing), and management of water for specific species habitats.

10.3.3 Mitigation and Conservation Components of Cost Estimates

Using the methods summarized in Section 10.3.2 and described in Appendix F, a total cost estimate for each of the cost categories was calculated based on full implementation of the BRCP. The mitigation component of the implementation costs was estimated by disaggregating the costs of implementing mitigation measures that address the effects of the covered activities on natural communities and covered species from the costs for implementing the full BRCP Conservation Strategy (see Appendix F for a description of assumptions used to identify the mitigation component costs for each of the cost categories). The remaining costs of the full BRCP Conservation Strategy implementation comprise the conservation component costs.

10.3.3.1 Mitigation Component BRCP Implementation Cost Estimate

Total mitigation component costs under the BRCP are estimated to be $138.9 million in 2011 dollar terms (Table 10–7, *Summary of BRCP Mitigation Implementation Costs by Cost Category* and Figure 10–3, *Summary of Mitigation Component Implementation Costs by Cost Category* [see separate file]). These costs address the mitigation requirements for impacts on biological resources resulting from 24,624 acres of new development within the Plan Area that will require mitigation (Table 4-4). The total mitigation component costs reflect the mitigation requirements if all of the covered activities (see Chapter 2, *Covered Activities*) are implemented (i.e., full build-out of the County's and cities' general plans, transportation plans, and other plans and activities). For those covered activities that are not implemented, mitigation will not be required and the total mitigation costs will be lower than indicated in Table 10–7.

Table 10–7. Summary of BRCP Mitigation Implementation Costs by Cost Category[1]

Cost Category	Estimated Cost
Conservation Measures	$108,656,000
Environmental compliance	$1,785,000
Monitoring and other surveys	$3,516,000
Administration and Management	$11,295,000
Changed circumstances	$3,143,000
Endowment Costs for Post-BRCP implementation	$10,522,000
Total	**$138,917,000**

[1] Discrepancies in total values due to rounding. Cost estimates are rounded to the nearest $1,000.

To provide context for the estimated mitigation component costs for mitigating impacts of BRCP covered activities, a single large project completed in the Plan Area in 2008, the Highway 149 improvement project, had mitigation costs that totaled approximately $15 million.

10.3.3.2 Conservation Component BRCP Implementation Cost Estimate

Total conservation component costs for BRCP implementation over the 50-year BRCP implementation period are estimated to be $238.1 million in 2011 dollar terms (Table 10–8 and Figure 10–4, *Summary of Conservation Component Implementation Costs by Cost Category* [see separate file]). These costs are distributed over the 50-year implementation as shown in Figure 10–5, *Total Conservation Component Implementation Costs by Implementation Period* (see separate file). These costs address the implementation of conservation actions that contribute to the conservation of natural communities and the conservation and recovery of covered species and do not include costs for avoiding, minimizing, and mitigating impacts of the covered activities. As shown in Table 10–8, *Summary of BRCP Conservation Component Implementation Costs by Cost Category* and Figure 10–4, the total estimated conservation component cost over 50 years includes approximately $181.2 million to implement the conservation measures, representing 76 percent of costs of the BRCP conservation component. Protecting 59,399 acres of natural communities (CM1, Acquire Lands) requires the largest investment, with an estimated cost of approximately $152.7 million (see Appendix F). Consequently, BRCP conservation component costs are highest during the second and third decades of implementation when the majority of conservation lands are assumed to be acquired (Figure 10–5).

Table 10–8. Summary of BRCP Conservation Component Implementation Costs by Cost Category[1]

	Conservation Costs by Implementation Period						
Cost Category	***Years 1–10***	***Years 11–20***	***Years 21–30***	***Years 31–40***	***Years 41–50***	***Total***	***Average Annual Cost***
Conservation measures	$22,456,000	$39,768,000	$52,737,000	$44,119,000	$22,110,000	$181,190,000	$3,624,000
Environmental compliance	$331,000	$489,000	$532,000	$288,000	$144,000	$1,783,000	$36,000
Monitoring and other surveys	$1,188,000	$1,830,000	$2,694,000	$2,804,000	$2,388,000	$10,904,000	$218,000
Administration and Management	$4,168,000	$4,553,000	$4,303,000	$4,303,000	$4,303,000	$21,630,000	$433,000
Changed circumstances	$204,000	$423,000	$597,000	$642,000	$615,000	$2,480,000	$50,000
Endowment for Post-BRCP implementation	$2,615,000	$4,509,000	$5,992,000	$4,947,000	$2,087,000	$20,149,000	$403,000
Total	**$30,962,000**	**$51,571,000**	**$66,854,000**	**$57,101,000**	**$31,646,000**	**$238,135,000**	**$4,763,000**

[1] Discrepancies in total values due to rounding. Cost estimates are rounded to the nearest $1,000.

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CHAPTER 11. ALTERNATIVES TO TAKE

11.1 INTRODUCTION

The federal Endangered Species Act (ESA) requires that section 10 permit applicants specify in habitat conservation plans (HCPs) what alternative actions to the taking of federally listed threatened and endangered species were considered and the reasons why those alternatives are not proposed to be used.[1] There is no similar requirement under the Natural Community Conservation Planning Act (NCCPA). This chapter describes alternative actions to take that were considered for each of the covered wildlife and fish species. Federally listed threatened and endangered plants are not protected in the same way as wildlife and fish under the ESA, and the take prohibition does not apply to plants. The ESA requirement to evaluate alternatives to take does not apply to plants; therefore covered plant species are not addressed in this chapter. Although ESA section 10 only requires that alternatives to take be described for federally listed species (Section 11.3.2, *Covered Wildlife and Fish Species with ESA Status*), unlisted Butte Regional Conservation Plan (BRCP) covered wildlife and fish species are also addressed in this chapter (Section 11.3.3, *Covered Wildlife and Fish Species without ESA Status*) because they could become listed at some time during the 40-year permit period.

The U.S. Fish and Wildlife Service (USFWS)/National Marine Fisheries Service (NMFS) *HCP Handbook* (USFWS/NMFS 1996) identifies two types of alternatives typically considered in HCPs: 1) alternatives that would result in take levels below those anticipated for the proposed project, and 2) alternatives that would cause no incidental take, thereby eliminating the need for an incidental take permit. These HCP alternatives to take are not defined in the same way as alternatives in a National Environmental Policy Act (NEPA) process; more detailed project alternatives are considered in the draft environmental impact report/environmental impact statement (EIR/EIS) that accompanies this draft BRCP.

The assessment of alternatives to take for the BRCP is presented for two levels of ecological scale: 1) regional (Plan Area) and 2) individual wildlife and fish species. This approach reflects how the regional local government general plan and the BRCP planning processes developed and selected alternatives that avoided and minimized impacts on covered wildlife and fish species occurrences and habitat and how take of these covered species were further reduced through provisions of the BRCP. At the regional level, a discussion is provided of the process used in developing the County's and cities' general plans and their integration with BRCP development to avoid and minimize take of covered species. As required by the ESA, the reasons for rejecting certain general plan alternatives are provided. At the species level, alternative approaches are described for each covered wildlife and fish species and the reasons for rejecting alternative approaches are given.

[1] 50 Code of Federal Regulations 17.22(b)(1)(iii)(C).

11.2 ALTERNATIVES TO TAKE EVALUATED AT THE REGIONAL SCALE

This section provides a description of planning processes within the BRCP Plan Area that evaluated alternatives with greater and lesser amounts of impacts on and take of federally listed wildlife and fish. Alternatives with different levels of impacts on and take of covered species were evaluated at the regional scale through the County and city (Chico, Oroville, Gridley, Biggs) local general plan update planning process. These general plans were developed with full public input to address local growth and development goals and also in conjunction with development of the BRCP to avoid and minimize take of covered wildlife, fish, and plant species. The development of the BRCP also incorporated alternative approaches to covered activities and conservation actions that further avoid and minimize impacts on and take of federally listed and other covered wildlife and fish species (and also covered plant species) that could have resulted from the chosen general plan preferred alternatives.

Reasons for rejecting specific general plan alternatives that would have lesser impacts on species than other alternatives were as follows:

1. The alternative is not consistent with the overall goals and objectives of the County and city general plans, planned infrastructure improvements, and the BRCP; and
2. The alternative is not practicable in light of cost, logistics and technology.

Because of the large number of covered species and the complexity of habitat distribution across the Plan Area, some alternatives have lesser impacts on certain species and greater impacts on other species relative to the preferred alternative. These instances are noted along with the reasons for rejection listed above.

The coordinated process of general plan development and BRCP development relative to avoidance and minimization of take on covered species is depicted in Figure 11–1, *Coordination of and Relationship between County and City General Plans and BRCP Planning Processes* (see separate file). As the general plans were developed, the BRCP provided information on biological resources and biological constraints to land development to support the local planning agencies in their preparation of land use alternatives and identification of their eventual general plan preferred alternatives. The preferred alternatives from the general plans were incorporated into the BRCP covered activities (Figure 11–1).

In development of the BRCP, several BRCP elements were used to further reduce impacts of planned future development (under the general plans' preferred alternatives) on covered species, specifically impact limits and avoidance and minimization measures (Figure 11–1). The BRCP sets limits on the amount of impacts on natural communities and covered species habitat and occurrences allowable within designated Urban Permit Areas (UPAs) and Conservation Acquisition Zones (CAZs). For several sensitive natural communities (e.g., vernal pool complex, riparian, open waters, and permanent wetlands) those impact limits are set below the level of impacts identified by a full application of the potential land use footprint of the general

plans (see planned development in Figures 4–1 to 4–4 and 4–3, *Maximum Extent of Permanent Direct Impacts on Natural Communities and Land Cover Types within the Plan Area*). These impact limits result in reduced impacts on California black rail, foothill yellow-legged frog, western pond turtle, valley elderberry longhorn beetle, Swainson's hawk, bald eagle, white-tailed kite, western yellow-billed cuckoo, and yellow-breasted chat. In addition, the BRCP includes avoidance and minimization measures (see Chapter 6, *Conditions on Covered Activities*) that identify specific requirements for the avoidance and minimization of direct and indirect impacts on covered species occurrences and habitats and natural communities based on planning and preconstruction survey results. Covered wildlife species for which specific avoidance and minimization measures are included in the BRCP are California black rail, Conservancy fairy shrimp, western burrowing owl, western spadefoot toad, foothill yellow-legged frog, western pond turtle, Blainville's horned lizard, giant garter snake, and valley elderberry longhorn beetle; nest sites for all covered raptor species; greater sandhill crane winter roosts; western yellow-billed cuckoo; yellow-breasted chat; vernal pool invertebrates; and all covered fish species.[2]

The following section describes the process to develop and evaluate alternatives to take at the regional level and the reasons for rejecting or selecting each of the alternatives.

11.2.1 No Take Alternative

An alternative that would restrict BRCP covered activities to avoid all adverse effects on covered wildlife and fish species and avoid all take of federally listed species would obviate the need for issuance of incidental take permits by USFWS and NMFS. This alternative that would avoid all incidental take was rejected because it would (1) severely constrain the implementation of the general plans and thus preclude achieving the objectives for planned growth and development, including providing state-mandated Regional Housing Need Allocations (RHNA) in the County and cities; (2) preclude improvements and maintenance of infrastructure supporting the health, safety and economy of the Plan Area (e.g., road construction, improvements, and maintenance; wastewater systems improvements and maintenance; solid waste capacity expansion; and agricultural water conveyance facilities improvement and maintenance); and (3) eliminate the need for the BRCP Conservation Strategy and thus preclude implementing actions that exceed mitigation of impacts and would contribute to the recovery of covered wildlife and fish species.

11.2.2 County's and Cities' General Plan Processes and Alternatives

The County's and cities' general plan updates were developed concurrently with the BRCP planning process (Figure 11–1). The General Plan for Butte County was updated during the period of April 2006 through October 2010.

[2] Avoidance and minimization measures are also provided for covered plant species.

The City of Oroville's General Plan was updated from late 2005 through June 2009; the City of Chico's from January 2008 through April 2011; the City of Gridley's from early 2008 through December 2010; and the City of Biggs' from January 2009 through the present. This section describes how the BRCP biological constraints map was used to inform the general plan updates and to develop alternatives that avoided and minimized impacts of general plan actions on sensitive habitats supporting covered species and presents a comparative analysis of the biological effects of different alternatives under each general plan process relative to the selected preferred alternatives. The preferred alternatives from the general plans were incorporated into the BRCP covered activities.

11.2.2.1 Biological Constraints Map

To support a process that provided for greater avoidance and minimization of impacts on covered wildlife and fish species and their habitats of the land use alternatives being considered under the general plan updates, Butte County Association of Governments (BCAG) provided the County and cities with a "biological constraints map" depicting the location of lands with very high, high, and moderate biological constraints to development based on the location of covered species' occurrences and habitats and sensitive natural communities (see Appendix J, *Biological Constraints Analysis*). Included in these three sensitive biological resource categories were nesting habitat for Swainson's hawk, peregrine falcon, bald eagle, and bank swallow; all habitat for yellow-billed cuckoo and yellow-breasted chat; all giant garter snake habitat; all large vernal pool habitat (at least 0.01 acre) that could support fairy and tadpole shrimp; all salmon, steelhead, and sturgeon habitat; and all riparian habitat that could support valley elderberry longhorn beetle.[3] The constraints map also identified ESA designated critical habitat and recovery core areas from existing USFWS recovery plans within the BRCP Plan Area. This information on sensitive biological resources was used by County and city planners to modify the initial draft general plan land use alternative configurations for future development to avoid and minimize impacts on the most sensitive covered species habitats and natural communities. Avoidance of these areas also minimized impacts on other covered species, including tricolored blackbird, western burrowing owl, and western spadefoot toad, which use grassland with vernal swale complex habitat, and California black rail and western pond turtle, which use emergent wetlands. Figure 11–1 depicts the relationship of the timing of release of the biological constraints map in December 2007 with the timing of preparation of the County and cities' general plan updates.

11.2.2.2 County General Plan Alternatives

11.2.2.2.1 Alternatives in Early County General Plan Development – 2006 to 2009

The preferred alternative adopted in the County 2030 General Plan, when compared to three draft general plan alternatives prepared prior to input from the BRCP constraints map, results in

[3] Note that for covered plant species, the sensitive resources data included all known occurrences of Butte County meadowfoam, veiny monardella, Butte County golden clover, Butte County checkerbloom, hairy Orcutt grass, Hoover's spurge, Greene's tuctoria and all modeled habitat for Butte County meadowfoam, Butte County golden clover, and Butte County checkerbloom.

reductions in the acreage of development impacts of approximately 40–80 percent for very highly sensitive biological resources, 0–41 percent[4] for highly sensitive biological resources, and 39–74 percent for moderately sensitive biological resources. The avoidance and minimization of very high, high, and moderate categories of biological constraints resulted in avoidance and minimization of take for all of the covered wildlife and fish species.

The County General Plan Citizen Advisory Committee evaluated proposals for 34 potential growth areas, and the County Board of Supervisors ultimately considered three land use alternatives (the Existing General Plan, the Concentrated Growth, and the Rural Extension Alternatives) and the Preferred Alternative land use plan in the County 2030 General Plan development process (Figure 11–2, *Butte County General Plan 2030 Existing General Plan Alternative (September 28, 2007)*, Figure 11–3, *Butte County General Plan 2030 Concentrated Growth Alternative (September 28, 2007)*, and Figure 11–4, *Butte County General Plan 2030 Rural Extension Alternative (September 28, 2007)* [see separate files]). Impacts on natural communities that support important habitat for federally listed threatened and endangered species and other covered species, such as vernal pool, grassland with swale complex, riparian, wetland, and stream habitats, were substantially reduced by incorporating the biological constraints analysis in the process of developing the Preferred Alternative for the County General Plan (see Figure 11–5, *Butte County General Plan 2030 Preferred Alternative (2009)* [separate file]). The Preferred Alternative has reduced impacts on natural communities compared to each of the three alternatives. For seasonal wetland habitats such as large vernal pools (at least 0.01 acre) and grassland with swale complex, the reductions in impacts ranged from 39 to 53 percent and 38 to 75 percent, respectively. In absolute terms, the Preferred Alternative would impact 500 to 2,500 fewer acres of grassland with swale complex compared to the other three land use scenarios. Avoidance of these habitats will benefit vernal pool shrimp species and western spadefoot toad, as well as covered raptor species and tricolored blackbird that use grassland with vernal swale as foraging habitat.

The reduction in impacts on permanent emergent wetlands attributable to the Preferred Alternative when compared to one alternative was 46 percent while the preferred alternative was 4 percent higher than two other alternatives (in absolute terms this difference is only about 3 acres). Species such as giant garter snake, California black rail, and western pond turtle will benefit from the avoidance of impacts to wetland habitat. The reduction in impacts on drainages attributable to the Preferred Alternative relative to the other alternatives was 17–48 percent, while the reductions for irrigated rice ranged from 55 percent to 91 percent for two alternatives. While the impact of the Preferred Alternative was 5 percent higher on rice than one alternative, the impact in absolute terms was only about 5 acres larger. Species that use drainages, including the covered fish, foothill yellow-legged frog, giant garter snake and western pond turtle will benefit from the reductions in impacts on their habitat attributable to the Preferred Alternative,

[4] One alternative had 3 percent less impact on highly sensitive biological resources than the preferred general plan alternative, but this same alternative had 40 percent more impact on very highly sensitive biological resources and 39 percent more impact on moderately biological sensitive resources than the Preferred Alternative (combined, this alternative had 18 percent more impact than the Preferred Alternative on mapped sensitive resources).

and giant garter snake and greater sandhill crane will benefit from the avoidance of rice land. The reductions in impacts on riparian forest and scrub attributable to the Preferred Alternative relative to the other alternatives were 16–25 percent. Avoidance and minimization of impacts to riparian habitat will benefit nesting covered raptor species as well as obligate riparian species like western yellow-breasted chat, yellow-billed cuckoo, and valley elderberry longhorn beetle.

11.2.2.2.2 Alternatives Evaluated In the County General Plan EIR – 2009 to 2010

The County 2030 General Plan EIR evaluated three land use alternatives in addition to the land use plan Preferred Alternative (the Draft General Plan Update, Figure 11–5): an alternative that maintained the existing 1995 General Plan (the No-Project-"Existing General Plan" or Character Alternative, Figure 11–6, *Butte County General Plan 2030 EIR No Project Alternative (2009)* [see separate file]), an alternative that concentrated new development in the urban spheres of Chico and Oroville (the Concentrated Growth Alternative, Figure 11–7, *Butte County General Plan 2030 EIR Concentrated Growth Alternative (2009)* [see separate file]), and an alternative that maintained the current pattern of rural residential sprawl at the fringes of Chico and Oroville (the Rural Extension Alternative, Figure 11–8, *Butte County General Plan 2030 EIR Rural Extension Alternative (2009)* [see separate file]).

The No Project Alternative assumes General Plan 2030 would not be adopted and the existing General Plan would remain in effect. Thus, new development would occur according to the existing General Plan land use designations, as well as the County's existing General Plan policies.

The No Project Alternative differs from the Preferred Alternative in terms of the amount of residential and non-residential growth proposed. When compared to the Preferred Alternative, the No Project Alternative would allow for 3.65 percent more residential units, 72 percent less retail/office uses, 36 percent more industrial uses, and 1,300 fewer people at the 2030 build-out horizon.

The Concentrated Growth Alternative assumes that the same goals, policies, and actions included in General Plan 2030 would be adopted. However, development would be directed toward the existing urban areas. Outlying areas would instead be designated for very low density residential, agriculture, and resource conservation. Meanwhile, higher density development would occur in and around the existing urban areas.

The Concentrated Growth Alternative would provide for approximately 3.65 percent more new residential units than Preferred Alternative, which would equate to 1,300 more residents at projected 2030 build-out. This alternative includes the same amount of new industrial space and 11 percent more new commercial space.

The Rural Extension Alternative assumes that the same goals, policies, and actions included in General Plan 2030 would be adopted. However, development would be distributed more widely throughout the county with less emphasis on locating new development in or next to existing

urban areas than General Plan 2030. Typically, outlying areas under this alternative would allow more dwelling units than under the Preferred Alternative and densities would often be lower in and around the existing urban areas.

The Rural Extension Alternative would provide for approximately 4.4 percent more new residential units than Preferred Alternative, which would equate to about 1,500 more residents in Butte County at projected 2030 build-out. Similarly, this alternative includes 9 percent more new industrial use and 38 percent more square feet of new commercial space.

The Preferred Alternative has substantially reduced impacts on most of the important habitats for covered wildlife and fish when compared to each of the three alternatives. For seasonal wetland habitats such as large vernal pools (at least 0.01 acre) and grassland with vernal swale complex, the reductions in impacts ranged from 57 to 84 percent and 76 to 82 percent, respectively. In absolute terms, the reduced impacts under the Preferred Alternative for grassland with swale complex ranged from approximately 2,500 to 3,600 acres. Avoidance of this habitat will benefit vernal pool shrimp species, western spadefoot toad, covered raptor species, and tricolored blackbird, as well as other wildlife. The reduction in impacts on permanent emergent wetlands under the Preferred Alternative when compared to the other three alternatives ranges from 76 to79 percent, which will benefit giant garter snake, California black rail, and western pond turtle. The reduction in impacts on riparian forest and scrub attributable to the Preferred Alternative relative to the other alternatives is 34–65 percent.

This avoidance of riparian habitat will benefit nesting raptor species as well as riparian obligates, including western yellow-breasted chat, yellow-billed cuckoo, and valley elderberry longhorn beetle. The impact of the Preferred Alternative on rice is relatively large compared to the other three alternatives (300–1,500 percent greater), but amounts to only 1.4 percent of the total rice in the Plan Area. Reducing impacts on rice land to the level of the other alternatives was not considered practicable because it would not allow the achievement of development goals desired by the community. However, most impacts to rice land occur in the vicinity of the Gridley-Biggs UPA and lie on the periphery of areas considered important for associated covered wildlife species such as giant garter snake and greater sandhill crane.

The County adopted the Preferred Alternative after analyzing the other alternatives and determining that it exhibits the highest degree of consistency with the overall vision, purpose and intent of the 2030 General Plan update. The Preferred Alternative reflects a balanced approach to directing new residential development to the urban areas or spheres of influence of the incorporated cities, and providing the appropriate land opportunities to accommodate economic development for expected growth in the agricultural services, professional and business services, government, healthcare, education and wholesale trade industries that are critical to maintaining the county's sustainable economic base. In addition, the Preferred Alternative provides the land area necessary to meet the state-mandated Regional Housing Needs Allocation assigned to the unincorporated area. The Rural Extension Alternative would impact larger areas of sensitive habitat (such as the vernal pool core area north of Oroville and east of

Chico) by allowing increased parcelization in the Planning Area, although the resulting development would occur at a lower building density than the other three alternatives.

11.2.2.3 City of Chico General Plan Alternatives – January 2008 to April 2011

The City of Chico evaluated three alternatives and the proposed land use plan in their General Plan EIR process: the No Project Alternative (Chico's prior 1994 General Plan), an Expanded Urban Development Alternative, the Increased Density Alternative, and the Preferred Alternative (Figure 11–9, *Chico 1994 Existing General Plan EIR Alternative*, Figure 11–10, *Chico General Plan 2030 Expanded Urban Development EIR Alternative (March 2009)*, Figure 11–11, *Chico General Plan 2030 Increased Density EIR Alternative (March 2009)*, and Figure 11–12, *Chico General Plan 2030 EIR Preferred Alternative* [see separate files]). Impacts on natural communities that support important habitat for federally listed threatened and endangered species and other covered species, such as vernal pool, grassland with swale complex, riparian, wetland, and stream habitats, were substantially reduced by incorporating the biological constraints analysis in the City of Chico's General Plan development process (see Figure 11–1). The Preferred Alternative has reductions in impacts when compared to the No Project and Expanded Urban Development alternatives. For seasonal wetland habitats such as large vernal pools (at least 0.01 acre) and grassland with swale complex, the reductions in impacts ranges from 24 to 29 percent and 16 to 45 percent, respectively. These reduced impacts benefit vernal pool shrimp species and western spadefoot toad, as well as covered raptor species that use these areas as foraging habitat and tricolored blackbird that may use it as both breeding and foraging habitat. The reduced impact on permanent emergent wetlands attributable to the Preferred Alternative when compared to the No Project and Expanded Urban Development alternatives is 20–23 percent.

Greater avoidance of emergent wetland under the Preferred Alternative benefits many covered species, including tricolored blackbird, California black rail, giant garter snake, and western pond turtle. Impacts on rice are the same for all alternatives, but the overall impact is small (less than 50 acres, or 0.04 percent, of existing rice in the Plan Area). The reduction in impacts on riparian forest and scrub attributable to the Preferred Alternative relative to the other alternatives is 21–58 percent. This avoidance of riparian habitat will benefit nesting raptor species as well as riparian obligates, including western yellow-breasted chat, yellow-billed cuckoo, and valley elderberry longhorn beetle.

The Increased Density Alternative has less development than the Preferred Alternative, and was identified as the environmentally superior land use alternative in General Plan Update Draft Environmental Impact Report. The Increase Density Alternative did not include the Bell Muir and Doe Mill/Honey Run developments (referred to as "Special Planning Area 3" in the Preferred Alternative), and would impact less than a third of the Blue Oak Savannah and less than half of the Blue Oak Woodland that would be impacted by the adopted General Plan update.

The City of Chico adopted the Preferred Alternative after analyzing the other alternatives and determining it reflected the highest degree of consistency of the overall vision, purpose and intent of the 2030 General Plan update. The Preferred Alternative was considered an appropriate balance between the status quo No Project Alternative (existing general plan) and the environmentally superior Increased Density Alternative, based on the City's needs to accommodate anticipated growth and economic development.

While the Increased Density Alternative would result in less development, it assumes growth would occur exclusively on lands north and south of the urban core and in 17 redevelopment "Opportunity Sites" in the existing city limits. These lands do not enjoy equal opportunity and development costs (such as market availability or available infrastructure), and some carry constraints that would preclude development in an economically viable manner within the 2030 General Plan forecast horizon. The Urban Expansion Alternative was rejected because it relied on a continuation of current City growth patterns that jeopardize the integrity of the Green Line (a boundary identified in both the City's and County's General Plan for the protection of agricultural lands), foothill areas, and important farmlands of local, regional or state significance.

11.2.2.4 City of Oroville General Plan Alternatives – Late 2005 to June 2009

The City of Oroville General Plan EIR evaluated three alternatives to the preferred general plan alternative: the No Project Alternative (i.e., Oroville's prior general plan), Reduced Density Alternative, and Neighborhood Focused Alternative (Figure 11–13, *Oroville General Plan 2030 EIR No Project Alternative*, Figure 11–14, *Oroville General Plan 2030 EIR Reduced Density Alternative*, Figure 11–15, *Oroville General Plan 2030 EIR Neighborhood-Focused Growth Alternative*, and Figure 11–16, *Oroville General Plan 2030 EIR Preferred Alternative* [see separate files]). Impacts on natural communities that support important habitat for federally listed threatened and endangered species and other covered species, such as vernal pool, grassland with swale complex, riparian, wetland, and stream habitats, were significantly reduced by incorporating the constraints analysis in the process of developing the City of Oroville's General Plan Preferred Alternative.

The Preferred Alternative has reduced impacts to important natural communities when compared to each of the three alternatives. For large vernal pools (at least 0.01 acre) the reductions in impacts range from 7 to 21 percent. For grassland with swale complex the reduction in impacts under the Preferred Alternative when compared to the Reduced Density and Neighborhood Focus Alternative is 15 percent, while impacts under the Preferred Alternative are 7 percent higher than the No Project Alternative.

Avoidance of these habitat impacts will benefit vernal pool shrimp species and western spadefoot toad, as well as raptor species and tricolored blackbird that use grassland with vernal swale as foraging and sometimes breeding habitat. The Preferred Alternative has a greater relative impact of 9 percent on permanent emergent wetlands compared to the other alternatives. There are no impacts on irrigated rice attributable to any of the alternatives analyzed in the EIR.

Impacts on riparian forest and scrub under the Preferred Alternative are 12–17 percent greater than the other alternatives, corresponding to about 80–100 acres greater loss. These impacts, however, are addressed under the BRCP through more restrictive impact limits and avoidance and minimization measures to be implemented at the individual project level for riparian forest and scrub habitats.

The City of Oroville adopted the Preferred Alternative after analyzing the other alternatives and determining it reflected the highest degree of consistency of the overall vision, purpose and intent of the 2030 General Plan update. The economic development and land use goals of the General Plan focus growth on lands to the south and east of the city, which represent the most logical areas for expansion from a land use perspective (see *Land Use Element*, Oroville General Plan pages 3-16 and 3-17), but also affect a variety of wildlife habitats, including vernal pools, and grasslands with vernal swale complex. The majority of these targeted growth areas are also designated as Redevelopment Areas and Enterprise Zones (see Oroville General Plan Figure LU-3), as future locations where the City may realize its goals for a sustainable economy, with a dependable tax base and quality jobs, goods and services (see *Vision Statement and Guiding Principles*, Oroville General Plan page 2-3). Lastly, it is unlikely that all of the lands indicated for development on the Preferred Alternative (Figure 11–16) will occur during the General Plan's 25 year build-out horizon, based on the City's historic growth rate (2.9 percent per annum) in the city limits and sphere of influence. Therefore, the area impacted by build-out of the General Plan will likely be less than that assumed in the BRCP covered activities.

11.2.2.5 Cities of Gridley and Biggs General Plans – 2008–2012

Gridley and Biggs are the two smallest incorporated areas in Butte County, with respective populations of 6,454 and 1,787 based on the 2010 U.S. Census. Both cities engaged in updates to their General Plans during the general timeframe as the County, Chico, and Oroville updates. Gridley's updated 2030 General Plan was adopted in February 2010, while the City of Biggs 2030 General Plan update is still pending approval (anticipated late 2012). The two cities are located at the southwest quadrant of the BRCP Plan Area, and share a 2,864-acre overlapping Planning Area boundary (north of Gridley and south of Biggs) that has been designated as a special "Area of Concern" by the Butte County Local Agency Formation Commission (LAFCO). Both cities' General Plans contain land use assumptions for portions of the Area of Concern.

The City of Gridley's adopted General Plan expands the city's planned development footprint from 375 acres to 1,224 acres, and concentrates new growth within 1,200 acres of the northerly Sphere of Influence and Area of Concern. Other land use alternatives considered during the 2030 General Plan update included a No Project Alternative (maintaining the existing General Plan), a Centralized Development with Urban Reserve Alternative, and a Centralized Development Alternative. All three of the alternatives would result in a smaller area of urban development in the Area of Concern, corresponding to a reduced impact on irrigated cropland and rice land in the BRCP. However, each of the alternatives would still result in urban

development in areas currently undeveloped but designated for future growth. Impacts to natural communities and biological resources (including BRCP covered species) would be slightly reduced under the three land use alternatives. The city adopted the 2030 General Plan update (Preferred Alternative) because it most closely aligns with the land use, housing, economic development, and conservation goals outlined in the General Plan Vision and Guiding Principles. Further, the Centralized Development with Urban Reserve Alternative would result in substantially less land available for commercial and industrial growth (30–40 percent less), which would be inadequate to satisfy the anticipated demand for agricultural-related industrial uses planned east of the central city.

The City of Biggs 2030 General Plan update is pending adoption in late 2012. However, the City has reviewed various land use alternatives and selected a Preferred Alternative that will be the focus of the General Plan Update programmatic Environmental Impact Report (EIR). The City considered three other alternatives that were used to inform selection of the Preferred Alternative. The first Alternative (Alternative A) focused on maintaining existing low-density residential development patterns in the town center, while aggressively expanding to incorporate lands east of the city at the Highway 99-B Street junction for development with commercial, industrial, agricultural industrial, mixed-use and medium density residential uses. The second alternative (Alternative B) proposed a similar eastern expansion with roughly double the high-intensity mixed-use development. The southern one-third of the overall 4,375-acre planning area would be designated as Urban Reserve for consideration as future development. The third alternative (Alternative C) included the easterly expansion as well as a significant expansion of higher intensity residential and mixed uses in the south Planning Area. Alternative C would accommodate more than three times the number of residential units than Alternative A (22,000 versus 6,000). The Preferred Alternative is comprised of elements from both Alternatives A and B, incorporating an expansion to the Highway 99-B Street junction developed with lower intensity uses, and an expanded area of heavy industrial and agricultural industrial west of the city to accommodate job-generating uses that would help diversify the city's traditional agricultural-based economy. The remainder of the overall Planning Area north, east and south of the city would retain an agricultural designation consistent with that approved on the County's 2030 General Plan update.

The City of Biggs Preferred Alternative was prepared in consideration of the BRCP biological constraints map balanced with the mixed use, commercial and industrial expansion areas deemed critical to the city's economic future. Of the land use alternatives considered to date in the Biggs 2030 General Plan Update, the Preferred Alternative best represents the city's goals for retaining Biggs' rural small-town character, and would result in lesser impacts to irrigated cropland and rice land than Alternatives B and C.

11.2.3 Additional BRCP Reduction in Take

The BRCP evaluated the effects of implementing the combined build-out of the preferred alternatives of the general plans for the County and the cities of Chico, Oroville, Gridley, and

Biggs, as part of the BRCP covered activities. Following completion of an assessment of impacts of BRCP covered activities on natural communities (see Chapter 4, *Impact Assessment and Estimated Level of Take*), the extent of riparian and wetland land cover types that could be removed by the covered activities was further reduced to avoid impacts on covered wildlife species habitats supported by those land cover types (e.g., western yellow-billed cuckoo, yellow-breasted chat, California black rail, giant garter snake, Swainson's hawk, western pond turtle) in specified locations. These reduced impacts are reflected in the impact limits provided for natural communities in 4–3.

In addition, the Conservation Strategy includes avoidance and minimization measures (see Chapter 6, *Conditions on Covered Activities*) that are required to be implemented at the time each of the covered activities is implemented. These measures are designed to avoid or further minimize direct and indirect impacts on covered wildlife and fish individuals and habitat that would otherwise be incurred under the covered activities.

11.2.4 Conclusions for Regional Alternatives

Each of the cities and the County developed and evaluated alternatives to their general plans that collectively encompass the BRCP Plan Area. In identifying their preferred alternatives, the local governments selected the alternative that met their community's goals, was practicable, and avoided and minimized impacts on covered species. The BRCP provides additional limits on impacts and specific impact avoidance and minimization measures that further reduce impacts on covered species from activities identified in the various general plans.

11.3 EVALUATION OF ALTERNATIVES TO TAKE BY SPECIES

11.3.1 Evaluation Criteria

Alternative approaches to covered activities that would avoid or minimize take for each covered wildlife and fish species were evaluated and are described in this section. Alternative approaches were assessed based on the following criteria:

1. Level of incidental take expected to result and conservation benefits to the species;
2. Consistency with the overall goals and objectives of the County and city general plans, planned infrastructure improvements, and the BRCP; and
3. Practicability in light of cost, logistics and technology.

The evaluation describes potential alternatives to take considered for each of the species and the reasons that each of the alternatives to take was not adopted in the BRCP Conservation Strategy.

11.3.2 Covered Wildlife and Fish Species with ESA Status

11.3.2.1 Western Yellow-Billed Cuckoo

The western yellow-billed cuckoo is a riparian obligate species typically found in willow-cottonwood riparian forest; however, alder and box elder can also be important habitat elements. Nests are found primarily in willow trees. Four confirmed or probable breeding locations have been verified within the Plan Area, along with numerous other detections. Breeding pairs have also been reported from between Oroville and the western Butte County border. Known occurrences of this species in the Plan Area are associated primarily with the Sacramento River. Habitat areas occur along the Feather River and several smaller tributaries to the Sacramento River. Patch size is an important landscape feature for western yellow-billed cuckoo, which require minimum patches greater than 20 acres and apparently prefer patch sizes greater than 50 acres (Laymon 1998).

Implementation of covered activities could result in the removal of 50 acres of modeled western yellow-billed cuckoo habitat (0.9 percent of all modeled habitat in the Plan Area), predominantly in the Oroville UPA and to a lesser degree outside of UPAs in the Northern Orchard and Southern Orchard CAZs (Table 4–9, *Maximum Extent of Permanent Direct Impacts on Modeled Covered Species Habitat Types and Known Occurrences by CAZ and UPA*). The BRCP prohibits removal of modeled habitat that would reduce the patch size of affected modeled habitat areas below 25 acres to minimize the adverse effects associated with habitat fragmentation, to which nesting cuckoos are sensitive (Hughes 1999). Direct mortality of individuals and removal of occupied nest sites will be avoided as a requirement of the BRCP. The potential effects of noise and visual disturbances on individuals associated with implementation of the covered activities will be minimized with implementation of avoidance and minimization measures described in Chapter 5, *Conservation Strategy*.

Alternatives to avoid any removal of modeled western yellow-billed cuckoo habitat would require not implementing covered activities that affect modeled habitat. This alternative, beyond avoidance of habitat areas incorporated into the general plans as described in Section 11.2, *Alternatives to Take Evaluated at the Regional Scale*, was considered not practicable because it would be too prohibitive to planned development and infrastructure projects and would not necessarily avoid take of western yellow-billed cuckoo. Other alternatives considered for the County and Chico general plans all impacted larger amounts of riparian habitat than the preferred alternatives and would therefore remove more potential habitat for western yellow-billed cuckoo. The Oroville General Plan Preferred Alternative impacts a greater amount of riparian habitat than the other alternatives considered, because the goals of the general plan cannot be satisfactorily met through those alternatives. However, as discussed below, BRCP impact limits reduced the allowable impacts on riparian habitat in the Oroville UPA, and BRCP conservation measures (CMs) protect and restore a much greater amount of riparian habitat than will be impacted. The potential for the destruction of nests, eggs, nestlings, and adult birds will be avoided with implementation of the BRCP avoidance and minimization measures.

As described in Section 5.6, *Conservation Provided for Covered Species*, the BRCP will protect 1,785 acres of currently unprotected modeled western yellow-billed cuckoo habitat, resulting in combination with existing protected habitat protection of approximately 50 percent of habitat in the Plan Area (see Table 5–21a, *Expected Extent of Conserved Covered Species Habitat Types in the Plan Area with BRCP Implementation*). Restoration of 50 acres of western yellow-billed cuckoo habitat and 138 additional acres of riparian habitat (see Table 5–6, *BRCP Restoration Targets*) in locations that establish patches of riparian habitat of at least 25 acres will increase the extent of cuckoo habitat in the Plan Area. Implementation of these conservation actions and applicable avoidance and minimization measures are expected to benefit the species to a greater degree than any alternatives that may reduce take.

11.3.2.2 Bald Eagle

The bald eagle occurs as permanent resident and uncommon winter migrant. It is an uncommon breeding species in Butte County with two nesting territories reported within the Plan Area (Appendix A, Figure A.11–1, *Bald Eagle Modeled Habitat and Recorded Occurrences*). Bald eagles regularly winter in and around the Plan Area, including at Lake Oroville, Thermalito Forebay and Afterbay, along the Feather and Sacramento Rivers, and in the wetlands associated with Llano Seco and the Gray Lodge Wildlife Area (Figure A.11–1). One winter roost site near Lake Oroville has been occupied by at least 60 individuals. Bald eagles require large bodies of water or free-flowing rivers with abundant fish for foraging habitat and large, old-growth or dominant live trees for nest sites, typically near a permanent water source (see Appendix A, *Covered Species Accounts*).

Implementation of the covered activities would result in the removal of up to 3,570 acres of modeled bald eagle seasonal foraging habitat and 2,708 acres of nesting habitat, representing approximately 2.0 percent and 1.4 percent, respectively, of the current extent of these modeled bald eagle habitats in the Plan Area (Table 4–8, *Maximum Extent of Permanent Direct Impacts on Modeled Covered Species Habitat Types and Known Occurrences within the Plan* Area, Figure 4–30, *Bald Eagle: Direct Impacts of Covered Activities*). Implementation of BRCP covered activities will avoid removal of active bald eagle nests. The majority of habitat to be removed would be in the Sierra Foothills CAZ (3,272 acres). The potential effects of noise and visual disturbances on individuals associated with implementation of the covered activities will be avoided and minimized with implementation of avoidance and minimization measures described in Chapter 5, *Conservation Strategy*.

Alternatives to reduce the allowable removal of modeled bald eagle habitat would require not implementing covered activities that affect modeled habitat. This alternative provided additional avoidance of habitat areas incorporated into the general plans as described in Section 11.2 was considered impracticable because it would be too prohibitive to planned development and transportation projects. Out of the three preferred alternatives for Butte County, Chico, and Oroville, only the Oroville preferred alternative removes a larger amount of riparian bald eagle nesting habitat compared to the other alternatives considered. In nearly all cases the three

preferred alternatives remove relatively less foraging habitat than the other alternatives. Overall, the preferred alternatives are the ones that maximize avoidance of bald eagle habitat.

As described in Section 5.6 the BRCP will protect an additional 4,435 acres of modeled bald eagle nesting habitat and 21,195 acres of modeled seasonal foraging habitat, resulting in protection of over 25 percent and 28 percent of these habitat types, respectively, in the Plan Area (see Table 5–21a). Protection of riparian and woodland land cover types will ensure the availability of bald eagle nest and winter roost sites to accommodate the potential future expansion of the nesting and wintering populations in conjunction with protection and management of a large proportion of its foraging habitat. In addition, restoration of 121 acres of emergent wetland and restoration of salmonid spawning habitat will increase the habitat area supporting the bald eagle's primary prey species. Implementation of these conservation actions and applicable avoidance and minimization measures is expected to benefit the species to a greater degree than any alternatives that may reduce take.

11.3.2.3 Giant Garter Snake

The giant garter snake occurs in the Plan Area predominantly in lowland aquatic habitats, such as emergent wetlands, agricultural ditches and rice fields, and other wetland communities of the Butte Basin. Giant garter snake has been found in numerous locations in the western portion of Butte County area near the Sacramento River, south of Chico and west of Biggs and Gridley, in the 1990s (California Natural Diversity Database [CNDDB] 2006) (see Appendix A, Figure A.12–1, *Giant Garter Snake Modeled Habitat and Recorded Occurrences*) and occurrences have been reported near Chico (USFWS 2006a). Eric Hansen (pers. comm.) notes that few if any records occur east of Highway 99 in Butte County and that no definitive records occur east of Highway 70.

Implementation of covered activities could result in the removal of 3,194 acres of modeled giant garter snake breeding and movement habitat, representing 1.9 percent of the modeled habitat in the Plan Area (Table 4-8) primarily in the Southern Orchards CAZ and the Gridley-Biggs UPA (Table 4–9 and Appendix A, Figure 4–31, *Giant Garter Snake: Direct Impacts of Covered Activities*). Some covered activities are likely to directly kill or injure individual giant garter snakes. The potential mortality or injury to individual snakes associated with ground disturbing activities (e.g., operation of construction equipment, activities to maintain canals and drains) and effects of noise and visual disturbances on individuals associated with implementation of the covered activities will be minimized with implementation of avoidance and minimization measures described in Chapter 5, *Conservation Strategy*.

BRCP avoidance and minimization measures reduced the allowable impact on modeled giant garter snake wetland breeding and movement habitat to 54 acres. An alternative to reduce such impacts to zero acres was considered not to be practicable because it would be too prohibitive to planned development in the UPAs and infrastructure improvements outside of the UPAs. While the preferred alternatives adopted for the Butte County and Oroville general plans remove a

greater amount of natural communities that support giant garter snake, the majority of habitat removed consists of rice land that will be replaced under the BRCP by higher quality restored wetland habitat in areas that will serve higher functions for giant garter snake. The potential for mortality or injury of individuals associated with maintenance of agricultural water conveyance facilities will be avoided and minimized because these activities are typically undertaken during the giant garter snake's inactive period. Greater restrictions on these activities were not considered to be practicable, because not undertaking maintenance of canals and drains would prevent the delivery and drainage of irrigation water.

As described in Section 5.6 the BRCP will protect 27,547 acres of currently unprotected modeled giant garter snake breeding and movement habitat and restore 500 acres of breeding and movement habitat, resulting in protection of approximately 36 percent of modeled breeding and movement habitat in the Plan Area (Table 5–21a). Maintaining and restoring connectivity across modeled habitat through the north-south BRCP giant garter snake corridor is expected to increase food abundance, contribute to higher reproduction and survival rates, and provide for dispersal and genetic exchange of giant garter snakes. Implementation of these conservation actions and applicable avoidance and minimization measures is expected to benefit the species to a greater degree than any alternatives that may reduce take.

11.3.2.4 Central Valley Steelhead

Central Valley steelhead occur in the Feather River, Little Dry Creek, Butte Creek, Little Chico Creek, Big Chico Creek, Lindo Channel, Mud Creek, and Rock Creek. Spawning occurs in all of these waterways except Lindo Channel and Rock Creek. Adults migrate through Lindo Channel but are not known to spawn within the channel. Rock Creek is used by steelhead as a juvenile rearing location only.

The Conservation Strategy precludes removal of Central Valley steelhead habitat (Table 4–8). Noise and visual disturbances associated with construction-related activities near occupied habitat could temporarily disturb individuals, and the potential exists for discharge of contaminants and sediment from project sites into habitat that could exert sublethal effects on individual steelhead and cause temporary avoidance of habitat areas. These potential effects will be avoided and minimized with implementation of avoidance and minimization measures (see Chapter 6, *Conditions on Covered Activities*).

An alternative to eliminate any possibility of adverse effects on Central Valley steelhead was considered not to be practicable because it would preclude maintenance and improvement of bridges to maintain public safety and transportation facilities within the Plan Area; and it would preclude implementation of conservation actions that are designed to benefit Central Valley steelhead. BRCP conservation measures for steelhead (e.g., placement of spawning gravels, removal of riprap) will have temporary adverse effects on its habitat, but will result in net habitat benefits.

As described in Section 5.6 the BRCP will protect an additional 20 linear miles of currently unprotected Central Valley steelhead habitat, resulting in protection of about 22 percent of habitat in the Plan Area (Table 5–21a). Together with conservation measures CM9, Replenish Spawning Gravels for Salmonids, CM10, Remove Impediments to Upstream and Downstream Fish Passage, and CM11, Remove, Modify, or Screen Unscreened Diversions, implementation of these conservation actions and applicable avoidance and minimization measures are expected to benefit the species to a greater degree than any alternatives that may reduce potential indirect effects to Central Valley steelhead.

11.3.2.5 Central Valley Spring-Run Chinook Salmon

Central Valley spring-run Chinook salmon occur in several Plan Area drainages, including Big Chico Creek, Butte Creek, and the Feather River (see Appendix A).

The covered activities will not result in the removal of modeled Central Valley spring-run habitat (Table 4–8). Noise and visual disturbances associated with construction-related activities (e.g., bridge maintenance and replacement projects) in or near occupied habitat could temporarily disturb individuals, and the potential exists for discharge of contaminants and sediment from project sites into habitat that could exert sublethal effects on individual spring-run Chinook salmon and cause temporary avoidance of habitat areas. These potential effects will be avoided and minimized with implementation of avoidance and minimization measures (see Chapter 6, *Conditions on Covered Activities*).

An alternative to eliminate any possibility of adverse effects on spring-run Chinook salmon was considered not to be practicable because it would preclude maintenance and improvement of bridges to maintain public safety and transportation facilities in the Plan Area; and it would preclude implementation of conservation actions that are designed to benefit spring-run Chinook salmon, but will have temporary adverse effects on its habitat (e.g., placement of spawning gravels, removal of riprap).

As described in Section 5.6 the BRCP will protect an additional 20 linear miles of currently unprotected modeled Central Valley spring-run Chinook salmon habitat, resulting in protection of about 21 percent of habitat in the Plan Area (Table 5–21a). Together with conservation measures CM9, Replenish Spawning Gravels for Salmonids, CM10, Remove Impediments to Upstream and Downstream Fish Passage, and CM11, Remove, Modify, or Screen Unscreened Diversions, implementation of these conservation actions and applicable avoidance and minimization measures is expected to benefit the species to a greater degree than any alternatives that may reduce potential indirect effects to Central Valley spring-run Chinook salmon.

11.3.2.6 Green Sturgeon

Green sturgeon occurs in the Sacramento River along the western boundary of the Plan Area and the Feather River up to the Thermalito Afterbay. Covered activities will not affect green sturgeon in the Sacramento River (see Chapter 4, *Impact Assessment and Estimated Level of*

Take). Because operations and flood control on the Sacramento and Feather Rivers are under the jurisdiction of state and federal agencies, the BRCP does not cover these activities and does not include conservation actions that will benefit this species.

Implementation of the covered activities will not result in the removal of modeled green sturgeon habitat (Table 4-8). On the Feather River, noise and visual disturbances associated with construction-related activities (e.g., bridge maintenance and replacement projects) in or near occupied habitat could temporarily disturb individuals, and the potential exists for discharge of contaminants and sediment from project sites into habitat that could exert sublethal effects on individual green sturgeon and cause temporary avoidance of habitat areas. These potential effects will be avoided and minimized with implementation of avoidance and minimization measures (see Chapter 6, *Conditions on Covered Activities*).

An alternative to eliminate any possibility of adverse effects on green sturgeon was considered not to be practicable because it would preclude maintenance and improvement of bridges to maintain public safety and transportation facilities in the Plan Area.

11.3.2.7 Valley Elderberry Longhorn Beetle

Only a few verified observations of valley elderberry longhorn beetle have been recorded in the Plan Area; most are along the Sacramento River with a few along Big Chico Creek, Butte Creek, and the Feather River. Its host plant, the elderberry shrub, is a common species in riparian forest and scrub throughout much of the Plan Area, and therefore the species may be more widespread (see Appendix A.21, *Valley Elderberry Longhorn Beetle (Desmocerus Californicus Dimorphus)*).

Implementation of covered activities could result in the removal of 2,280 acres of modeled valley elderberry longhorn beetle habitat, representing 5.3 percent of all modeled habitat in the Plan Area, primarily in the Chico and Oroville UPAs (Table 4–9). The potential effects of removing elderberry shrubs that support valley elderberry beetle habitat will be minimized with implementation of avoidance and minimization measures described in Chapter 5, *Conservation Strategy*. As approved, the general plans for Chico, Oroville, and Butte County could have resulted in the removal of 3,260 acres of modeled valley elderberry longhorn beetle habitat, but BRCP avoidance and minimization measures reduced the allowable impact to 2,280 acres. An alternative to reduce such impacts to zero acres was considered impracticable because it would be too prohibitive to planned development in the UPAs and to infrastructure improvements outside of the UPAs. Other alternatives considered for the County and Chico general plans all impacted larger amounts of riparian habitat than the preferred alternatives and would therefore remove more potential habitat for valley elderberry longhorn beetle. The Oroville General Plan preferred alternative impacts a greater amount of riparian habitat than the other alternatives considered. However, the BRCP impact limits reduce the allowable impacts on riparian habitat in the Oroville UPA and BRCP conservation measures protect and restore a much greater amount of riparian habitat than will be impacted.

As described in Section 5.6 the BRCP will protect 8,282 acres of currently unprotected modeled valley elderberry longhorn beetle habitat, resulting in protection of over 33 percent of all modeled habitat in the Plan Area (Table 5–21a). Restoration of 178 acres of riparian forest and scrub (Table 5–6) will increase connectivity between habitat patches and increase the amount of habitat available for valley elderberry longhorn beetle, as restored habitat will be designed to incorporate plantings of elderberry shrubs. Implementation of these conservation actions and applicable avoidance and minimization measures is expected to benefit the species to a greater degree than any alternatives that may reduce take.

11.3.2.8 Vernal Shrimp Species (Vernal Pool Tadpole Shrimp, Conservancy Fairy Shrimp, and Vernal Pool Fairy Shrimp)

Vernal pool shrimp species (vernal pool tadpole shrimp, vernal pool fairy shrimp, and Conservancy fairy shrimp) occur in vernal pools throughout the foothill grasslands of the Plan Area (see Appendix A).

Implementation of the covered activities could result in the removal of up to 1,422 acres of modeled vernal pool shrimp species habitat, representing 4.2 percent of the modeled habitat in the Plan Area, primarily in the Sierra Foothills CAZ (Table 4–9). The Conservation Strategy precludes removal of vernal pools supporting Conservancy fairy shrimp. Implementation of the avoidance and minimization measures described in Chapter 5, *Conservation Strategy*, will minimize disturbances to vernal pools and vernal pool with swale complex land cover types that support vernal pool shrimp habitat.

Proposed widening of Highway 99 could have resulted in the removal of two vernal pools occupied by Conservancy fairy shrimp, but BRCP avoidance measures preclude impacts on these vernal pools and any other vernal pools that are found to support Conservancy fairy shrimp in the future. Alternatives to further avoid removal of modeled vernal pool species habitat would require not implementing covered activities that affect modeled habitat. This alternative of providing for greater reductions in habitat removal than in the general plans was considered not to be practicable because it would be too prohibitive to planned development and infrastructure projects. The preferred alternatives for the Butte County, Chico, and Oroville general plans result in greater avoidance and minimization of impacts to vernal pool shrimp species habitats than the other alternatives considered.

As described in Section 5.6 the BRCP will protect an additional 21,400 acres of modeled vernal pool shrimp species habitat, resulting in protection of over 75 percent of modeled habitat in the Plan Area (see Table 5–21a). In addition, BRCP mitigation requires the restoration of 306 acres of vernal pools and other seasonal wetlands to mitigate for the removal of vernal pools and other seasonal wetlands and a small portion of managed seasonal wetland. Implementation of these conservation actions and applicable avoidance and minimization measures is expected to benefit the shrimp species and will support recovery of the species pursuant to the goals of the USFWS Recovery Plan (USFWS 2005).

11.3.3 Covered Wildlife and Fish Species without ESA Status

11.3.3.1 Tricolored Blackbird

Few breeding colonies of tricolored blackbird exist in the Plan Area. As of 1989, three extant tricolored blackbird nesting colonies had been reported from the Plan Area. Since that time, only one active colony comprised of an estimated 500 adult blackbirds has been reported (see Appendix A). Tricolored blackbird forages in grassland, seasonal wetland habitats, and agricultural land (mostly alfalfa and recently tilled fields). Large breeding colonies have historically been established in freshwater wetland habitat, and chosen sites must have open, accessible water, a nesting substrate protected from predators, and suitable foraging space within a few miles of the colony that provides sufficient insect prey (see Appendix A).

Implementation of the covered activities would result in the removal of up to 12,617 acres of modeled tricolored blackbird breeding and foraging habitat, representing approximately 5 percent of the current extent of modeled tricolored blackbird breeding and foraging habitat in the Plan Area (Table 4–8, Figure 4–21, *Tricolored Blackbird: Direct Impacts of Covered Activities*). The Conservation Strategy precludes removal of active nesting colonies. The potential effects of noise and visual disturbances on individuals associated with implementation of the covered activities will be minimized with implementation of avoidance and minimization measures described in Chapter 5, *Conservation Strategy*.

Alternatives to further avoid removal of modeled tricolored blackbird habitat would require not implementing covered activities that affect modeled habitat. This alternative to take, beyond reductions incorporated into the general plans as described in Section 11.2 was considered impracticable because it would be too prohibitive to planned development and transportation projects. The preferred alternatives for Butte County and Chico general plans avoid tricolored blackbird habitat to a greater extent than the other alternatives considered. The Oroville preferred alternative impacts more habitat, but only by a relatively small amount. Overall, the preferred alternatives minimize impacts to tricolored blackbird habitat to the greatest degree possible relative to all development alternatives considered.

As described in Section 5.6 the BRCP will protect 48,411 acres of modeled tricolored blackbird habitat in addition to its existing protected habitat, resulting in protection of over 34 percent of habitat in the Plan Area (see Table 5–21a). Current distribution of tricolored blackbirds within this habitat is limited to a small portion of the Plan Area and habitat protection will focus on currently occupied habitat areas, including protection of known nesting colony sites. Restoration of 121 acres of emergent and managed wetland will also increase the amount of high quality tricolored blackbird foraging and nesting habitats. Implementation of these conservation actions and applicable avoidance and minimization measures is expected to benefit the species to a greater degree than any alternatives that may reduce take.

11.3.3.2 Yellow-Breasted Chat

Yellow-breasted chats are rare in California and the Plan Area, where the species has been observed in the Upper Park area of Big Chico Creek, Lower Butte Creek Canyon, Little Chico Creek, and at the Butte Creek Ecological Preserve. Chats are strongly associated with early successional riparian vegetation that includes dense riparian thickets of willows, vines, and brush, though some taller trees are required as song perches (see Appendix A).

Implementation of covered activities could result in the removal of 278 acres of modeled yellow-breasted chat habitat (3.8 percent of all modeled habitat in the Plan Area), predominantly from the Chico and Oroville UPAs (Table 4–9). Modeled yellow-breasted chat known occupied habitat will not be removed. The potential effects of noise and visual disturbances on individuals associated with implementation of the covered activities will be minimized with implementation of avoidance and minimization measures described in Chapter 5, *Conservation Strategy*.

As approved, the general plans for the City of Oroville, City of Chico, and Butte County could have resulted in the removal of 941 acres of yellow-breasted chat habitat, but BRCP avoidance and minimization measures reduced the allowable impact to 278 acres. An alternative to reduce such impacts to zero acres was considered impracticable because it would be too prohibitive to planned development in the Oroville and Chico UPAs and infrastructure improvements outside of the UPAs. Other alternatives considered for the County and Chico general plans all impacted larger amounts of riparian habitat than the preferred alternatives and would therefore remove more potential habitat for yellow-breasted chat. The Oroville General Plan preferred alternative impacts a greater amount of riparian habitat than the other alternatives considered because the goals of the general plan cannot be satisfactorily met through the others. However, the BRCP impact limits reduce the allowable impacts on riparian habitat in the Oroville UPA and BRCP conservation measures protect and restore a much greater amount of riparian habitat than will be impacted.

As described in Section 5.6 the BRCP will protect an additional 3,020 acres of modeled yellow-breasted chat nesting and foraging habitat, 185 acres of which will be known use area habitat, resulting in protection of over 48 percent of its modeled habitat in the Plan Area (see Table 5–21a). In addition, BRCP protection of over 48 percent of the riparian habitat present in the Plan Area is expected to maintain patches of habitat suitable for supporting migration and dispersal of the species. Restoration of 178 acres of riparian forest and scrub (see Table 5–6) in locations used by yellow-breasted chat will increase the extent of chat habitat in the Plan Area. Implementation of these conservation actions and applicable avoidance and minimization measures is expected to benefit the species to a greater degree than any alternatives that may reduce take.

11.3.3.3 Bank Swallow

Bank swallows are colony nesting birds that require steep, eroding stream banks where they construct their nesting cavities. Recently, 17 bank swallow colonies have been identified along

the Sacramento River within or immediately adjacent to the Plan Area (nine on the eastern bank and eight on the western bank). An additional 23 colonies along the Feather River between the confluence with the Sacramento River and Oroville have been reported. Several of these colonies occur within the Plan Area and are considered extant.

Implementation of the covered activities will not result in the removal of modeled bank swallow habitat (Table 4–8, Figure 4–23, *Bank Swallow: Direct Impacts of Covered Activities*), and the Conservation Strategy precludes removal of any habitat supporting nesting colonies and disturbances to colony sites during the breeding season. The potential effects of noise and visual disturbances on individuals associated with implementation of the covered activities will be minimized with implementation of avoidance and minimization measures described in Chapter 5, *Conservation Strategy*.

As described in Section 5.6 the BRCP will protect at least 20 linear miles of existing unprotected modeled bank swallow habitat along Mud Creek, Lindo Channel, and Butte Creek. Protection of existing stream channels and removal of riprap will help ensure that the erosional processes that provide bank swallow nesting habitat over time are maintained, and it contributes to the goals of the California Department of Fish and Game (DFG) bank swallow Recovery Plan. Implementation of these conservation actions and applicable avoidance and minimization measures is expected to benefit the species to a greater degree than any alternatives that may reduce take.

11.3.3.4 Western Burrowing Owl

Western burrowing owls occur year-round in relatively low densities in the Plan Area. Reported occurrences of western burrowing owl are primarily in the western portion of the Plan Area (see Appendix A). Western burrowing owls are found in open, dry grasslands and agricultural and range lands, and are often associated with burrowing animals whose abandoned burrows they nest in. Low vegetation and sloping terrain are preferred sites that allow for maximum visibility to detect predators while foraging and spending time outside burrows (see Appendix A).

Implementation of the covered activities would result in the removal of up to 14,496 acres of modeled western burrowing owl habitat, representing 8.8 percent of modeled habitat in the Plan Area (Table 4–8, Figure 4–20, *Western Burrowing Owl: Direct Impacts of Covered Activities*). The potential for removal of nesting burrows and effects of noise and visual disturbances on individuals associated with implementation of the covered activities will be minimized with implementation of avoidance and minimization measures described in Chapter 5, *Conservation Strategy*.

Alternatives to further avoid removal of modeled western burrowing owl habitat would require not implementing covered activities that affect modeled habitat. This alternative to take, beyond avoidance of habitat areas incorporated into the general plans as described in Section 11.2 was considered not be practicable because it would be too prohibitive to planned development and infrastructure projects. Other alternatives considered for the Butte County and Chico general

plans all impacted larger amounts of natural communities that support western burrowing owl habitat than the preferred alternatives. The Oroville General Plan preferred alternative impacts a greater amount of western burrowing owl habitat than the other alternatives considered because the goals of the general plan cannot be satisfactorily met through the other alternatives.

As described in Section 5.6 the BRCP will protect an additional 36,388 acres of modeled western burrowing owl habitat (Table 5–8), resulting in protection of 48 percent of its modeled habitat in the Plan Area (Table 5–21a). Implementation of these conservation actions and applicable avoidance and minimization measures is expected to benefit the species to a greater degree than any alternatives that may reduce take.

11.3.3.5 Greater Sandhill Crane

Greater sandhill cranes winter but do not breed in the Plan Area. The majority of cranes that winter in Sacramento Valley winter in the Butte Basin in areas extending from Chico to the Butte Sink between the Sacramento River and State Route 99. The Butte Basin frequently supports up to 70 percent of the Central Valley greater sandhill crane population (Littlefield 2002). Greater sandhill crane in the Plan Area most commonly use harvested rice fields as foraging habitat, along with winter wheat, harvested and unharvested corn, and grasslands. Roost sites are another key habitat element for cranes and consist of shallowly flooded open fields or wetlands close to food sources that offer protection from predators and are free of disturbance (see Appendix A).

Implementation of the covered activities would result in the removal of up to 1,764 acres, (approximately 1 percent) of modeled greater sandhill crane wintering habitat in the Plan Area (Table 4–8, Figure 4–26, *Greater Sandhill Crane: Direct Impacts of Covered Activities*), primarily from the South Orchards and Basin CAZs. The Conservation Strategy precludes removal of greater sandhill crane roosting sites. The potential effects of noise and visual disturbances on individuals associated with implementation of the covered activities will be minimized with implementation of avoidance and minimization measures described in Chapter 5, *Conservation Strategy*.

Alternatives to further avoid removal of modeled greater sandhill crane habitat would require not implementing covered activities that affect modeled habitat. This alternative to take, beyond avoidance of habitat areas incorporated into the general plans as described in Section 11.2 was considered not be practicable because it would be too prohibitive to planned development and infrastructure projects. The preferred alternatives for the Butte County and Chico general plans impact the same amount (or less) of greater sandhill crane habitat than the other alternatives considered. While the Oroville general plan has a relatively greater impact, habitat removal occurs at the periphery of the greater sandhill crane modeled habitat area in the Plan Area. In addition, the amount of habitat removed is relatively small compared to the total area available, and will be more than compensated for as discussed below.

As described in Section 5.6 the BRCP will protect or create an additional 21,660 acres of greater sandhill crane foraging and roosting habitat, resulting in protection of approximately 33 percent of habitat in the Plan Area (see Table 5–21a), as well as 500 acres of traditional upland use area. Most of the protected wintering habitat is comprised of rice land, which may be replaced at the discretion of BCAG as the Implementing Entity by managed wetlands that support comparable habitat functions for the crane. The Conservation Strategy will also create and maintain two crane winter roost sites located within the Basin CAZ in traditional crane winter use areas. These roost sites will be managed to provide appropriate seasonal wetland vegetation that supports crane roosting habitat and upland berms situated throughout the seasonal wetland as loafing areas. Implementation of these conservation actions and applicable avoidance and minimization measures is expected to benefit the species to a greater degree than any alternatives that may reduce impacts on modeled greater sandhill crane habitat.

11.3.3.6 California Black Rail

Currently there are seven locations within the Plan Area that are known to be occupied by California black rail (see Appendix A). Within the Plan Area, California black rail occupy emergent wetlands and/or seeps dominated by bulrushes (*Scirpus* spp.) and cattails (*Typha* spp.) with shallow water (usually less than 3 centimeters); see Appendix A.

The Conservation Strategy precludes implementing any actions that would remove occupied California black rail habitat or cause direct mortality or injury of individuals. Implementation of covered activities would result in the removal of up to 35 acres of emergent wetland that could support patches of California black rail habitat (Table 4–3) representing approximately 0.8 percent of the current extent of mapped emergent wetland in the Plan Area (Table 4–3; Figure 4–18, *Wetland: Direct Impacts of Covered Activities*). The potential effects of noise and visual disturbances on individuals associated with implementation of the covered activities will be minimized with implementation of the avoidance and minimization measures described in Chapter 5, *Conservation Strategy*. As approved, the general plans for Chico, Oroville, and Butte County as a whole could have resulted in the removal of 76 acres of emergent wetland that could support California black rail habitat, but BRCP avoidance and minimization measures will reduce the allowable impact to 35 acres, thereby avoiding the removal of 41 acres of emergent wetland. An alternative to further reduce such impacts was considered not to be practicable because it would be too prohibitive to planned development in the Chico, Oroville, and Bangor UPAs and to other projects such as road improvements outside of the UPAs. The preferred alternatives for the Butte County and Chico general plans avoid natural communities that may support California black rail habitat (i.e., emergent wetland) to a greater extent than the other alternatives considered. While the Oroville general plan impacts a slightly larger area compared to the other alternatives, the BRCP Conservation Strategy protects and restores a much larger amount of habitat than is removed.

Implementation of the BRCP will protect an additional 695 acres of emergent wetland that could support patches of California black rail habitat, resulting in protection of nearly 58 percent of

emergent wetland in the Plan Area (see Table 5–20a, *Expected Extent of Conserved Natural Communities in the Plan Area with BRCP Implementation*). The Conservation Strategy also prioritizes protecting lands that support springs and small patches of wetland that support California black rail habitat. BRCP restoration of any portion of the 121 acres of emergent wetland (see Table 5–6) in locations that support hydrologic conditions required by California black rail would also result in increasing the extent of black rail habitat in the Plan Area. Implementation of these conservation actions and applicable avoidance and minimization measures is expected to benefit the species to a greater degree than any alternatives that may reduce impacts on California black rail habitat.

11.3.3.7 American Peregrine Falcon

Breeding pairs of American peregrine falcon have been reported in the Plan Area from upper Butte Creek Canyon, the Upper Bidwell Park area, along the western bluffs of DFG's Table Mountain Ecological Reserve, and on a suspension bridge across Lake Oroville (see Appendix A).

Implementation of covered activities would result in the removal of up to 3,759 acres of modeled peregrine falcon seasonal and year-round foraging habitat (approximately 1.9 percent of the modeled habitat in the Plan Area), primarily in the Chico UPA (Cascades CAZ), Oroville UPA (Sierra Foothills CAZ), and Gridley-Biggs UPA (Southern Orchards CAZ) (Table 4–9). The Conservation Strategy precludes removal of known and modeled peregrine falcon nesting habitat and includes an objective to protect all currently unprotected peregrine falcon nesting sites from activities that could adversely affect the nesting habitat or reduce nesting success (see Section 5.3.2.3, *Species-Level Goals and Objectives*). The potential effects of noise and visual disturbances on individuals associated with implementation of the covered activities will be avoided and minimized with implementation of avoidance and minimization measures described in Chapter 5, *Conservation Strategy*.

Alternatives to avoid greater amounts of modeled peregrine falcon foraging habitat would require not implementing covered activities that affect modeled habitat. This alternative, providing additional avoidance of habitat in areas incorporated into the general plans as described in Section 11.2 was considered not practicable because it would be too prohibitive to planned development and infrastructure projects. Other alternatives considered under the County, Chico, and Oroville general plans for the most part impact a greater amount of peregrine falcon foraging habitat than the preferred alternative. The greatest relative loss of habitat under the preferred alternative compared to the other alternatives consists of rice land removal and occurs in the Gridley-Biggs area. Given the small peregrine population in the Plan Area and the vast amount of rice land habitat remaining after the implementation of the covered activities, the loss of this small proportion of foraging habitat under the BRCP covered activities is not likely to result in harm to peregrine falcon.

As described in Section 5.6 the BRCP will protect an additional 35 acres of modeled peregrine falcon nesting habitat and 29,157 acres of foraging habitat, resulting in protection of over 65 percent and 33 percent of these habitat types, respectively, in the Plan Area (see Table 5–21a). Protection of suitable cliff faces that support nesting habitat will ensure the availability of peregrine falcon nest sites to accommodate the potential future expansion of the nesting population in conjunction with protection and management of a large proportion of its foraging habitat. In addition, restoration of 121 acres of emergent wetland will increase the habitat area supporting the peregrine falcon's wetland-associated prey species. Implementation of these conservation actions and applicable avoidance and minimization measures are expected to benefit the species to a greater degree than any alternatives that may reduce habitat removal.

11.3.3.8 Swainson's Hawk

Within the Plan Area, Swainson's hawks nest primarily west of State Route 99. Nesting habitat is more abundant in this area and agricultural land use patterns are more compatible with the species' foraging requirements. Important habitat components for Swainson's hawk are large native trees to nest in, located in riparian corridors or sometimes as isolated trees, and suitable foraging habitat, which typically consists of farm and pasturelands that support high densities of small rodent prey and low vegetation cover.

Implementation of covered activities could result in the removal of 11,312 acres of modeled Swainson's hawk habitat (7.5 percent of all modeled habitat in the Plan Area), 92.3 percent of which consists of foraging habitat, primarily in the Oroville UPA and to a lesser degree in the Chico and Gridley-Biggs UPAs (Table 4–9). The Conservation Strategy precludes implementing any actions that would remove occupied nest sites or cause direct mortality or injury of individuals. The potential effects of noise and visual disturbances on individuals associated with implementation of the covered activities will be minimized with implementation of the avoidance and minimization measures described in Chapter 5, *Conservation Strategy*. As approved, the general plans for the cities of Chico, Oroville, and others, as well as for Butte County as a whole, could have resulted in the removal of 11,503 acres of Swainson's hawk habitat, but BRCP avoidance and minimization measures will reduce the allowable impact to 11,312 acres, thereby avoiding the removal of 191 acres of nesting habitat. An alternative to further reduce such impacts was considered not to be practicable because it would be too prohibitive to planned development in the Chico, Oroville, and Durham UPAs and to other projects such as road improvements outside of the UPAs. The preferred alternatives for the Butte County and Chico general plans impact less nesting and foraging habitat than the other alternatives considered. While the Oroville general plan preferred alternative removes a larger amount of habitat compared to the other alternatives, community development goals for Oroville would not be met if impacts were reduced further. In addition, the BRCP Conservation Strategy protects and restores a much greater amount of habitat than is removed.

As described in Section 5.6 the BRCP will protect 23,005 acres of currently unprotected modeled Swainson's hawk habitat, resulting in protection of over 44 percent of habitat in the Plan Area

(Table 5–21a). Restoration of 178 acres of riparian forest (Table 5–11, *Covered Species Habitat Conservation and Mitigation Targets*) will also increase the extent of Swainson's hawk nesting habitat in the Plan Area. Implementation of these conservation actions and applicable avoidance and minimization measures is expected to benefit the species to a greater degree than any alternatives that may reduce take.

11.3.3.9 White-Tailed Kite

Few confirmed records exist of white-tailed kite in Butte County; however, the species is known to occur along the Sacramento River, Feather River, Butte Creek, Big Chico Creek, and at Gray Lodge Wildlife Area and other various locations throughout Butte County from the Sacramento River to the Sierra Nevada. As such, white-tailed kite is expected to occur in low densities throughout much of the Plan Area. Important habitat components for white-tailed kite are trees with a dense canopy, located in riparian corridors or sometimes as isolated trees, and suitable foraging habitat, which typically consists of alfalfa and other hay crops, pasture, and grassland that support high densities of small rodent prey, particularly meadow vole.

Implementation of covered activities could result in the removal of 16,183 acres of modeled white-tailed kite habitat (5.3 percent of all modeled habitat in the Plan Area), 83.9 percent of which consists of foraging habitat, primarily in the Oroville UPA and to a lesser degree in the Chico and Gridley-Biggs UPAs (Table 4–9). The Conservation Strategy precludes implementing any actions that would remove occupied nest sites or cause direct mortality or injury of individuals. The potential effects of noise and visual disturbances on individuals associated with implementation of the covered activities will be minimized with implementation of the avoidance and minimization measures described in Chapter 5, *Conservation Strategy*. BRCP avoidance and minimization measures reduce the allowable impact on white-tailed kite habitat to 16,183 acres. An alternative to further reduce such impacts was considered not to be practicable because it would be too prohibitive to planned development in the Chico, Oroville, and Foothill Area UPAs, and to other projects such as road improvements outside of the UPAs. The preferred alternatives for the Butte County and Chico general plans impact less nesting and foraging habitat than the other alternatives considered. While the Oroville general plan preferred alternative removes a larger amount of habitat compared to the other alternatives, community development goals for Oroville would not be met if impacts were reduced further. In addition, the BRCP conservation strategy protects and restores a much greater amount of habitat than is removed.

As described in Section 5.6 the BRCP will protect 56,241 acres of currently unprotected modeled white-tailed kite habitat, resulting in protection of over 34 percent of habitat in the Plan Area (Table 5–21a). Restoration of 178 acres of riparian forest (Table 5–6) will also increase the extent of white-tailed kite nesting habitat in the Plan Area. Implementation of these conservation actions and applicable avoidance and minimization measures is expected to benefit the species to a greater degree than any alternatives that may reduce impacts on modeled white-tailed kite habitat.

11.3.3.10 Blainville's Horned Lizard

Currently the only known occurrence of Blainville's horned lizard in the Plan Area is from Table Mountain. The species can occur in many habitat types, including grassland, oak woodland, and riparian habitats. An exposed gravelly substrate is thought to be a limiting habitat requirement (see Appendix A).

Covered activities will not affect known occupied Blainville's horned lizard habitat located on Table Mountain and thus will not remove its habitat or affect individuals. There is no habitat model for Blainville's horned lizard and the extent of impacts on habitat cannot be calculated, although patches of habitat could be removed by covered activities. Habitat restoration conservation measures will avoid removal of occupied Blainville's horned lizard habitat. The potential effects of noise and visual disturbances on individuals associated with implementation of the covered activities will be minimized with implementation of avoidance and minimization measures described in Chapter 5, *Conservation Strategy*.

As described in Section 5.6 the BRCP will protect 5 patches of Blainville's horned lizard occupied habitat (Table 5–8, *BRCP Covered Species Modeled Habitat Protection Targets*). Implementation of conservation actions and applicable avoidance and minimization measures is expected to benefit the species to a greater degree than any alternatives that may reduce take.

11.3.3.11 Western Pond Turtle

The western pond turtle has been reported to occur in several locations in the Plan Area, including drainages and ponds along the eastern side of the Plan Area, Big Chico Creek, and the Upper Butte Wildlife Area. The species likely occurs in most perennial streams in the Plan Area and in large ponds and other water bodies. However, the species is likely underreported, and probably occurs throughout the Plan Area in suitable aquatic and adjacent upland habitats.

Implementation of the covered activities would result in the removal of up to 4,606 acres of modeled western pond turtle habitat, representing approximately 5 percent of modeled western pond turtle habitats in the Plan Area (Table 4–8, Figure 4–32 *Western Pond Turtle: Direct Impacts of Covered Activities*). Covered activities will also remove up to 24 stock ponds supporting modeled western pond turtle aquatic habitat. The potential effects of noise and visual disturbances on individuals associated with implementation of the covered activities will be minimized with implementation of avoidance and minimization measures described in Chapter 5, *Conservation Strategy*.

BRCP avoidance and minimization measures reduced the allowable impact on modeled western pond turtle habitat to 4,606 acres. An alternative to reduce such impacts to zero acres was considered not to be practicable because it would be too prohibitive to planned development in the UPAs and infrastructure improvements outside of the UPAs. The Butte County and Chico general alternatives avoid natural communities that support western pond turtle habitat to a greater extent than the other alternatives considered. While the Oroville preferred alternative

impacts a relatively greater amount, protection and restoration of suitable habitat under the BRCP far exceeds what will be removed, as discussed below. The potential for mortality or injury of individuals associated with in- and near-water maintenance of agricultural water conveyance facilities will be largely avoided because these activities are typically undertaken during the western pond turtle's inactive period. Restricting these activities further was not considered to be practicable, because not undertaking maintenance of canals and drains when it must occur during the active season would prevent the delivery and removal of irrigation water.

As described in Section 5.6 the BRCP will protect an additional 695 acres of modeled western pond turtle aquatic habitat: emergent wetland and 10,270 acres of upland nesting and movement habitat, resulting in protection of over 55 percent and 50 percent of these habitat types in the Plan Area (see Table 5–21a). Enhancement and management of agricultural habitats will include maintaining water in canals and ditches to facilitate movement and dispersion of turtles and providing effective genetic linkages among populations. Implementation of these conservation actions is expected to be sufficient to sustain the existing and provide for future increases in the abundance and distribution of western pond turtle in the Plan Area.

11.3.3.12 Foothill Yellow-Legged Frog

Foothill yellow-legged frogs are found in or near clear, cool rocky streams in a variety of habitats, including valley-foothill hardwood, valley-foothill hardwood-conifer, valley-foothill riparian, ponderosa pine, mixed conifer, coastal scrub, mixed chaparral, and wet meadow types. Within the Plan Area foothill yellow-legged frogs have been observed in Big Chico Creek, Butte Creek, Feather River, Mud Creek and Rock Creek.

Implementation of the covered activities would result in the removal of up to 1,189 acres of modeled foothill yellow-legged frog stream and adjacent upland habitat in the Plan Area (Table 4–9, Figure 4–33, *Yellow-Legged Frog: Direct Impacts of Covered Activities*). Where impacts to occupied habitat cannot be avoided and foothill yellow-legged frogs are found within the work area, avoidance and minimization efforts (e.g., translocation) will be implemented to minimize take. Noise and visual disturbances associated with construction-related activities near occupied habitat could temporarily disturb individuals, and the potential for discharge of contaminants and sediment from project sites into habitat could exert sublethal effects on individual frogs and cause temporary avoidance of habitat areas. These potential effects will be avoided and minimized with implementation of avoidance and minimization measures (see Chapter 6, *Conditions on Covered Activities*).

Alternatives to further avoid removal of modeled foothill yellow-legged frog habitat would require not implementing covered activities that affect modeled habitat. This alternative to take beyond reductions incorporated into the general plans as described in Section 11.2 was considered not be practicable because it would be too prohibitive to planned development and transportation projects.

As described in Section 5.6 the BRCP will protect 2,025 acres of modeled yellow-legged frog habitat, resulting in protection of over 24 percent of its modeled habitat in the Plan Area (Table 5–21a). Implementation of these conservation actions and applicable avoidance and minimization measures are expected to benefit the species to a greater degree than any alternatives that may reduce take.

11.3.3.13 Western Spadefoot Toad

Western spadefoot toads require an aquatic habitat for breeding and a terrestrial habitat for feeding and aestivation. Optimal aquatic habitat consists of vernal pools and other seasonal wetlands free of native and nonnative predators such as fish, bullfrogs, and crayfish. Terrestrial habitat can consist of grassland and woodland community types up to more than 1,000 feet around aquatic breeding habitat with sandy or gravelly soil suitable for burrowing (see Appendix A). Western spadefoot toads are mostly terrestrial, using upland habitats to feed and burrow in for their long dry season dormancy. Only one record of the western spadefoot toad exists within Butte County, within the city limits of Chico along Intermittent Creek, a tributary to Sycamore Creek.

Implementation of the covered activities would result in the removal of up to 10,142 acres of modeled western spadefoot toad habitat, representing approximately 9.4 percent of the total modeled western spadefoot toad habitat in the Plan Area (Table 4–8, Figure 4–34, *Western Spadefoot Toad: Direct Impacts of Covered Activities*). Covered activities will also remove up to 22 stock ponds that could support western spadefoot toad breeding habitat. The potential effects of noise and visual disturbances on individuals associated with implementation of the covered activities will be minimized with implementation of avoidance and minimization measures described in Chapter 5, *Conservation Strategy*.

Proposed widening of Highway 99 could have resulted in the removal of two vernal pools occupied by Conservancy fairy shrimp that also support modeled western spadefoot toad habitat, but BRCP avoidance measures preclude impacts on these vernal pools and any other vernal pools that are found to support Conservancy fairy shrimp in the future. Alternatives to further avoid removal of western spadefoot toad habitat would require not implementing covered activities that affect modeled habitat. This alternative to take, beyond reductions incorporated into the general plans as described in Section 11.2 was considered not be practicable because it would be too prohibitive to planned development and infrastructure projects. The preferred alternatives for the Butte County, Chico, and Oroville general plans all avoid impacts to the natural communities that support western spadefoot toad habitat to a greater extent than the other alternatives considered.

As described in Section 5.6 the BRCP will protect 30,675 acres of modeled breeding and upland habitats, resulting in protection of over 40 percent of its habitat in the Plan Area (see Table 5–21a). Achieving the BRCP biological goals and objectives applicable to the western spadefoot toad will also help achieve the Recovery Plan (USFWS 2005) goals for western

spadefoot toad (Section 5.3, *Biological Goals and Objectives*). Implementation of these conservation actions and applicable avoidance and minimization measures is expected to benefit the species to a greater degree than any alternatives that may reduce take.

11.3.3.14 Central Valley Fall/Late Fall-Run Chinook Salmon

Central Valley fall/late fall-run Chinook salmon occur in the Feather River to Oroville, Butte Creek, Big Chico Creek, Little Chico Creek, Rock Creek, Mud Creek, and the Sacramento River. Butte Creek in particular had consistent returns of 2,000–5,000 fall-run adults between 2001 and 2005, but since then returns have declined to fewer than 400 individuals.

The covered activities do not result in the removal of modeled Central Valley fall/late fall-run Chinook salmon habitat (Table 4–8). Noise and visual disturbances associated with construction-related activities (e.g., bridge maintenance and replacement projects) in or near occupied habitat could temporarily disturb individuals, and the potential for discharge of contaminants and sediment from project sites into habitat could exert sublethal effects on individual fall/late fall-run Chinook salmon and cause temporary avoidance of habitat areas. These potential effects will be avoided and minimized with implementation of avoidance and minimization measures (see Chapter 6, *Conditions on Covered Activities*).

An alternative to eliminate any possibility of adverse effects on fall/late fall-run Chinook salmon was considered not to be practicable because it would preclude maintenance and improvement of bridges to maintain public safety and the Plan Area's transportation system, and would preclude implementation of conservation actions that are designed to benefit fall/late fall-run Chinook salmon, but will have temporary adverse effects on its habitat (e.g., placement of spawning gravels, removal of riprap).

As described in Section 5.6 the BRCP will protect an additional 20 linear miles of currently unprotected modeled Central Valley fall/late fall-run Chinook salmon habitat, resulting in protection of over 25 percent of habitat in the Plan Area (Table 5–21a). Together with conservation measures CM9, Replenish Spawning Gravels for Salmonids, CM10, Remove Impediments to Upstream and Downstream Fish Passage, and CM11, Remove, Modify, or Screen Unscreened Diversions, implementation of these conservation actions and applicable avoidance and minimization measures is expected to benefit the species to a greater degree than any alternatives that may reduce potential indirect and periodic maintenance effects to Central Valley fall/late fall-run Chinook salmon.

CHAPTER 12. INDEPENDENT SCIENCE ADVISORY PROCESS

12.1 BACKGROUND AND REGULATORY REQUIREMENTS

The habitat conservation planning process, as described by the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS), provides flexibility in resolving conflicts between species conservation and economic development. USFWS and NMFS published a *Handbook for Habitat Conservation Planning and Incidental Take Permitting Process* in 1996 (HCP Handbook) as a guide for their staff in processing incidental take permit applications and participating in associated habitat conservation planning efforts. In 2000, USFWS and NMFS published an addendum to the HCP Handbook to provide additional guidance on habitat conservation plans (HCPs); it is known as the Five-Point Policy.[1] In the Five-Point Policy, USFWS and NMFS encourage the use of independent science input to help inform the development of HCPs.

In addition, the California Natural Community Conservation Planning Act (NCCPA) calls for incorporation of independent scientific input in the development of natural community conservations plans (NCCPs), requiring such input to provide technical scientific recommendations on specific topics such as conservation strategies, reserve design principles, management principles, monitoring, adaptive management, and data gaps to support NCCP development.

Engagement of independent scientists in development of the Butte Regional Conservation Plan (BRCP) was managed through a neutral facilitation team established specifically for this purpose, as described in more detail below. Advice and recommendations from independent scientists were captured in Independent Science Advisor reports prepared by the BRCP Independent Science Advisors and provided to the BRCP Steering and Stakeholder Committees. All advice provided by the Independent Science Advisors was given serious consideration by the Steering and Stakeholder Committees in the development of the BRCP. The following sections provide more details on the independent science advisory process, the recommendations that were provided, and how these recommendations were incorporated into the BRCP. Examples of recommendations that were not incorporated into the BRCP and rationale for those decisions are also provided in this chapter.

12.2 INDEPENDENT SCIENCE ADVISORY PROCESS

An Independent Science Advisors panel was assembled to support the BRCP. The panel was composed of recognized experts in technical fields relevant to the biological resources addressed by the Plan. Their charge was to clarify the current state of technical knowledge available for the

[1] 65 *Federal Register* (FR) 35242 (June 1, 2000).

conservation planning process. The panel operated independently of the Steering Committee, Stakeholder Committee, Permittees, and consultants. The facilitator of the Independent Science Advisors was selected by the BRCP Steering Committee and was approved by the California Department of Fish and Game (DFG)[2], USFWS, and NMFS. The Science Facilitator worked with the Butte County Association of Governments (BCAG), Steering Committee representatives, DFG, and USFWS to develop a "long list" of potential candidates for the Independent Science Advisors panel.

The Facilitator developed a prioritized list of candidates based on their expertise, experience, proven ability to work well with groups, and ability to contribute useful information on schedule. This prioritization process resulted in a "short list" of science advisor candidates that were agreed upon by the Facilitator and BCAG, Steering Committee representatives, DFG, and USFWS. The short list identified preferred and alternate candidates for each pertinent area of expertise (e.g., experts on plant ecology, vernal pool ecology, aquatic ecology, the natural communities present, and species experts) with enough redundancy to allow that some candidates might not be available or interested in serving on the panel. Final selections of the Independent Science Advisors panel members and potential alternates from the short list were made by the Science Facilitator, without the influence of BCAG, Steering Committee, Stakeholder Committee or consultants.

Once the selection of panel members was made, the Science Facilitator ensured that all science advisors understood their roles pursuant to the NCCPA. The Science Facilitator served as a point of contact between the Independent Science Advisors and entities working on the Plan. To ensure the independence of the science advisors, all questions to or from the Independent Science Advisors were communicated through the Facilitator. The Science Facilitator coordinated the panel's review of and recommendations for the Conservation Strategy and was ultimately responsible for the scheduled delivery of these reviews and recommendations; however, the Science Facilitator was generally not involved in the writing or producing of Independent Science Advisors reports.

The Independent Science Advisors were charged with the following tasks as per the NCCPA:

1. Recommend scientifically sound conservation strategies for species and natural communities proposed to be covered by the Plan.
2. Recommend a set of reserve design principles that addresses the needs of species, landscapes, ecosystems, and ecological processes in the planning area proposed to be addressed by the Plan.
3. Recommend management principles and conservation goals that can be used in developing a framework for the monitoring and adaptive management component of the Plan.

[2] Currently the California Department of Fish and Wildlife.

4. Identify data gaps and uncertainties so that risk factors can be evaluated.[3]

Consistent with the requirements of the NCCPA and the policy directives of the Five-Point Policy,[4] the BRCP Steering Committee directed the Science Facilitator to convene meetings of the Independent Science Advisors at several key stages of the BRCP planning process. Each of the independent science efforts is summarized in Section 12.3, *Independent Science Reviews*, and includes a brief summary of major findings and information regarding how recommendations were incorporated into the overall planning process. The Independent Science Advisors produced recommendations on a range of relevant topics, including approaches to conservation planning for aquatic and terrestrial species in the Plan Area and development of the adaptive management and monitoring programs.[5] Reports prepared by the Independent Science Advisors for the BRCP are provided in Appendix G, *Independent Science Advisors Reports.*

12.3 INDEPENDENT SCIENCE REVIEWS

12.3.1 November 2007 Independent Science Advisors Report on Overall Guidance

The Independent Science Advisors held a two-day workshop on June 11–12, 2007 to review information gathered for the BRCP planning process, hear the concerns of Plan participants, tour portions of the Plan Area, and begin formulating recommendations for Plan development and implementation. Specific questions the Independent Science Advisors were asked to address included the following topics:

- Sufficiency of the proposed covered species list.
- Effective ways of grouping species to assist in designing, managing, or monitoring a reserve.
- Conceptual or analytical models that could be used to address information gaps, assess plan effects, or otherwise inform Plan development and implementation.
- Suggestions on models to use or not use in the formation of the Plan.
- Identification of ecological processes most critical to maintaining ecosystem and species viability, and incorporation of these processes into ecosystem reserve design.
- Specific monitoring protocols to detect changes in species populations or processes.
- Adaptive management and monitoring considerations.

The Independent Science Advisors published the Report of Independent Science Advisors for Butte County Habitat Conservation Plan / Natural Community Conservation Plan (HCP/NCCP) on November 30, 2007 (Appendix G). This report provided recommendations on various issues

[3] Fish and Game Code § 2810(b)(5).
[4] 65 FR 35242.

regarding plan development. Examples of recommendations that were implemented in BRCP development include the following.

- Supplement the list of covered species with planning species to help guide Plan development. The BRCP adopted the American badger, black-tailed deer, and white-fronted goose as planning species to guide the development of minimum patch size requirements for the protection of grassland, oak woodland and savanna, and agricultural land cover types, respectively. These species require large patches of habitat to meet their life requirements and providing sufficient patch size for these species encompasses the patch size requirements for all other associated native species that use smaller patches of habitat.
- Treat vernal pools as a separate natural community/habitat. The BRCP includes separate biological goals and objectives, conservation measures, and analyses for vernal swale complex, vernal pool, and altered vernal pool habitats from the larger grassland natural community. Vernal swale complex and associated vernal pools are addressed as an integrated terrain unit, grassland with vernal swale complex.
- Reserve design principles. The Independent Science Advisors report provided numerous recommendations regarding reserve design principles (e.g., protect large patches of habitat, protect mosaics of habitat) and these design principles were incorporated into the BRCP conservation land assembly principles described in Section 8.7.1.6, *Conservation Land Assembly Principles*.

Some Independent Science Advisors recommendations were not implemented because they were not deemed practicable at this time (e.g., were better suited to be addressed during Plan implementation), sufficient information or appropriate tools were not available to address the underlying issue intended by the recommendation, or the recommendations did not meet the regulatory purposes of the BRCP. For example, an Independent Science Advisors report included recommendations to add covered species to the BRCP that were not likely to become federally or California listed, and such species were not incorporated into the BRCP (the BRCP incidental take authorizations only need to provide for species that are currently listed or that become listed over the term of the BRCP). BRCP conservation measures for ecosystem functions and natural communities, however, will benefit the species recommended for addition by the panel.

12.3.2 July 2011 Independent Science Advisors Review of Draft Conservation Strategy

The Independent Science Advisors were requested to review the BRCP Draft Conservation Strategy (BRCP Chapter 5, *Conservation Strategy*) and to respond to specific questions regarding the proposed approach for conserving the covered species and natural communities. The Independent Science Advisors published the *Report of Independent Science Advisors for Butte County Habitat Conservation Plan / Natural Community Conservation Plan (HCP/NCCP)*

in July 2011 (Appendix G). This report provided recommendations for improving the Conservation Strategy and provided responses to specific questions regarding assumptions and uncertainties associated with the proposed conservation measures. Examples of recommendations that were implemented in BRCP development include the following.

- Recognize the importance of managed grazing as a habitat management tool. The Conservation Strategy was revised to emphasize the use of managed grazing on BRCP conservation lands, particularly within protected oak woodland and savanna, grassland, and grassland with vernal swale complex natural communities, to maintain and improve habitat conditions for covered and other native species (e.g., vegetation structure, cover, and composition).
- Update land cover type mapping for vernal pool and other sensitive habitats. The BRCP Geographic Information Systems (GIS) land cover type data base was revised to reflect more recent conversions of sensitive land cover types to other uses (e.g., new development and cultivated land) since the original land cover type mapping was completed by Leidos in 2007. In addition, an analysis of existing on-ground wetland delineations was used to assess the average density of vernal pools and other seasonal wetlands in different grassland landscape settings.
- Give priority to application of the most important conservation land assembly principles. The Conservation Strategy was revised to indicate the physical and biological attributes embodied in the land assembly principles that should be given the highest priority for consideration by the Implementing Entity during the conservation land acquisition evaluation process.
- Add the establishment of a wildlife corridor along the Sacramento River. The Conservation Strategy was revised to add an ecological corridor along the Sacramento River in the Sacramento River Conservation Acquisition Zone (CAZ) and Northern Orchards CAZ. This additional corridor is designed to be developed within the existing mosaic of riparian forest and scrub, orchard, and croplands in these CAZs.
- The Conservation Strategy should address road mortality on amphibians and reptiles. A conservation measure was added to the Conservation Strategy directing the Implementing Entity to coordinate with transportation agencies (e.g., California Department of Transportation [Caltrans], Federal Highway Administration [FHWA]), USFWS, and DFG to identify areas of high road mortality within the BRCP conservation lands system and to work with responsible agencies for modifying road corridors to reduce road fatalities.

The BRCP was also revised to address recommended technical clarifications and new information identified by the Independent Science Advisors for the Conservation Strategy and Appendix A, *Covered Species Accounts*.

The Independent Science Advisors, in their responses to the questions regarding key assumptions used and uncertainties considered in the development of the Conservation Strategy, generally concurred with the overall conservation approach, with the caveats described in Appendix G. Important areas of general concurrence include:

- Establishment of the Chico Butte County Meadowfoam Preserve and actions for protecting and managing Butte County meadowfoam occurrences and habitat on other lands under the BRCP for the purpose of conserving this species.
- The appropriateness of the proposed habitat enhancement and management actions for covered species.
- The adequacy of the proposed conservation measures for addressing the major environmental stressors, under the control of the BRCP, on covered species and that are known or believed to be suppressing covered species populations.
- The conservation land assembly principles as revised to reflect priorities for selection of conservation lands.

CHAPTER 13. LIST OF PREPARERS

This chapter provides the names of organizations and individuals that were involved in the development of the Butte Regional Conservation Plan (BRCP).

13.1 BRCP STEERING COMMITTEE MEMBERS

The following individuals were members of the BRCP Steering Committee for the years indicated.

- Bill Connelly, County Supervisor, Butte County District 1 (2011–Present)
- Linda Dahlmeier, Mayor, City of Oroville (2011–Present)
- Jane Dolan, County Supervisor, Butte County District 2 (2007–2010)
- Scott Gruendl, City Council Member, City of Chico (2007–2008)
- Jamie Johansson, Vice Mayor, City of Oroville (2007–2010)
- Jody Jones, Director, Caltrans District 3 (2009–2014)
- Amarjeet Benipal, Director, Caltrans District 3 (2014 – Present)
- Curt Josiassen, County Supervisor, Butte County District 4 (2007–2009)
- Steve Lambert, County Supervisor, Butte County District 4 (2010–Present)
- Ann Schwab, Mayor, City of Chico (2009–Present)
- Ted Trimble, Manager, Western Canal Water District (2009–Present)

13.2 BUTTE COUNTY ASSOCIATION OF GOVERNMENTS

Preparation of the BRCP was coordinated by the Butte County Association of Governments (BCAG) on behalf of the cities of Biggs, Chico, Gridley, and Oroville, the County of Butte, Caltrans District 3, and the Western Canal Water District. The following BCAG staff worked closely with all stakeholders in the BRCP planning process.

- Jon Clark, Executive Director
- Chris Devine, Planning Manager
- Andy Newsum, Deputy Director

13.3 STAKEHOLDER COMMITTEE

A Stakeholder Committee of local citizens provided regular input into development of the BRCP. The Stakeholder Committee was comprised of designated representatives from the following designated member organizations:

- Butte County Resources Conservation District
  - Pia Sevelius
  - Nathan Key
  - Alexis Vertolli
  - Bill Kellogg
  - Steve Troester
- California Native Plant Society
  - Suellen Rowlison
  - Woody Elliott
  - Bill Haas
  - Josephine Guardino
- Building Industry Association
  - Jason Bougie
  - Jim Stevens
- Butte County Farm Bureau
  - Colleen Cecil
- Western Canal Water District
  - Ted Trimble
  - Anjanette Shadley Martin
- Altacal Audubon Society
  - Phil Johnson
  - Scott Huber
  - Dawn Garcia
- Ducks Unlimited
  - Virginia Getz
- Butte County Agricultural Commission

  - Richard Price
  - Mary Daniels
  - Eric Pittman
- California State University, Chico
  - Scott McNall
  - Jeff Mott
- Butte Glenn Community College
  - Kim Jones
  - Mike Miller
- Sierra Club
  - Mary Watters
  - Pat Kelly
  - Grace Marvin
- Caltrans District 3
  - Jeff Swindle
  - Carolyn Brown
- California Department of Water Resources
  - Dave Bogener
- Farm Credit Northern California
  - Tod Kimmelshue
- Butte Environmental Council
  - Robin Huffman
  - Carol Perkins
  - Desiree Hatton
  - Robyn DiFalco

13.4 FISH AND WILDLIFE AGENCIES

The U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), and the California Department of Fish and Game (DFG) participated in Steering Committee and Stakeholder Committee meetings in the capacity of providing technical advice and guidance

regarding species biology and regulatory requirements. The following representatives from these agencies contributed to the preparation of the BRCP.

13.4.1 U.S. Fish and Wildlife Service (USFWS)

- Jesse Wild
- Rick Kuyper
- Nina Bicknese
- Jason Hanni
- Eric Tattersall
- Cay Goude
- Mike Thomas

13.4.2 National Marine Fisheries Service (NMFS)

- Rosalie del Rosario
- Mike Gutierrez
- Gretchen Umlauf

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CHAPTER 14. REFERENCES

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14.2 PERSONAL COMMUNICATIONS

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Johnson, Phil and Scott Huber, Altacal Audubon members, meeting with Altacal Audubon, May 10, 2007.

Marchetti, Michael, Professor, California State University, Chico. Phone conversation with Rick Wilder regarding fish distribution and abundance in Butte County. February 18, 2008.

McReynolds, Tracy, Biologist, DFG. 2008. Phone conversation with Rick Wilder about fish distribution and abundance in Big Chico Creek. February 19, 2008.

Seesholtz, Alicia, Environmental Specialist, DWR. Phone conversation with Rick Wilder about fish distribution and abundance in the Feather River. January 16, 2008.

Snowden, Jim. 2007. California Department of Fish and Game, retired. May 18.

Sterling, John, H.T. Harvey Associates (formerly), email exchange with Jim Estep, May 18, 2007.