APPENDIX A – APPLICANT'S INTERESTS AND OBJECTIVES

Project Background

The Applicant for the Energy Gateway South Transmission Project (Project), PacifiCorp, serves more than 1.7 million retail electric customers (native load) in the states of California, Idaho, Oregon, Utah, Washington, and Wyoming (Figure 1). The Project would be built in the service area of Rocky Mountain Power (the Company), a business unit of PacifiCorp, which delivers electricity to more than a million retail customers in its service area, which includes Utah, Wyoming, and Idaho.

Within the Company's service area, there has been more than a decade of population growth and economic prosperity. Coupled with an increase in per-customer electric usage, this growth has resulted in a significant increase in the overall demand for electricity. As a result, the transmission system used to provide the Company's customers with access to low-cost generating resources and provide reliable service is now fully utilized. Consequently, significant new transmission infrastructure is needed to adequately serve the Company's existing and forecasted customer needs.

Since 1996, the population in the counties served by the Company has grown substantially. While near-term economic conditions have slowed, the Company's service territory continues to growth in all customer segments, and currently forecasts an increase overall energy usage across its system at an average of 2.3 percent per year over the next 5 years and by 2 percent each year over the next 10 years (Section 2.3). The Company currently has approximately 12,500 megawatts (MW) of existing resources, and its 10-year planning forecast predicts it will need approximately 15,000 MW by 2020 (Section 2.3).

The Company's need for the Project is tied to its obligations as a regulated utility to increase its transmission capacity and to provide safe, reliable electricity to its customers at a reasonable cost. The purpose of this Project is to alleviate constraints within the Company's existing transmission system, provide integration of additional planned and existing transmission segments and improve system reliability and operational flexibility of the bulk electric system. The addition of this line also would provide opportunity to maintain the system with fewer operational constraints.

Numerous studies have been used to inform the design of the Company's recommended bulk electric transmission additions, which resembles a triangular footprint over Idaho, Utah, and Wyoming, with paths extending into Oregon and Washington. The footprint defined by these studies is now known as Energy Gateway. PacifiCorp's priority in building Energy Gateway is to meet the needs of its customers.

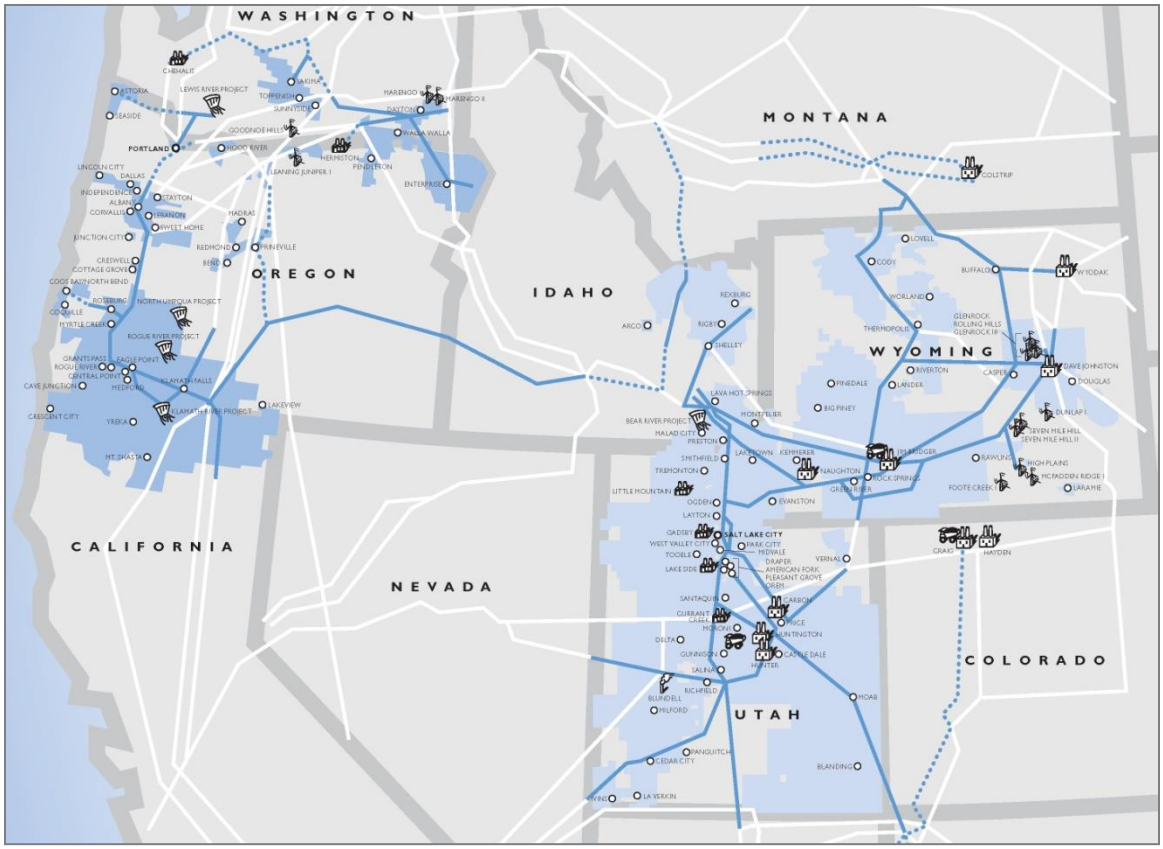


Figure 1 PacifiCorp Service Territory

1.0 Acronyms and Definitions

Several acronyms and technical concepts are used in the document and the reader will better understand this report by becoming familiar with the following terms:

- **Adjacent Transmission Circuits:** (as defined by Western Electricity Coordinating Council [WECC] TPL-001-WECC-CRT-2 System Performance Criterion) Two transmission circuits with separation between their center lines less than 250 feet at the point of separation with no Bulk Electric System circuit between them. Transmission circuits that cross, but are otherwise separated by 250 feet or more between their centerlines, are not Adjacent Transmission Circuits.
- **Bulk Electric System**: The electrical generation resources, transmission lines, interconnections with neighboring systems and associated equipment generally operated at voltages of 100 kilovolts (kV) or higher. Radial transmission facilities serving only load with one transmission line source generally are not in this definition.
- **Contingency Analysis**: The assessment of risk that certain scenarios resulting from outage events may pose to an electrical network.
- **Electrical Transfer**: Power in an alternating current (AC) electric network does not travel along any one set path. Instead, power flows from a "generation source" to a "load sink" along all the paths that can connect them. This means that changes in generation and transmission at any point in the system will change loads on generators and transmission lines at every other point—often in ways not easily controlled.

- **Electrical Transmission Capacity**: The amount of power, measured in megawatts (MW), flowing over each transmission line. This amount must remain at or below the line's rated capacity to prevent thermal overloading or power-supply instability such as phase and voltage fluctuations. Capacity limits vary, depending on the length of the line, type/size of the line conductor and the transmission voltage.
- **Energy Gateway Program:** The Company's large-scale transmission expansion program that consists of three principal legs: Energy Gateway Central, Energy Gateway West, and the subject project, Energy Gateway South Transmission Project. The Company also considers the Sigurd to Red Butte 345kV No. 2 Project to be within the scope of the Energy Gateway Program.
- **Extra-high Voltage (EHV):** Electric transmission facility energized at 300,000 volts (300kV) or greater.
- **Fault:** A condition when one or more electrical conductors contact the ground and/or each other typically resulting in protective equipment tripping out of service to stop the fault current that is several times larger in magnitude than the current that normally flows through a circuit.
- **Generation Tripping:** An intentionally engineered loss or shut-down of generation facilities in response to system disturbances.
- **Load Shedding:** An electrical power outage wherein customer's electrical service is interrupted. Causes can be due to insufficient electrical generation capacity or transmission system outages. Load shedding, under certain contingency conditions, may be used by an electric utility company in order to avoid a cascading event that may result in a widespread blackout of the power system.
- **Mean Time Between Failures (MTBF):** The elapsed time between failures of a system element or event during operation.
- **North American Electric Reliability Corporation (NERC)**: NERC is a self-regulatory, non-government organization that has statutory responsibility to regulate bulk power system users, owners, and operators through the adoption and enforcement of standards for fair, ethical and efficient practices. As of June 18, 2007, the Federal Energy Regulatory Commission (FERC) granted NERC the legal authority to enforce reliability standards with all users, owners, and operators of the bulk power system in the United States, and made compliance with those standards mandatory and enforceable.
- **Redundancy**: The duplication of critical system components or transfer capacity of a system with the intention of increasing or maintaining reliability, usually in the case of a backup or fail-safe.
- **Contingency Reserves**: The generating capacity immediately available to a system operator to meet customer demand in the event of a generator(s) failure or transmission system outages. (i.e., contingencies).
- **Western Electricity Coordinating Council**: WECC is the regional entity responsible for coordinating and promoting bulk electric system reliability in the Western Interconnection (one of the two major AC power grids in North America, the other being the Eastern Interconnection). In addition, WECC assures open and non-discriminatory transmission access among members, provides a forum for resolving transmission access disputes and provides an environment for coordinating the operating and planning activities of its members as set forth in the WECC Bylaws.

2.0 Applicant's Need

2.1 Summary

PacifiCorp needs to make improvements to its bulk transmission network in order to transport electricity reliably from generation resources (owned generation and market purchases) to various load centers. Additional transmission infrastructure is needed to:

- Maintain compliance with mandated national reliability standards that require the Company to have a plan to: "operate to supply projected customer demands and projected Firm Transmission Services, at all demand levels over the range of forecast system demands…."[1]
- Meet obligations and requirements specifically required under the Company's Open Access Transmission Tariff (OATT) approved by the Federal Energy Regulatory Commission (FERC).
- Insure customers have an adequate supply of reliable and low-cost energy
- Reliably deliver power to continuously changing customer energy-supply demands under a wide variety of system-operating conditions.
- Supply all electrical demand and energy requirements of customers at all times, taking into account scheduled and unscheduled system outages.
- Allow the Company to access energy available from existing markets and to sell excess generation to those existing markets when it is economic to do so for customers.
- Support options for generation resource development including economically feasible renewable generation as specified in the Company's current and future Integrated Resource Plans.
- Meet the current and reasonably anticipated energy supply requirements, policies, rules and laws at the federal level and in the states the company serves.

In particular, the Project is needed to fulfill the following key responsibilities of the Company:

Serve Native Load. The Company is responsible for providing electric service to 1.7 million retail customers in the states of California, Idaho, Oregon, Utah, Washington, and Wyoming. The Company has a legal obligation to ensure sufficient firm point-to-point and network transmission capacity is available to meet the electric demands of all its customers now and into the future.

Serve Third-Party Network Customers. In addition to providing service to its native load customers, the Company also is required to provide transmission service to its third-party network customers, which in turn directly serve customers in these same states. The Company has a legal responsibility to provide reliable transmission service to third parties to the degree transmission capacity is available.

Ensure Reliability. The Project is needed to improve the Company's ability to provide reliable electrical service to all its customers in a nondiscriminatory manner. The Project also is needed to provide redundancy during transmission and generation contingencies for other planned and existing transmission segments (Gateway West and Gateway Central, respectively), thereby providing operational flexibility for the bulk electric system, ensuring reliability, and supporting capacity ratings for each segment.

Access to Energy Resources. The Company has a legal obligation to transport identified third-party network generation to serve network loads. The Project is needed to provide the Company with access to rich and diverse generation resources throughout its service territory needed to meet the growing

[1]NERC Transmission Planning Standard TPL-002-1.

electrical demands of its customers. In general, expansion of the transmission system is needed to accommodate a variety of future resource scenarios and plans.

Maximize Infrastructure Benefits. When interconnected to the wider electric system in the west, the Project would function as a fully interconnected electric system element in the west-wide electric grid and would be expected to carry its fully rated capacity (1,500 MW of electrical power flow) across the system. When interconnected with other Energy Gateway segments (Gateway West and Gateway Central), the Project would allow all Energy Gateway segments to achieve their fully rated capacities.

2.2 Applicant's Needs as a Regulated Utility

The Company is a vertically integrated electric utility under the jurisdiction of the FERC and six state regulatory commissions. The Company sells electricity primarily in the retail market, with sales to residential, commercial, industrial, and other customers. It also sells electricity in the wholesale market when excess electricity generation exists or when required for other system-balancing activities. The Company's business unit of the PacifiCorp operates under oversight and regulatory controls of the Public Service Commission of Utah, Wyoming Public Service Commission, and the Idaho Public Utilities Commission. PacifiCorp also provides service to more than 730,000 retail customers in the states of Oregon, Washington, and California under the trade name Pacific Power. Pacific Power is subject to the regulatory oversight of the Oregon Public Utility Commission, Washington Utilities and Transportation Commission, and California Public Utilities Commission.

As provided in the Company's OATT under Sections 15.4, 28.2, and 28.3, the Company is obligated to expand its transmission system to provide requested firm point-to-point and network transmission service, and to construct and place in service sufficient capacity to deliver resources reliably to network and native load customers. The Company's Attachment K of the OATT also requires planning for the expansion of the system to ensure that its transmission system meets industry, regulatory, and reliability standards. The Company is subject to both mandated and voluntary standards directed at increasing supply of renewable ("green") energy sources as part of its overall least-cost risk-adjusted energy-resource portfolio. The Energy Gateway program and the Project are both needed to ensure these long-term requirements are met. The Company, under the NERC and WECC reliability standards, needs to plan, construct and operate its system in a manner that accounts for the overall reliability of the nation's electric supply system.

Additionally, the Company requires new transmission capacity to adequately serve its customers' load and growth needs across the next 20-year horizon and beyond. Recognizing the potential regional benefits of trying to "upsize" the Project (such as maximizing the use of energy corridors, minimizing environmental impacts, and improved economies of scale), the Company included in its original Energy Gateway plan the potential for doubling the Project's capacity to encourage third-party commitments and equity partnerships necessary to support such an investment. In the years since the May 2007 announcement of Energy Gateway, the Company has pursued such partnerships but due to the significant costs inherent in transmission investments—and the Company's obligation to shelter its customers from costs and risks associated with "upsizing" the Project exclusively for the third-parties' benefit—these commitments have not materialized. The Company is committed to building Energy Gateway to meet the needs of its customers and is moving ahead with the appropriate investments to do so, which for the Project is reflected by its description as a single-circuit 500kV facility.

In summary, the Company's obligations as a regulated utility require it to:

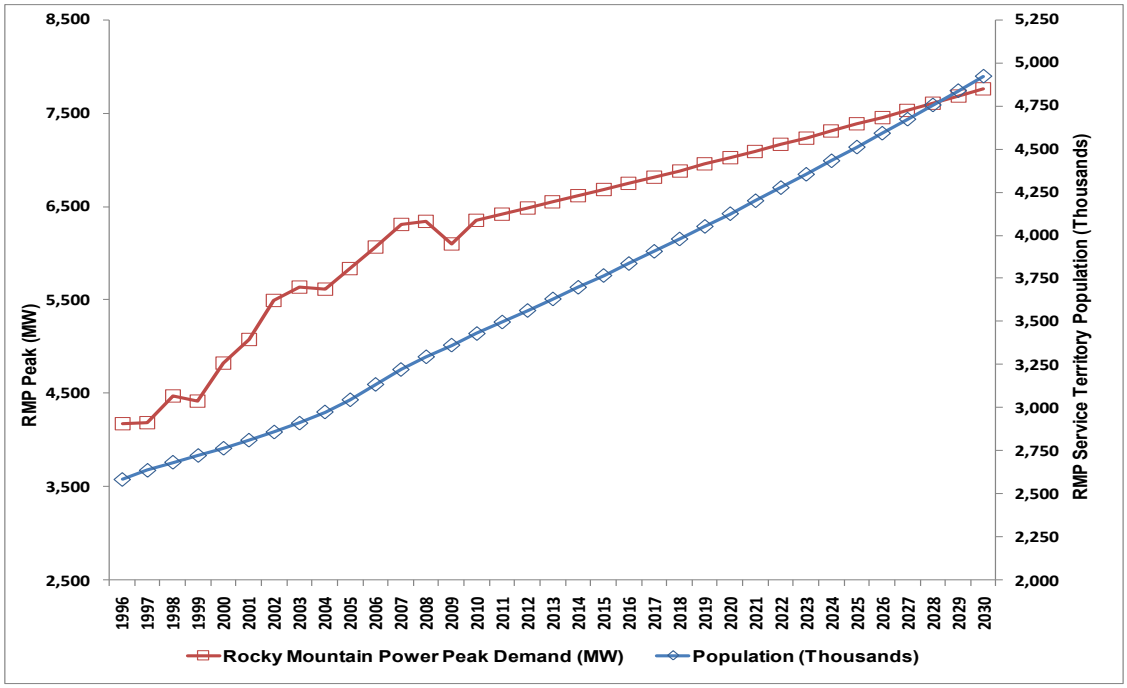
- Provide increased capacity as required to serve existing and growing loads.
- Meet contract obligations provided for under transmission service agreements.

- Identify reliability and system constraints within the Company's existing transmission system that necessitate the improvement and/or development of new transmission paths.
- Provide safe, reliable electricity to its customers at a reasonable cost.
- Ensure sufficient infrastructure is available to generate, transmit, and distribute electricity to its 1.7 million retail customers.

2.3 Need to Increase Capacity

Current and Projected Electrical Demand

Since 1996 the population in the counties served by the Company has grown substantially[2]. Along with this growth there has been an even greater growth in the demand for electricity[3] (Figure 2). As a regulated utility serving these counties, the Company needs to provide safe, reliable service to existing and future customers on a nondiscriminatory basis.



Data derived from IHS Global Insight. Not to be reproduced without permission.

Figure 2 – Growth of Rocky Mountain Power's Peak Demand and Population in its Service Territory

While near-term economic conditions have slowed, the Company's service territory continues to see growth within all customer segments. One of the more significant drivers of this growth is demand from the extractive industries in the states served by the Company. The Company currently forecasts an increase in overall energy usage across its system at an average of 2.3 percent each year over the next 5 years and by 2 percent each year over the next 10 years[4] (Figure 3).

[2]SOURCE: IHS Global Insight state and county estimates, December 2010.
[3]SOURCE: Rocky Mountain Power billing system.
[4]SOURCE: Rocky Mountain Power 2011 Business Plan.

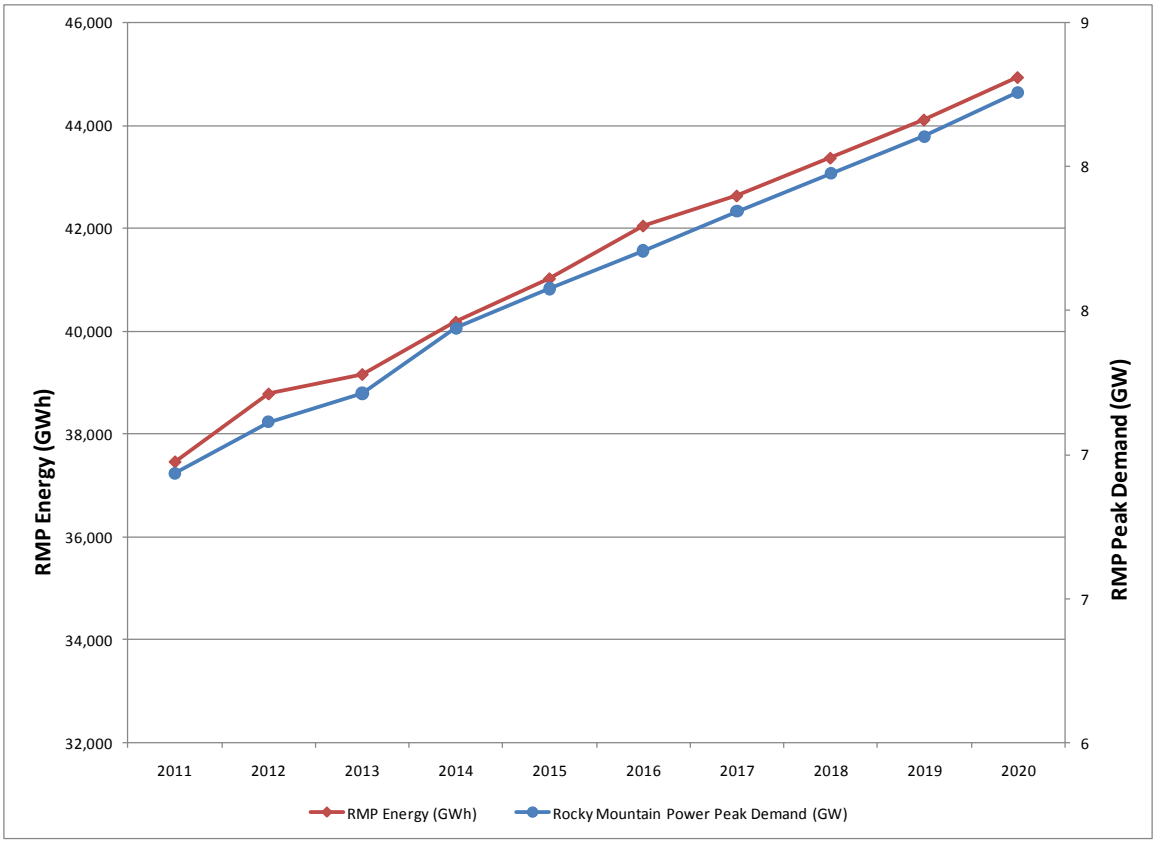


Figure 3 – Forecast Growth of Rocky Mountain Power's Energy Delivery and Peak Demand

The Company's transmission business operates independently of its merchant function and markets its transmission services using an Open Access Same-time Information System (OASIS). The Company's wholesale transmission services are regulated by FERC under cost-based regulation subject to the Company's OATT, which requires it to provide transmission service to eligible wholesale customers. Therefore, in addition to ensuring transmission capacity is available to meet the needs of its retail customers, the Company has an obligation to ensure sufficient transmission capacity is available to meet the growing needs of its third-party network customers.

The Company currently has approximately 12,500 MW of existing resources (Figure 4), and its 10-year planning forecast predicts it will need approximately 15,000 MW, including reserves, by 2020. As demonstrated in Figure 4, there will be a deficit in existing resources due to a combination of retiring generation resources, expiring energy and capacity contracts, and growth in existing and new customer demand for energy that will result in an energy capacity resource gap of 3,852 MW. Furthermore, the Company's eastern-system peak is expected to continue growing faster than the western-system peak, with average annual growth rates of 2.4 percent and 1.4 percent, respectively, over the forecast horizon.

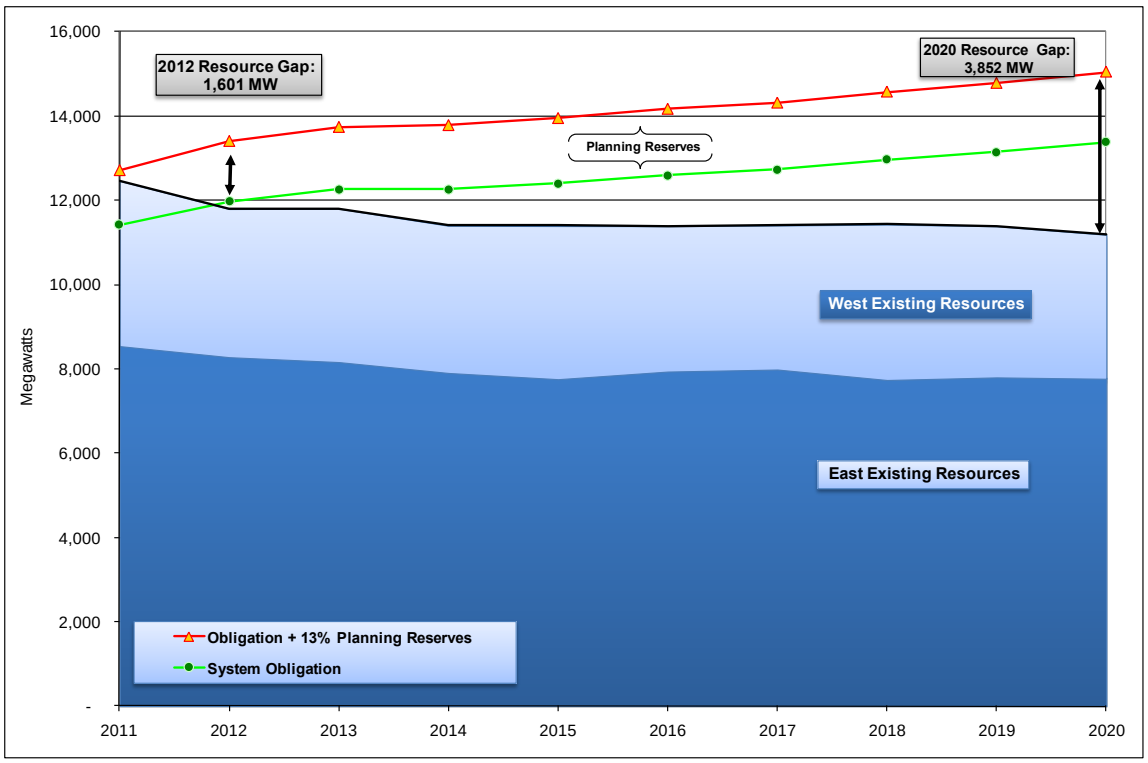


Figure 4 – System Capacity Resource Gap (PacifiCorp 2011 IRP)

Existing Transmission Capacity, Constraints, and Regional Planning

Capacity refers to the amount of power a transmission line can reliably deliver. Capacity is measured in MWs and is limited by the current (in amperes) that the wire can carry or the minimum voltage levels delivered to the substations. Multiple transmission lines generally located in similar alignments and operating electrically in parallel are referred to as electrical transmission "paths." The capacity ratings of the paths are based on meeting established reliability criteria. The Company's high-voltage transmission system is composed of multiple 230kV, 345kV, and 500kV segments. Based on current projections, loads, and the dynamic blend of energy resources are expected to become more complex over the next 20 years, which will challenge the existing capabilities of the transmission network. The Company along with other regional utilities has determined that the Western Interconnection requires additional transmission facilities to meet increased demand for electrical transmission, including the accommodation of multiple renewable-generation projects.

Transmission reliability and the ability to address capacity or congestion issues in a timely manner represent important planning considerations for ensuring that peak load and energy obligations are met on a reliable basis. The cycle time to add significant transmission infrastructure is often longer than adding generation resources or securing third-party resources. Transmission additions must be integrated into regional plans and then permits must be obtained to site and construct the physical assets. Inadequate transmission capacity limits the ability to access what would otherwise be cost effective generating resources.

In the Western Interconnection, regional planning has evolved into a three-tiered approach where an interconnection-wide entity, in this case WECC, conducts regional planning at a very high level, several sub-regional planning groups focus with greater depth on their specific areas, and transmission providers perform local planning studies within their sub-region. This coordinated planning helps to ensure that

customers in the region are served reliably and at the least cost. The Company is one of the founding members of the Northern Tier Transmission Group (NTTG). Originally formed in early 2007, NTTG has an overall goal of improving the operation and expansion of the high-voltage transmission system that delivers power to consumers in seven western states. The NTTG footprint includes approximately 4.3 million customers and more than 29,000 miles of transmission lines within Oregon, Washington, California, Idaho, Montana, Wyoming, and Utah.

Repeated sub-regional studies have concluded the critical need to alleviate transmission congestion and move transmission-constrained energy resources to regional load centers. These include the Rocky Mountain Area Transmission Study dated September 2004, the Western Governors' Association Transmission Task Force Report dated May 2006, and the NTTG Fast Track Project Process in 2007, the Transmission Expansion Planning Policy Committee (TEPPC) 2009 Annual Report, the 2009 TEPPC Western Interconnection Transmission Path Utilization Study, plus subsequent the Company planning studies In addition, the WECC Seams Steering Group-Western Interconnection (SSG-WI) of 2005 analyzed this region, and its results were included in the 2006 U.S. Department of Energy (DOE) National Electric Transmission Congestion Study (DOE 2006). The 2006 DOE study identifies the region from Wyoming to the west as a conditional constrained area, meaning that any generation developed in Wyoming will require additional transmission. These studies helped inform the design of the Company's recommended bulk electric transmission additions, which took on a consistent footprint establishing a triangle over Idaho, Utah, and Wyoming, with paths extending into Oregon and Washington. The footprint defined by these studies is now known as Energy Gateway. Studies also were performed in 2007 through the NTTG Fast Track Project Process and as part of the approved NTTG 2011 Biennial Transmission Plan, which indicated a strong need for a series of independent transmission segments, each of which addresses an independent purpose, though all are part of the larger grid. Gateway South is an important component of the needed grid expansion identified by that planning effort.

All of these studies show that the existing generation is using all of the transmission capacity from Wyoming and that the addition of generation resources will require more transmission capacity. These studies also show that the cost of generation and transmission in Wyoming is typically much less than energy from other locations.

On a broader scale, the DOE also sponsored a study through Idaho National Laboratories to assess the economic impact of *not* building transmission upon the Pacific Northwest. The report was published in July 2008 and used a preliminary engineering review and analysis of planned transmission projects to preliminarily rank the projects based on estimates of their potential economic value, likelihood of execution, resource area(s) being accessed, size, and value to the transmission system as a whole. Although the Project's primary purpose is to serve customers in Utah and the Southwest, it ranked 5th (of 15 major projects) in importance for the Pacific Northwest[5]. This conclusion provides a strong indicator that the Project is important on both a local and regional scale.

2.4 Need to Ensure Reliability

Transmission systems in the United States must be planned, operated, and maintained according to NERC[6] reliability standards. All system planners, users, owners, and operators of the bulk-power system

[5]Idaho National Laboratory: The Cost of Not Building Transmission (2008).

[6]NERC's mission is to improve the reliability and security of the bulk power system in North America. To achieve that, NERC develops and enforces reliability standards; monitors the bulk power system; assesses future adequacy; audits owners, operators, and users for preparedness; and educates and trains industry personnel. NERC is a self-regulatory organization that relies on the diverse and collective expertise of industry participants. As the Electric

and regional entities must comply with these reliability standards or face significant penalties for noncompliance. Regionally, the Company also is governed by WECC[7] standards and criteria, which may be more stringent than those required by NERC. Compliance with these standards requires transmission systems to be planned and constructed with sufficient levels of redundancy to maintain reliable operation in the event of a loss or outage of system elements (i.e., transmission line segment or substation element). NERC and WECC performance requirements also require detailed risk assessments of system impacts that would result from a multitude of outage scenarios. Compliance with these standards and regional criteria is not optional for the Company as a Transmission Owner and Transmission Planner under NERC registration.[8]

The NERC and WECC standards and criteria are performance-based. Therefore, they do not dictate the site-specific locations of proposed transmission lines. The physical arrangement of new and existing lines and corridors is left to the transmission provider because it is most knowledgeable about the best method to meet system performance requirements and manage reliability risks and costs. Should a transmission provider fail to meet NERC standards and WECC criteria resulting in widespread uncontrolled loss of generation or customer demand, it would be required per WECC System Performance Criteria TPL-001 WECC-CR-2, WRS5, to take action "so that future occurrences of the event will not result in cascading, or it must demonstrate that the MTBF is greater than 300 years (frequency less than 0.0033 outages/year) and approved by PCC." Severe measures would be required to meet this elevated level of required system performance.

NERC Transmission Planning Standard TPL 002 states that "system simulations and associated assessments are needed periodically to ensure that reliable systems are developed that meet specified performance requirements with sufficient lead time, and continue to be modified or upgraded as necessary to meet present and future system needs."

This means the Company must have a forward-looking transmission plan of action to reliably serve current and anticipated future customer demands under all expected operating conditions, including normal system operations (all system elements in service) and during system contingencies (where elements of the transmission system are out of service), both planned or unplanned.

Collectively these standards are designed to protect the West's interconnected electrical grid by dictating minimum performance levels of transmission system reliability for projects like this Project. In the event

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Reliability Organization, NERC is subject to audit by the FERC and governmental authorities in Canada (NERC 2008).

[7]WECC and the nine other NERC regional reliability councils were formed due to national concern regarding the reliability of the interconnected bulk power systems, the ability to operate these systems without widespread failures in electric service, and the need to foster the preservation of reliability through a formal organization. WECC's service territory extends from Canada to Mexico. It includes the provinces of Alberta and British Columbia, the northern portion of Baja California, Mexico, and all or portions of the 14 western states in between (WECC 2008a).

[8]NERC and WECC standards and criteria that apply to the Company's transmission system and design of the Project include but are not limited to:

- NERC TPL-001 – System Performance Under Normal Conditions
- NERC TPL-002 – System Performance Following Loss of a Single BES Element
- NERC TPL-003 – System Performance Following Loss of Two or More BES Elements
- NERC TPL-004 – System Performance Following Extreme BES Events
- TPL 001-WECC-1-CR – System Performance Criteria Normal Conditions
- TPL 002-WECC-1-CR – System Performance Criteria Following Loss of a Single BES Element
- TPL 003-WECC-1-CR – System Performance Criteria Following Loss of Two or More BES
- TPL 004-WECC-1-CR – System Performance Criteria Following Extreme BES Events

that the Company's new transmission line fails to perform in accordance with these reliability requirements, the Company may be required by WECC and NERC to limit the capacity or operation of the lines to levels that would not cause major disturbances or disruptions to the Western Interconnection. Therefore, the Project has been designed such that a common-mode outage would not result in a reduction of its rated capacity (de-rating). This approach protects the Company's ability to maintain its obligations to its native load and network customers and minimizes the risk of a de-rating. If the Project were subject to a de-rating, then the Company would be required to mitigate for the lost capacity. Given the scale of the Project, this scenario would require the design and construction of an additional 500kV transmission facility.

2.4.1 WECC Planning Studies to Establish Line Ratings

The WECC rating studies are required to account for outages or, in other words, events and circumstances that are deemed credible based on the utility's system operating experience and history. Within the Project area, there are other existing and planned EHV lines that the Company must consider when siting the proposed Project. If the proposed Project and the other EHV lines are all colocated in proximity then the Company must be able to demonstrate it has an acceptable back-up plan in place should they be simultaneously out of service for any reason.

For the Company to reliably serve immediate future loads within its service area, a new transmission line needs to be designed such that it meets NERC and WECC planning and reliability criteria. However, meeting these planning criteria does not relieve the Company of other performance-based standards enforced by WECC. In particular if a severe system disturbance occurs due to line outages, the Company's experience demonstrates that WECC may reduce the line ratings and useable capacity in order to restore system reliability. Under such a scenario, the Company would expect that construction of a new line would be needed to make up for the lost capacity.

2.4.2 Use of Federally Designated Corridors

As part of its original feasibility analysis, the Company considered routes in federally designated corridors located within the Project area, but suggested the removal of some routes from further consideration based upon many factors, including its fundamental need to comply with NERC and WECC requirements. The West-wide Energy Corridors (WWEC) Programmatic Environmental Impact Statement (PEIS) published by the Department of Energy, Bureau of Land Management, and Forest Service confirms that compliance with NERC and WECC standards is essential to reliability.[9]

The WWEC PEIS concludes that "…by far the most cost effective preemptive strategy against multiple simultaneous line loss involves ensuring adequate distance separation between lines at the planning stage. Experience among WECC system operators has also shown that the nature of the land between lines…should dictate safe separation distances on a case-by-case basis…[I]n forested areas or in areas where vegetation provides substantial amounts of fuel for fires, greater line spacings (up to 5 miles) may be necessary to prevent adjacent lines from becoming simultaneously involved in faults caused by ionized smoke."

The Company's planning for the Project, therefore, incorporates the findings of the WWEC PEIS as well as its own experience.

[9]Programmatic Environmental Impact Statement, Designation of Energy Corridors on Federal Land in 11 Western States (DOE/EIS-0386); DOE 2008

2.4.3 Company and Industry Experience

As described above, the Company is required to use its experience when planning for new facilities. The Company has more than 100 years of experience with instances of multiple transmission lines located in the same general proximity experiencing simultaneous outages due to a variety of causes, including but not limited to fire and smoke, high winds, dust storms, ice storms, blizzards, lightning, landslides, earthquakes, vandalism, tower or conductor failure, equipment failure, airplane collisions, and other experience. The following examples demonstrate the need for the Company and the affected land-management agencies (e.g., Bureau of Land Management, Forest Service) to consider separation distances during the planning, design, and siting of the Project as a means to reduce risk to system reliability in the planning and construction of new transmission lines:

- **1981.** Fire forced two 345kV lines north of Camp Williams out of service and a third 345kV line cascaded, resulting in a Utah state-wide blackout.
- **1982–1983.** Landslides destroyed transmission towers on the two Emery to Sigurd 345kV lines.
- **1983.** Severe winds destroyed sections of seven lines between Salt Lake City and Ogden (345kV, 230kV and 138kV)
- **1990.** A U.S. Air Force jet clipped an overhead shield wire, which wrapped around the double-circuit 345kV and 230kV lines between Terminal and Ben Lomond substations, causing outages.
- **2000.** Fires in the corridor of Emery to Camp Williams and Huntington to Spanish Fork lines forced 345kV lines out of service.
- **2002–2003.** Multiple fires in the corridor between Mona and Camp Williams forced lines out of service.
- **2007.** Fire caused both the Mona to Huntington and Mona to Bonanza 345kV lines in Central Utah to be de-energized for fire crew safety.
- **2007.** Fire forced three 345kV lines connecting Jim Bridger in Wyoming and southeast Idaho out of service.

In addition to the Company's experience, other utilities in the WECC have experienced significant system outages:

- **1990.** Fires caused six simultaneous outages (along with 17 single-line outages) of two Round Mountain to Table Mountain 500kV lines in northern California. Fires burned randomly back and forth across the corridor for more than 12 miles. Customer load interruptions ranged from 90 MW to 1,000 MW at times.
- **1993.** High winds caused the loss of two adjacent 500kV line towers on the Pacific Intertie, leaving an estimated 5.2 million customers in several states without power. This simultaneous loss of two major EHV lines resulted in a system reliability and capacity review that led to the requirement in 1993 to build a third 500kV transmission line across the Pacific Intertie to restore capacity and improve reliability.

PROJECT DESCRIPTION

This document provides detailed information provided by PacifiCorp (doing business as Rocky Mountain Power, the Company), the applicant for right-of-way across federal land, regarding the components of the transmission system evaluated in the environmental impact statement (EIS), including the transmission structures, the communications system, and the substations. These component descriptions apply to all the alternative routes, and throughout this document, a reference to a segment includes the alternative routes for that segment.

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LIST OF ACRONYMS

AC	Alternating current
ANSI	American National Standards Institute
ATV	All-terrain vehicle
CPT	Cone penetration test
EIS	Environmental impact statement
FAA	Federal Aviation Administration
IEEE	Institute of Electrical and Electronics Engineers
IRP	Integrated Resource Plan
kV	Kilovolt
MW	Megawatt
NEPA	National Environmental Policy Act of 1969
NERC	North American Electricity Reliability Council
NESC	National Electrical Safety Code
OATT	Open access transmission tariff
OHGW	Overhead ground wire
OPGW	Optical ground wire
POD	Plan of Development
ReMi	Refraction microtremor
WECC	Western Electricity Coordinating Council

1 INTRODUCTION

This appendix contains information provided by PacifiCorp (doing business as Rocky Mountain Power, the Company), applicant for right-of-way across federal land for construction, operation, and maintenance of the Energy Gateway South Transmission Project (Gateway South or Project). This appendix provides detailed information regarding the scope of work and components of the transmission system evaluated in the environmental impact statement (EIS) for the Project, including the transmission structures, communications system, and substations and series compensation stations. The component descriptions (Section 1.0) apply to the transmission segments and substation descriptions. It provides details regarding the system components (Section 2.0) and construction of the system (Section 3.0), provides information regarding the operations and maintenance of the system (Section 4.0), and decommissioning (Section 5.0).

The Project is part of the Company's transmission expansion program, called Energy Gateway, which is intended to add new transmission lines connecting new and existing generation resources to customers throughout the Company's service territory. Energy Gateway is composed of several large-scale projects that will address customers' increasing electric energy use and improve system reliability.

The Project is designed to provide 1,500 megawatts (MW) of new capacity needed to meet the current and forecasted needs of the Company's customers. These forecasts are based on the Company's 2013 Integrated Resource Plan (IRP) as required to fulfill the regulatory requirements and guidelines established by the public utility commissions of the states served by the Company. The IRP addresses the obligations of each company pursuant to its open access transmission tariff (OATT) to plan for and expand its transmission system in a nondiscriminatory manner based on the needs of its native load and network customers.

Gateway South is independent of, and would be built regardless of, any particular new generation or transmission project(s). The transmission grid, of which it would become a part, can be thought of in terms of hubs, spokes, and a backbone connecting the hubs. Each substation is a hub, and receives or sends electricity along the spokes. For this system to work, a backbone of high-capacity transmission lines is needed to connect the hubs and transport the electricity to where it is needed.

The purpose of the transmission line is to satisfy several distinct, yet inter-related needs, explained above. The purposes of the Project relative to meeting these needs are summarized below:

- Provide long-term transmission capacity to move resources to growing load centers
- Connect Gateway West and Gateway Central, providing operational flexibility for the bulk electric network, reliability, and supports path ratings for each segment
- Improve capacity and reliability of other interconnected transmission lines associated with Energy Gateway
- Reduce transmission limitations on the existing system
- Provide incremental transmission capacity planned at approximately 1,500 MW

As proposed, the Project would be comprised of an extra-high-voltage alternating current (AC) transmission line that would run between planned, proposed, and existing substations. A proposed single-circuit 500-kilovolt (kV) transmission line approximately 400 to 540 miles in length (depending on the alternative route chosen) would begin at the planned Aeolus Substation (planned as part of Gateway West) near Medicine Bow, Wyoming; connect to two separate, proposed series compensation substations;

and terminate at the existing Clover Substation (built as part of Gateway Central) near Mona, Utah. The two proposed series compensation substations would be located at approximately the one-third and two-thirds points of the transmission line between the Aeolus and Clover substations. Modifications at the existing Mona Substation are required to re-terminate existing lines to accommodate the nearby 500kV termination at Clover Substation.

1.1 Transmission Segment Descriptions

A schematic diagram of the Project segments described below is provided as Figure 1 – Project Layout Diagram.

1.1.1 Segment 1 Aeolus – Series Compensation Substation No. 1

Segment 1 is composed of one single-circuit 500kV transmission line[1] proposed between the planned Aeolus Substation near Medicine Bow, Wyoming, and the proposed Series Compensation Substation No. 1. The location of Series Compensation Substation No.1 would be dependent on the transmission-line route selected.

1.1.2 Segment 2 Series Compensation Substation No. 1 – Series Compensation Substation No. 2

Segment 2 is composed of one single-circuit 500kV transmission line proposed between the proposed Series Compensation Substation No. 1 and the proposed Series Compensation Substation No. 2. The location of Series Compensation Substation No. 2 would be dependent on transmission-line route selected.

1.1.3 Segment 3 Series Compensation Substation No. 2 – Clover Substation

Segment 3 is composed of one single-circuit 500kV transmission line proposed between the proposed Series Compensation Substation No. 2 and the Clover Substation. The location of Clover Substation is near Mona, Utah.

1.1.4 Segment 4a Clover Substation – Mona Substation No. 1

Segment 4a consists of rebuilding the single-circuit portion of the Clover – Mona 345kV No. 1 transmission line between the Clover Substation and the Mona Substation. The line is approximately 3 miles in length and would be rebuilt on existing right-of-way.

1.1.5 Segment 4b Clover Substation – Mona Substation No. 2

Segment 4b consists of rebuilding the single-circuit portion of the Clover – Mona 345kV No. 2 transmission line between the Clover Substation and the Mona Substation. The line is approximately 3 miles in length and would be rebuilt on existing right-of-way.

[1] A single-circuit transmission line (whether 345kV or 500kV) is composed of three electrical phases and two lightning protection shield wires. One of the lighting-protection shield wires is a steel overhead ground wire (OHGW), and the other is typically an optical ground wire (OPGW). The OPGW contains glass fibers used for communication along the fiber path for data transfer between the Company's facilities. The data transferred is required for system control and monitoring.

1.1.6 Segment 4c Mona Substation – Huntington Substation

Segment 4c consists of rerouting the existing Mona – Huntington 345kV transmission line into the Clover Substation and then out of the substation headed north to the Mona Substation. This reroute would involve construction of two new single-circuit 345kV transmission-line segments extending off the existing route, approximately 1 mile in length each.

A new transmission-line corridor would be needed for the north-south portion of the new line between the Mona Substation and Clover Substation, north of the Clover Substation. Also, a new transmission corridor would be needed for a new alignment extending east-west from the existing Mona – Huntington 345kV line into the existing Clover Substation. Existing/abandoned structures would be removed when the new transmission lines are placed in service.

1.2 Substation Descriptions

1.2.1 Aeolus Substation

This planned substation will be built as part of the Gateway West and a single 500kV dead-end structure will be constructed inside that substation for this Project. Major facility/equipment additions to be installed at Aeolus Substation for Gateway South include, but are not limited to, substation steel dead-end structures and bus work. It is anticipated that all work involved with terminating the Gateway South 500kV line would be performed within the substation fence as proposed by Gateway West.

1.2.2 Series Compensation Substation No. 1

Construction of proposed Series Compensation Substation No. 1 would consist of installation of circuit breakers and related switching equipment, bus supports, and other equipment to be installed for the 500kV transmission-line structures. Additional equipment, including 500kV series capacitors, shunt-reactor banks, and emergency generators along with all associated site preparation, fencing, foundations, protection, control, communications equipment, and metering would be installed. Locations for the series compensation stations have not yet been identified, but would be located approximately one-third the distance from the Aeolus Substation to the planned Clover Substation. Based on the Company's preferred route of approximately 400 miles, this places this station approximately 133 miles from Aeolus Substation.

1.2.3 Series Compensation Substation No. 2

Construction of proposed Series Compensation Substation No. 2 would consist of installation of circuit breakers and related switching equipment, bus supports, and other equipment to be installed for the 500kV transmission-line structures. Additional equipment, including 500kV series capacitors, shunt-reactor banks, and emergency generators along with all associated site preparation, fencing, foundations, protection, control, communications equipment, and metering would be installed. Locations for the series compensation stations have not yet been identified, but generally would be located approximately two-thirds the distance from the planned Aeolus Substation to the planned Clover Substation. Based on the Company's preferred route of approximately 400 miles, this places this station approximately 133 miles from both Clover Substation and Series Compensation Station No. 1.

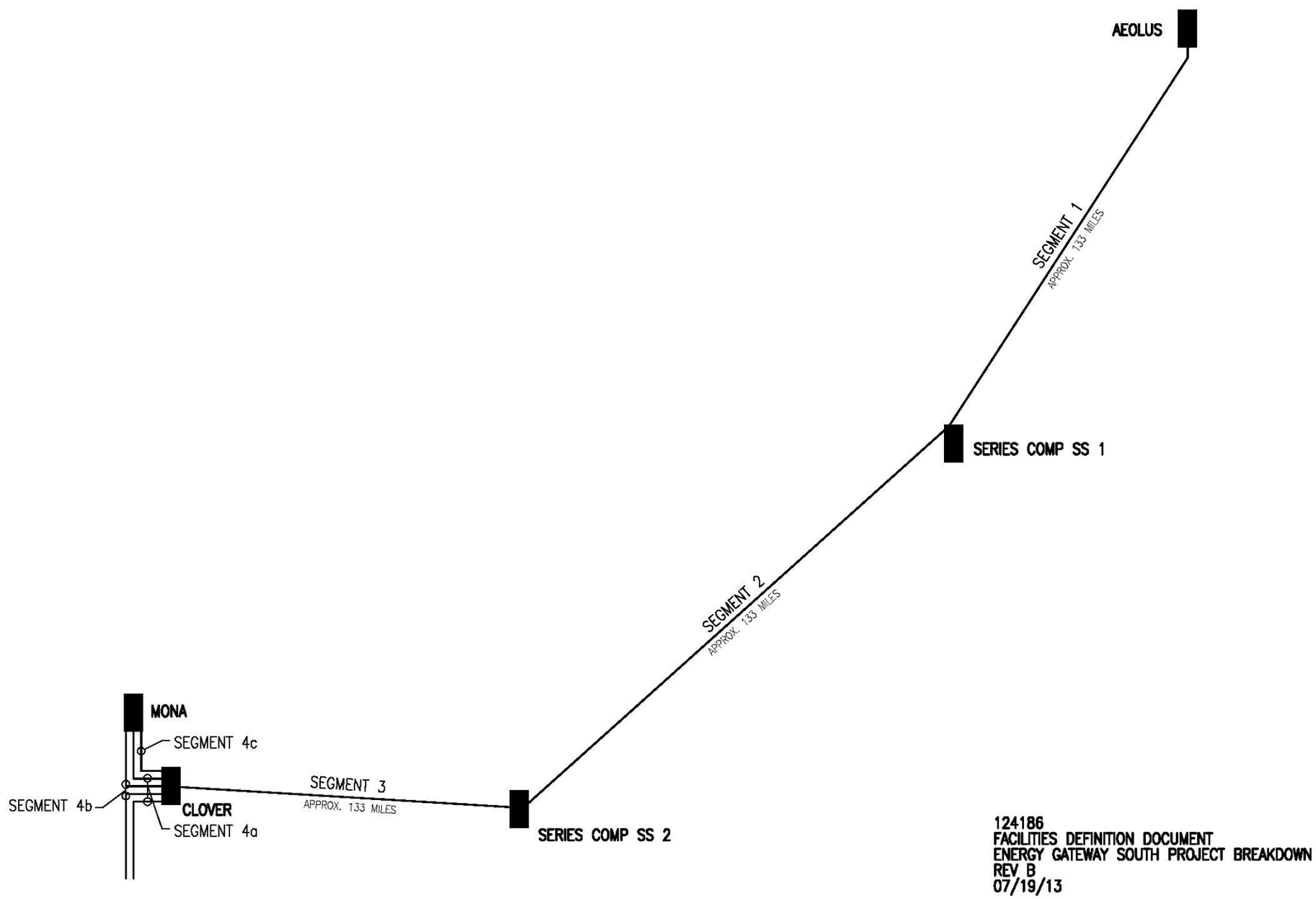
1.2.4 Clover Substation

Clover Substation is an existing facility of Gateway Central and has been permitted and assessed under previous National Environmental Policy Act (NEPA) documentation. Expansion of the existing facility, within the area previously permitted and assessed, is necessary to accommodate the equipment required to terminate the new 500kV and 345kV transmission lines into the substation. Major facility/equipment additions to Clover Substation include, but are not limited to, 500kV and 345kV related equipment; i.e., circuit breaker(s), shunt capacitor(s), series capacitor(s), and shunt reactor(s) along with all associated site preparation, fencing, foundations, steel substation towers, bus work, and protection and control metering.

1.2.5 Mona Substation

Changes to the existing Mona Substation occurring within the existing fence line include installation of new circuit breakers, protective relaying metering, substation structural members, and bus work to upgrade the Mona to Clover No. 1 and No. 2 transmission line bays. For Gateway South, it is anticipated that the current footprint of the Mona Substation will remain the same with no expansion of the substation required.

Figure 1 Project Layout Diagram



2 SYSTEM COMPONENTS

This section describes the various components of the transmission system for the Project, including the structures themselves, conductors used, other hardware needed, communication system, access to right-of-way, and, finally, the substations. Both the proposed and alternative structures are described below.

2.1 Transmission Structures

2.1.1 Types of Transmission Line Support Structures

The proposed transmission line circuits typically would be supported by the following types of structures: self-supporting single-circuit lattice steel and steel H-frame 500kV structures and steel H-frame, steel mono-pole single-circuit, and/or steel mono-pole double-circuit 345kV structures. Tangent structures are designed to support the conductors where the transmission-line angle at the structure location is typically 1 degree or less, meaning the transmission line is essentially a straight line. Very similar structures by appearance support the line at line angle (direction changes) up to about 30 degrees. A structure with more complex insulator assembles and heavier/stronger structures would be used when line angles are greater than 30 degrees.

500-KILOVOLT STEEL STRUCTURES

Lattice-steel structures, Figure 2, would be fabricated with galvanized steel members treated to produce a dulled galvanized finish. The average distance between 500kV structures, or span, would be 1,000 to 1,500 feet with occasional longer spans in rough terrain. Structure heights would vary depending on terrain and the requirement to maintain minimum conductor clearances from ground. The 500kV single-circuit structures would vary in height from 145 to 200 feet.

H-frame steel structures, Figure 3, would be fabricated as tubular self-weathering steel treatment to produce a rust-like finish. The average distance between 500kV structures would be 1,200 to 1,300 feet. Structure heights would vary depending on terrain and the requirement to maintain minimum conductor clearances from ground. The 500kV single-circuit H-frame structures would vary in height from 100 to 165 feet.

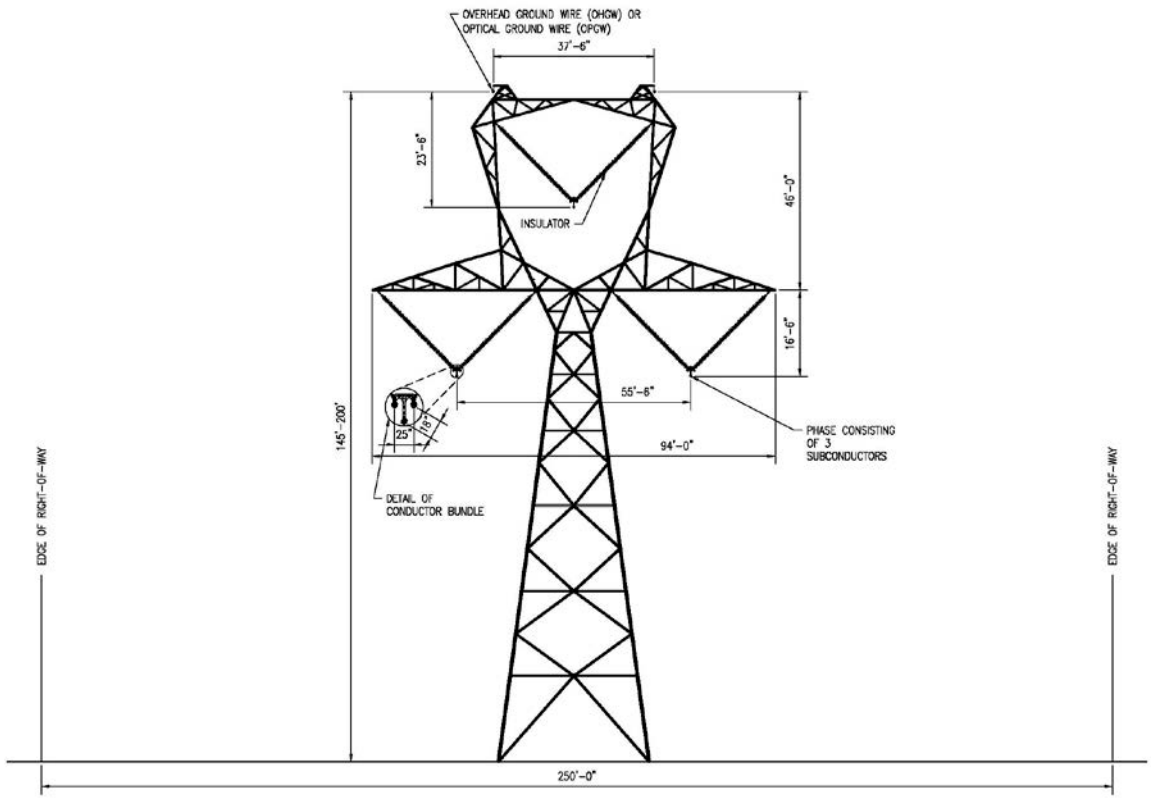


Figure 2 Proposed Tangent Single-circuit 500-kilovolt Lattice Steel Structure

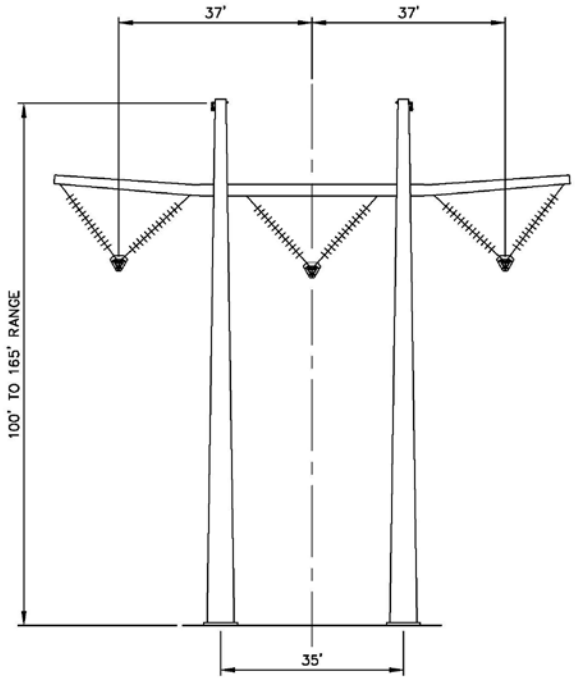


Figure 3 Proposed Tangent Single-circuit 500-kilovolt H-frame Structure

345-KILOVOLT STEEL STRUCTURES

The two existing and one proposed 345kV single-circuit transmission lines between the Clover and Mona substations (Segments 4a, 4b, and 4c) would use steel H-frame, steel mono-pole single circuit, and/or steel mono-pole double circuit 345kV structures (Figures 4, 5 and 6).

The 345kV structures would be steel H-frame, steel mono-pole single-circuit or steel mono-pole double-circuit structures depending on final design requirements. The steel H-frame structures would use self-weathering steel or a dulled galvanized steel finish. Weathering steel is manufactured from a group of steel alloys that were developed to eliminate the need for maintenance painting. This type of steel alloy forms a stable dark red-brown rust-like appearance after exposed to the weather for a few years. The average distance between H-frame structures would be approximately 800 to 1,200 feet. Typically, the 345kV single-circuit H-frame structures would have pole lengths ranging between 80 and 140 feet. Embedment depths are typically 10 percent of the pole length plus 5 feet, which in the case of this Project is expected to range between 13 and 19 feet.

The average span between single-circuit monopole structures would be approximately 700 to 800 feet. Structures would be set on a drilled-pier foundation. The structure heights above ground would vary from 85 to 130 feet.

The average distance between double-circuit monopole structures would be approximately 700 to 800 feet. Structures would be set on a drilled-pier foundation. The structure heights above ground would vary from 95 to 150 feet.

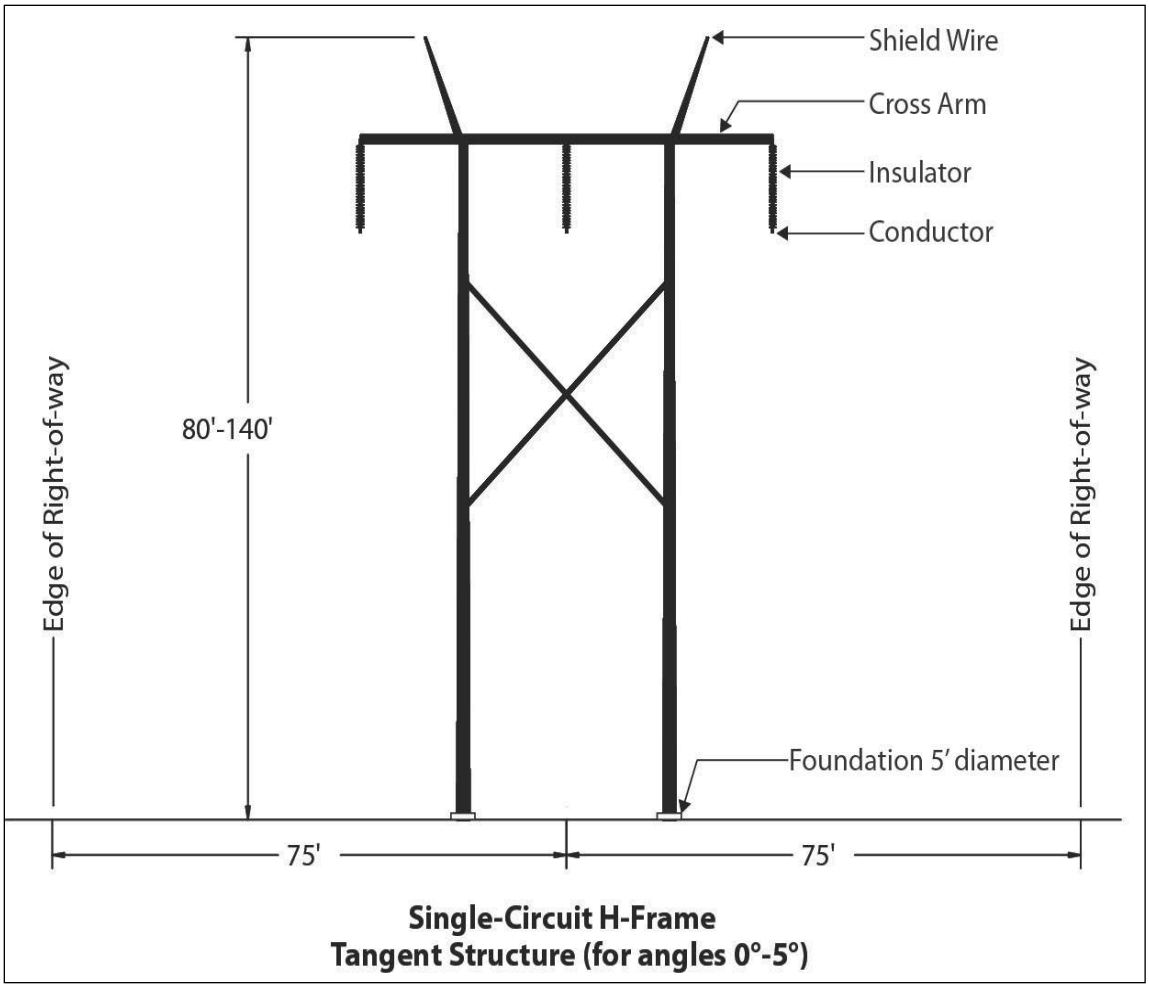


Figure 4 Proposed Tangent Single-circuit 345-kilovolt H-frame Structure

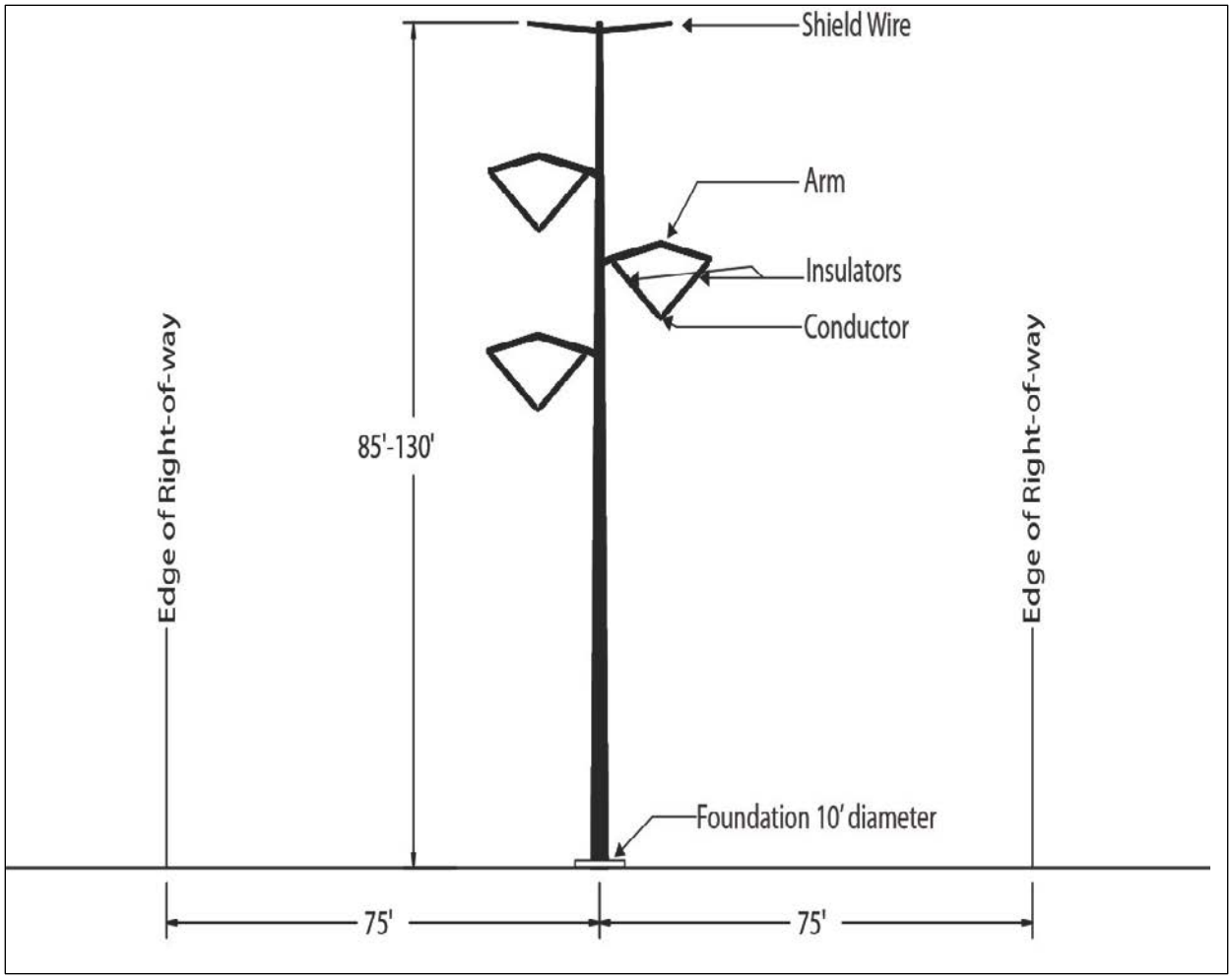


Figure 5 Proposed Single-circuit 345-kilovolt Mono-pole Tangent Structure (for angles 0°–5°)

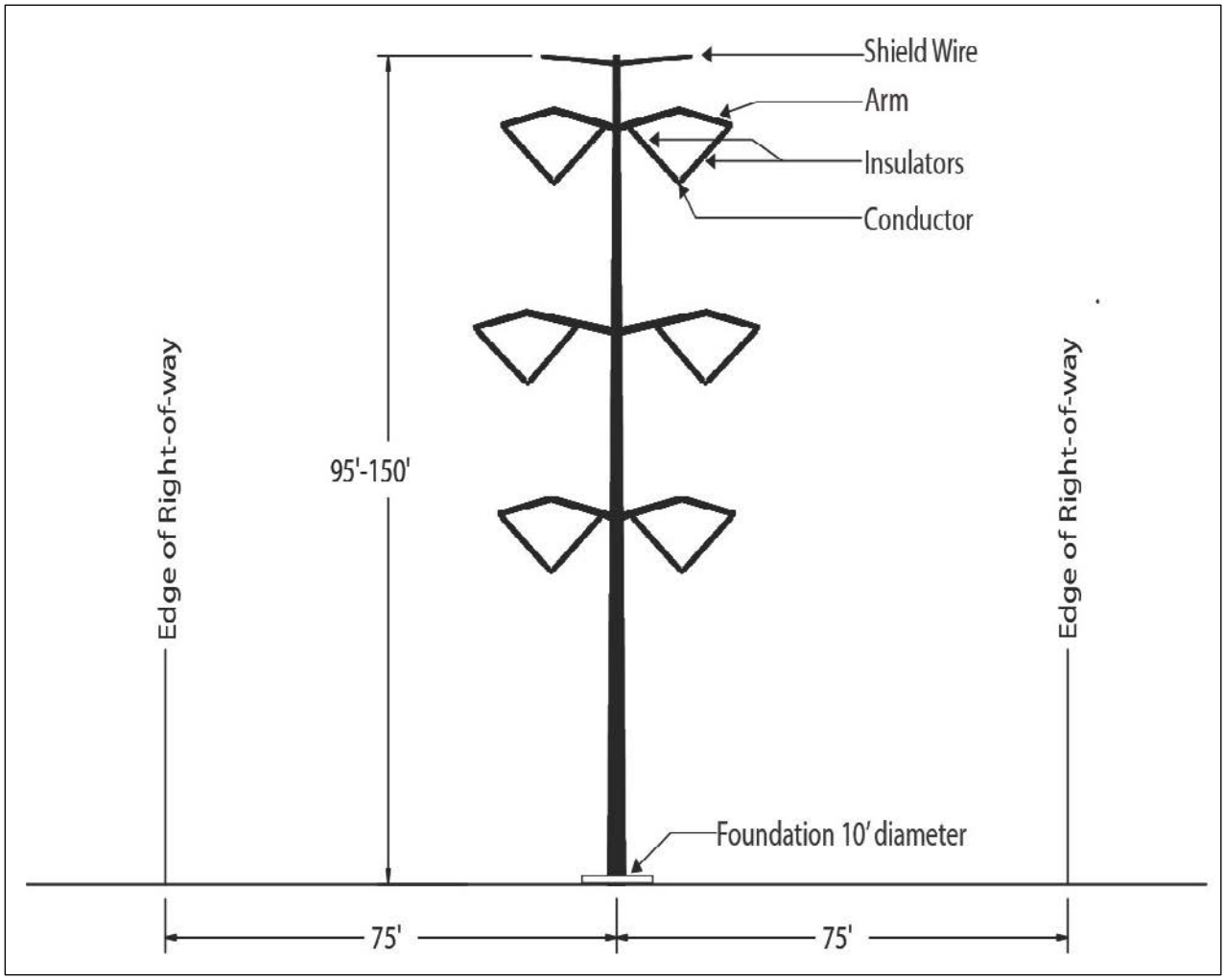


Figure 6 Proposed Double-circuit 345-kilovolt Mono-pole Tangent Structure (for angles 0°–5°)

2.1.2 Structure and Conductor Clearances

Conductor phase-to-phase and phase-to-ground clearance parameters are determined in accordance with the National Electrical Safety Code (NESC), ANSI C2, produced by the American National Standards Institute (ANSI) and are often supplemented by PacifiCorp's own standards that further address safety and performance criteria. The NESC code provides for minimum distances between the conductors and ground, crossing points of other lines and the transmission support structure and other conductors, and minimum working clearances for personnel during energized operation and maintenance activities (Institute of Electrical and Electronics Engineers [IEEE] 2007). Typically, the clearance of conductors above ground is no less than 35 feet for 500kV and no less than 30 feet for 345kV. During detailed design, clearances may be increased to account for localized and special conditions.

2.1.3 Structure Foundations

The 500kV single-circuit lattice-steel self-supported structures each require four foundations with one on each of the four corners of the lattice structures. The 500kV H-frame requires two foundations, one foundation for each tubular steel leg. The foundation diameter and depth for both steel-lattice and H-frame structures would be determined during final design and are dependent on the type of soil or rock present at each site; typical diameters and depths of foundation are shown in Table 1. Typically, the foundations for the self-supported single-circuit tangent lattice and H-frame structures would be composed of steel-reinforced concrete drilled piers.

Table 1
Typical 500-kilovolt Structure Type Foundation

Structure Type	Number of Foundations	Foundation Diameter (feet)	Foundation Depth (feet)	Area of All Foundations (square feet)
Tangent lattice	4	4.0	21.0	52.0
Small angle lattice	4	4.0	27.0	52.0
Medium angle lattice	4	4.0	30.0	52.0
Medium dead-end lattice	4	5.0	36.0	80.0
Heavy dead-end lattice	4	5.0	41.0	80.0
Tangent H-frame tubular steel	2	6.0	25.0	57.0
Angle H-frame tubular steel	2	7.0	30.0	77.0
Dead-end H-frame tubular steel	2	8.0	40.0	100.0

Depending on soil and tubular-steel structure type, the 345kV foundations would be either drilled-pier foundations or directly embedded. Typically, the tangent (no line angle change) 345kV single-circuit H-frame structures are directly embedded into the ground and do not require concrete foundations. The embedment depth is typically 10 percent of the pole length plus 5 feet. The diameter of the hole excavated for embedment is typically the pole diameter plus 18 inches. When a pole is placed in a hole, native or select backfill would be used to fill the voids around the perimeter of the hole.

Monopole 345kV single- and double-circuit structures would use a drilled-pier foundation. The foundation diameter and depth would be determined during final design and are dependent on the type of soil or rock present at each specific site. Typical foundation diameters and depths for the single-circuit and double-circuit mono-pole structure families are shown in Table 2.

Table 2 Typical 345-kilovolt Structure Type Foundations				
Structure Type	**Number of Foundations**	**Foundation Diameter (feet)**	**Foundation Depth (feet)**	**Area of All Foundations (square feet)**
Single Circuit				
Tangent H-frame	2	4.0	18.0	26.0
Tangent monopole	1	7.0	24.0	39.0
Small angle monopole	1	7.5	26.0	45.0
Medium dead-end lattice	1	4.0	20.0	13.0
Heavy dead-end lattice	1	4.0	25.0	13.0
Double Circuit				
Tangent monopole	1	8.5	32.0	57.0
Small angle monopole	1	9.0	34.0	64.0
Medium dead-end monopole	1	10.5	40.0	87.0
Heavy dead-end monopole	1	12.0	45.0	114.0

2.2 Conductors

2.2.1 Conductors for Segments 1, 2, and 3

The proposed conductor for the 500kV lines is 1,949.6 kcmil[2] 42/7 ACSR/TWD, "Athabaska/TW"[3]. Each phase of a 500kV three-phase circuit[4] would be composed of three sub-conductors in a triple bundle configuration. The individual 1,949.6 kcmil conductors would be bundled in a triangular configuration with spacing of 18 and 25 inches between sub-conductors (see Figure 11). The triple-bundled configuration is proposed to provide adequate current carrying capacity and to provide for a reduction in audible noise and radio interference as compared to a single large-diameter conductor. Each 500 kV sub-conductor would have a 42/7 aluminum/steel stranding, with an overall conductor diameter of 1.504 inches and a weight of 2.199 pounds per foot and a nonspecular finish[5].

2.2.2 Conductors for Segments 4a and 4b

The proposed conductor for the 345 kV lines, (Segments 4a, and 4b) is 1,272 kcmil 45/7 ACSR "Bittern." Each phase of the 345kV three-phase circuit would be composed of two sub-conductors. The individual 1,272 kcmil conductors would be bundled in a vertical configuration with spacing of 18 inches. The double-bundle configuration is proposed to provide adequate current carrying capacity and to provide for a reduction in audible noise and radio interference when compared to a single large-diameter conductor. Each 345kV conductor would have 45/7 aluminum/steel stranding, with an overall conductor diameter of 1.345 inches and a weight of 1.432 pounds per foot and a nonspecular finish.

[2] Kcmil (1,000 cmils) is a quantity of measure for the size of a conductor; kcmil wire size is the equivalent cross-sectional area in thousands of circular mils. A circular mil (cmil) is the area of a circle with a diameter of one thousandth (0.001) of an inch.
[3] Aluminum/steel refers to the conductor material composition. The preceding numbers indicate the number of strands of each material type present in the conductor (i.e., 42/7 aluminum/steel stranding has 42 aluminum strands wound around seven steel strands).
[4] For transmission lines, a circuit consists of three phases. A phase may consist of one conductor or multiple conductors (i.e., sub-conductors) bundled together.
[5] Nonspecular finish refers to a "dull" finish rather than a "shiny" finish.

2.2.3 Conductors for Segments 4c

The proposed conductor for the relocated Mona – Huntington 345kV transmission line loop into Clover Substation (Segments 4c) is 954 kcmil 54/7 ACSR "Cardinal." Each phase of the 345kV three-phase circuit would be composed of two sub-conductors in a double-bundle configuration. The individual 954 kcmil conductors would be bundled in a vertical configuration with spacing of 18 inches. The double-bundle configuration is proposed to provide adequate current carrying capacity and to provide for a reduction in audible noise and radio interference when compared to a single large-diameter conductor. Each 345kV conductor would have 54/7 aluminum/steel stranding, with an overall conductor diameter of 1.196 inches and a weight of 1.229 pounds per foot and a nonspecular finish.

2.3 Other Hardware

2.3.1 Insulators

As shown in Figure 4, insulator assemblies for 345kV H-frame tangent structures would consist of one insulator string hung vertically from the cross arm in the form of an "I."

As shown in Figures 2, 3, 5, and 6, insulator assemblies for the 345kV mono-pole structures and the 500kV tangent structures would consist of two strings of insulators normally in the form of a "V." The V-shaped configuration of the insulators restrains the conductor bundle from excessive swing into the structure in high winds allowing a more compact phase separation. Dead-end insulator assemblies for both 345kV and 500kV lines would use an I-shaped configuration, which consists of insulators hung from either a structure dead-end arm or a dead-end pole in the form of an "I." Insulators would be composed of grey porcelain or green-tinted toughened glass.

2.3.2 Grounding Systems

A grounding system would be installed at the base of each transmission structure that would consist of copper ground rods embedded into the ground in immediate proximity to the structure foundation and connected to the structure by a buried copper lead. When the resistance to ground for each transmission structure would be greater than 15 ohms with the use of ground rods, counterpoise would be installed to lower the resistance to 15 ohms or less. Counterpoise consists of a bare copper-clad or galvanized-steel cable buried a minimum of 12 inches deep, extending from structures (from one or more legs of structure) for approximately 200 feet within the right-of-way. During final design of the transmission line segments, appropriate electrical studies would be conducted to identify the issues associated with paralleling other facilities and the types of equipment that would need to be installed (if any) to mitigate the effects of the induced currents. In extremely rare situations where the soil conditions are nonresistant, the buried copper lead may need to be extended outside of the right-of-way. Coordination with the agencies would occur in these instances.

2.3.3 Minor Additional Hardware

In addition to the conductors, insulators, and overhead shield wires, other associated hardware would be installed on the structure as part of the insulator assembly to support the conductors and shield wires. This hardware would include clamps, shackles, links, plates, and various other pieces composed of galvanized steel and aluminum.

Other hardware that is not associated with the transmission of electricity may be installed as part of the Project. This hardware may include aerial marker spheres or aircraft warning lighting as required for the

conductors or structures per Federal Aviation Administration (FAA) regulations.[6] Structure proximity to airports and structure height are the determinants of whether FAA regulations would apply based on an assessment of wire/structure strike risk.

2.4 Communications Systems

2.4.1 Optical Ground Wire

Reliable and secure communications for system control and monitoring of Gateway South is very important to maintain the operational integrity of the Project and of the overall interconnected system. Primary communications for relaying and control would be provided via the optical ground wire (OPGW), for the Company's operation of the transmission system, which would be installed on the transmission lines. For the 500kV transmission lines, a secondary communications path would be provided by the Company's existing microwave system, which is currently installed from the Central Wyoming area to existing substations in central Utah. A secondary communications path also may be developed using a power line carrier for the Company's operation of the transmission system. No new microwave sites are anticipated for the Project. Updated microwave equipment may be installed at existing sites and at the substations.

Each structure would have two lightning-protection shield wires installed on the peaks of each of the 500kV single-circuit lattice-steel and H-frame structures (Figures 2 and 3). On the 345-kV H-frame structures, (Figures 4 through 6) these lightning-protection shield wires would be installed at the top of each pole. On both the 500kV and 345kV transmission lines where communication is required, one of the shield wires would be composed of extra-high-strength-steel wire with a diameter of 0.5 inch and a weight of 0.517 pound per foot. The second shield wire would be an OPGW constructed of aluminum and steel, which carries 48 glass fibers within its core. The OPGW would have a diameter of 0.64 inch and a weight of 0.375 pound per foot. The glass fibers inside the OPGW shield wire would provide optical data transfer capability among the Company's facilities along the fiber path for the Company's operation of the transmission system. The data transferred are required for system control and monitoring. On lines where communication is not required, both of the shield wires would be composed of the extra-high-strength steel wires. For Gateway South, all 500kV line segments would be designed to carry an OPGW. For the 345kV lines, Segment 4a would be designed to carry an OPGW.

2.4.2 Regeneration Stations

As the data signal is passed through the optical fiber cable, the signal degrades with distance. Consequently, signal regeneration stations are required to amplify the signals if the distance between substations or regeneration stations exceeds 55 miles. The exact locations cannot be determined at this time and would be based on the selected route.

A regeneration station may be housed within a substation control house in those cases where a substation is located along or near the final transmission route at an appropriate milepost. Otherwise, land must be obtained. Where a new site is required, the typical site would be 100 feet by 100 feet, with a fenced area of 75 feet by 75 feet. A 12-foot- by 32-foot- by 9-foot-tall building or equipment shelter (metal or concrete) would be placed on the site, and access roads to the site and power from the local electric distribution circuits would be required. An emergency generator with a liquid-petroleum-gas-fuel tank

[6] U.S. Department of Transportation, Federal Aviation Administration, Advisory Circular AC 70/7460-1K Obstruction Marking and Lighting, August 1, 2000; and Advisory Circular AC 70/7460-2K Proposed Construction or Alteration of Objects that May Affect the Navigable Airspace, March 1, 2000.

would be installed, in compliance with current regulations, at the site inside the fenced area. Two diverse communication cable routes (aerial and/or buried) from the transmission right-of-way to the equipment shelter would be required. Figure 7 illustrates the plan arrangement of a typical regeneration station.

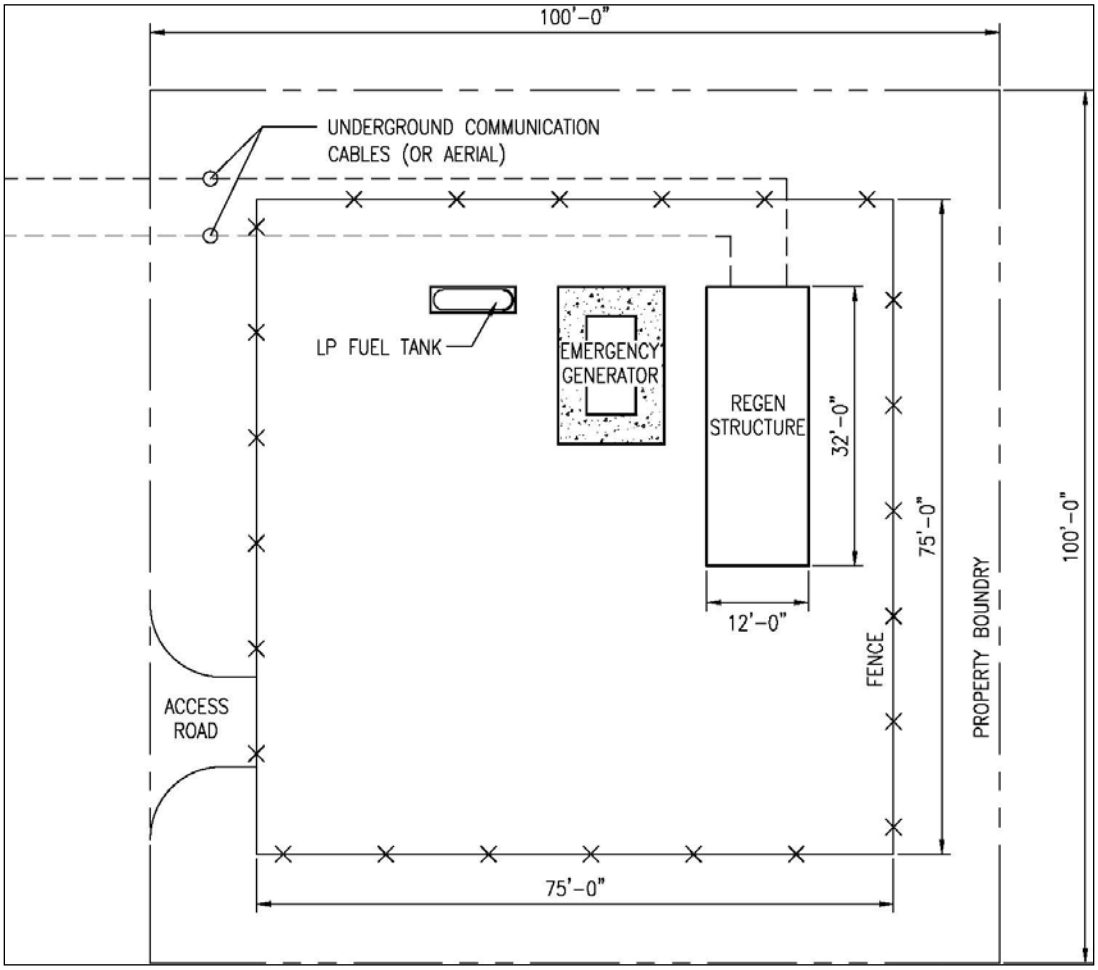


Figure 7 Typical Regeneration Station Site

2.5 Access to the Right of Way

Access to the right-of-way is an essential part of the construction and operation of the Project. Large foundation auger equipment, heavily loaded trucks, cranes, and specialized transmission-line construction equipment would be required for construction, maintenance, and emergency restoration activities. Annual ground-based inspections require vehicular access using four-wheel-drive trucks or four-wheel-drive all-terrain vehicles (ATVs) to each structure site. Section 4 (System Operation and Maintenance) describes in detail operational requirements.

During construction, vehicular access would be required to each structure. New access would be constructed and existing pathways widened as needed. Access not required after construction would be restored to the original condition or left as is, depending on landowner or land-management agency requirements.

Access construction employs heavy equipment including bulldozers, front-end loaders, dump trucks, water trucks, backhoes, excavators (both tracked and rubber-tired), and graders. Other specialized equipment, including boom trucks to install culverts in some areas, would be used where needed. Access would be built to provide a stable, permanent minimum 14-foot-wide travel surface. Depending on the side slope, disturbance width would be larger than 14-feet and can include cuts and fills, crowning and ditching, at-grade water bars, and various kinds of water-body crossings.

The largest of the heavy equipment needed, which dictates the minimum-needed road dimensions, is a truck-mounted aerial-lift crane 100,000 pounds gross-vehicle-weight eight-wheel-drive, 210-foot telescoped boom. Vehicle width is 8feet 6 inches (102 inches) or less and wheelbase is approximately 40 feet. To accommodate this equipment, the road specifications require a minimum 14-foot-wide road top (travel way) with minimum 16- to 22-foot-wide road width in turns. The required access disturbance area and travel way in areas of rolling to hilly terrain would require a wider disturbance to account for cuts and fills, or where vehicles are required to pass one another while traveling in opposite directions.

During routine operations (by four-wheel-drive truck and ATVs), vehicular access would be needed to each structure for periodic inspections and maintenance and to areas of forest or tall shrubs to control vegetation in the right-of-way for safe operation. In an emergency (i.e., in the event of a structure or conductor failure) full emergency access, including cranes and other heavy equipment, would be needed. Based on historical reliability of lattice structures and conductors, it is anticipated that only a small fraction of the structure sites would require emergency access over the life of the Project.

Following are access types anticipated to be used and or developed for the Project. The Company's typical water-body crossings standards are included as Attachment A of this appendix, Rocky Mountain Power's Transmission Construction Standard TA501.

Existing Roads – No Improvement: The Existing Roads – No improvement access-road type includes existing paved or all weather surfaced roads that meet the Company's construction road standards. The Company's construction-road standards include the use of a minimum travel surface width of 14 feet and require a travel-surface width of up to 22 feet depending on the radius of curves.

The Existing Roads - No Improvement access-road type includes existing maintained paved or all-weather surfaced roads that are able to be used in their current condition. The use of the term 'No-Improvement' is intended to signify that no additional new disturbance would be created outside of an established disturbed area. As such, the Existing Roads - No Improvement access-road type could include regular maintenance to make the road passable for construction. Regular maintenance could include, but is not limited to, minor blading activities, repair of washed out areas, wash-boarded areas, depressions requiring graveling, approach installation, and other minor improvements.

Existing Roads – Improvements Required: The Existing Roads - Improvements Required access-road type includes existing roads that require improvements to meet the Company's construction-road standards. The Existing Roads - Improvements Required access-road type includes existing roads that may require widening to a minimum 14 foot travel-surface width to meet the Company's construction-road standards. In areas of steep terrain, the road travel-surface width could be a maximum of 22 feet to meet the Company's construction-road standards, depending on radius of curves and the slope of the terrain. As a result, total disturbance has the potential to exceed 22 feet, depending on the slope of the terrain. Disturbed areas, as a result of cut-and-fill slopes, would exceed the travel-surface width in areas of steep terrain.

Improvements to this access-road type could include, but are not limited to, blading to create a road to meet the Company's construction-road standards, cut-and-fill activities, re-establishing drainage features,

tree removal, boulder and rock removal, bridge and culvert construction, installation of wash crossings, and other improvements to provide an adequate surface to support construction and maintenance vehicles.

Improvements to this access-road type may require reclamation to preconstruction conditions as determined by the land-management agency requirements or landowner requirements.

New Roads - Bladed: The New Roads – Bladed access-road type includes the construction of new permanent access roads where existing roads do not exist with the purpose of allowing for access to the Project right-of-way. New bladed access roads would be constructed to meet the Company's construction-road standards. The Company's road-construction standards include constructing a minimum travel-surface width of 14 feet. In areas of steep terrain, the road travel-surface width could be a maximum of 22 feet to meet the Company's construction-road standards, depending on radius of curves and the slope of the terrain. As a result, total disturbance has the potential to exceed 22 feet, depending on the slope of terrain. Disturbed areas, as a result of cut-and-fill slopes, would exceed the travel-surface width in areas of steep terrain.

New Roads – Overland Travel: The New Roads – Overland Travel access-road type includes new permanent access routes that would use Overland Travel with the purpose of allowing for access to the Project right-of-way. It is intended that Overland Travel access is used in areas where access can be attained without construction of roads according to the Company's access road standards. As such, overland travel would be used in areas of relatively flat topography. The result would be an access route that eventually would become a two-track trail or naturally revegetate completely, but still allow the Company's access without grading after construction.

Overland travel comprises the following two different methods:

- **Drive and Crush**, which is vehicular travel to access a site without significantly modifying the terrain. Vegetation is crushed, but not cropped, soil is compacted but no surface soil is removed. Even though vegetation may be damaged or destroyed, this creates vertical mulch on the surface soil and leaves the seed bank in place. Crushed vegetation would likely resprout after temporary use is stopped. A dozer, grader, or other type of equipment may be used to move boulders or other obstructions that prevent overland travel. Additionally, minor areas where the planned access crosses a side slope that exceeds the allowable slope for access by construction or maintenance vehicles, may be graded to provide safe passage. The disturbed area would be blended, to the extent practicable, into the existing grades and revegetated according to the prescribed mitigations.

- **Clear and Cut**, which is considered as above-grade removal of vegetation in order to improve or provide suitable access for equipment. All vegetation is removed using above-grade cutting methods that leave the root crown intact. Soils are compacted, but no surface soil is removed. A dozer, grader, or other type of equipment may be used to move boulders or other obstructions that prevent overland travel. Additionally, minor areas where the planned access crosses a side slope that exceeds the allowable slope for access by construction or maintenance vehicles, may be graded to provide safe passage. The disturbed area would be blended, to the extent practicable, into the existing grades and revegetated according to the prescribed mitigations.

Temporary Roads: The Temporary Roads access-road type is the temporary construction or use of roads to access a site and can include existing trails or two-track roads or overland travel access to support the construction of the Project and access the Project right-of-way. This access-road type may not require construction to meet the Company's road-construction standards. However, this access road type would be constructed to provide a safe travel way and, as such, temporary disturbance could result. Temporary

disturbance would be dictated by the underlying ground conditions, but disturbance could range from significant, such as blading/cut and fill activities, to minor, such as overland travel.

Unless otherwise noted by the land-management agency or landowner, this access-road type requires reclamation, to the extent practicable, to preconstruction conditions.

2.6 Series Compensation Substations

As mentioned in Section 1.2 of this appendix, two series compensation substations are planned. They are required to improve the transport capacity and efficiency of the transmission line. Locations for the stations have not been identified, as of the date of this Draft EIS; however, they would be located approximately one-third (Series Compensation Station No. 1) and two-thirds (Series Compensation Station No. 2) of the distance from the Aeolus Substation to the Clover Substation. The Company's preference is to site each series compensation station in-line with the transmission line. However, if directly routing the line through the station is precluded because of potential conflict with station site requirements, land use(s), or sensitive environmental resource, the line would diverge from centerline (but remain within a 4-mile-wide area) to provide a connection into and out of the series compensation station.

The following sections describe key components of series compensation substations.

2.6.1 Bay

A substation "bay" is the physical location within a substation fenced area where the high-voltage circuit breakers and associated steel transmission line termination structures, high-voltage switches, bus supports, controls, and other equipment are installed. For the 500kV transmission line, circuit breakers, high-voltage switches, bus supports, and transmission line termination structures typically would be installed. The tallest structures in the substations would be the 500kV dead-end structures, which vary in height from approximately 70 to 135 feet, and/or a microwave antenna tower, which would be 100 feet or more depending on the height needed to maintain line of sight to the nearest microwave relay site. Additional equipment including 500kV transformers and 500kV shunt reactors (which resemble a transformer in appearance), and 500kV shunt-capacitor banks would be installed.

Figure 8 is a perspective sketch illustrating the appearance of a typical 500kV substation with multiple line connections.

2.6.2 Access Road

Permanent all-weather access roads are required at the series compensation substation sites to provide access for personnel, material deliveries, vehicles, trucks, heavy equipment, low-boy tractor trailer rigs (used for moving large transformers), and ongoing maintenance activities at each site. Substation access roads are normally well-compacted, graded gravel roads approximately 20 feet wide with a minimum 110-foot turning radius to accommodate the delivery of large transformers to the site. New access roads would be developed from public roads to the two series compensation substations.

2.6.3 Control Building

One or more control buildings are required at each substation to house protective relays, control devices, battery banks for primary control power, and remote monitoring equipment. The size and construction of the building depends on individual substation requirements. Typically, the control building would be constructed of concrete block, pre-engineered metal sheathed, or composite surfaced materials. Special

control buildings may be developed within the series compensation substation developments to house other control and protection equipment.

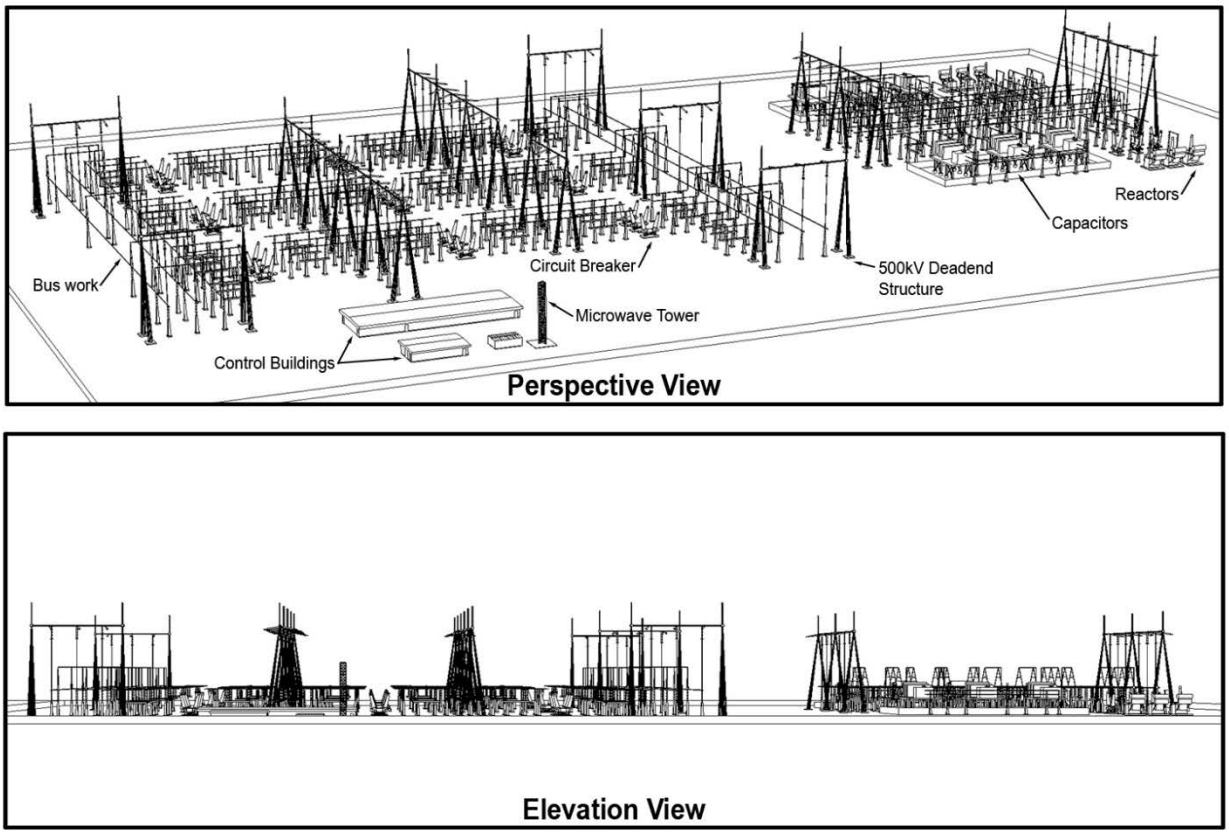


Figure 8 Typical 500-kilovolt Substation

2.6.4 Fencing

Security fencing would be installed around the entire perimeter of each series compensation substation to protect sensitive equipment and prevent accidental contact with energized conductors by third parties. This 7-foot-high fence would be constructed of chain link with steel posts, with 1 foot of barbed wire above the chain link and with locked gates.

2.6.5 Distribution Supply Lines

Station-service power would be required at each substation or regeneration station. Typically, station-service power is provided from a local electric distribution line, located in proximity to the substation or regeneration station. The voltage of the distribution supply line is typically 34.5kV or lower and carried on wood poles. For all new substations sites, it would be necessary to extend the electric distribution line from a suitable take-off point on the existing distribution line to the new Gateway South substation site or regeneration station. The location and routing of the existing distribution lines to the new substation sites would be determined during the final design process. Modifications to the existing distribution facilities may be necessary to provide increased capacity to support the expansions at the existing substation sites.

3 SYSTEM CONSTRUCTION

The following section and subsections describe land requirements and construction activities for the Project, including transmission line, series compensation substations, communication, and associated ancillary features.

All construction would be completed in accordance with the Project Construction Plan of Development (POD), which would be required as a condition of signing any federal land-use authorization (e.g., right-of-way grant, special-use permit, license agreement) and would be incorporated into such land-use authorization. The Construction POD will include such documents as:

- Traffic and Transportation Management Plan
- Stormwater Pollution Prevention Plan Framework
- Spill Prevention, Containment, and Countermeasures Plan Framework
- Historic Property Treatment Plan
- Blasting Plan Framework
- Plant and Wildlife Species Conservation Measures Plan
- Erosion, Dust Control, and Air Quality Plan
- Hazardous Materials Management Plan Framework
- Emergency Preparedness and Response Plan Framework
- Noxious Weed Management Plan
- Fire Protection Plan
- Stream, Wetland, Well, and Spring Protection Plan
- Paleontological Resources Treatment Plan
- Reclamation, Revegetation, and Monitoring Framework Plan

The Construction POD also will include more detailed descriptions of construction activities and requirements.

3.1 Land Requirements and Disturbance

3.1.1 Right-of-Way Width

The Company proposes to acquire a permanent 250-foot-wide right-of-way for the 500kV single-circuit sections of the Project, and a 150-foot-wide right-of-way for the 345kV single-circuit Segment 4c of the Project. Segments 4a and 4b would be in existing right-of-way. The determination of these widths is based on two criteria:

- Sufficient clearance in the span between support structures to obstacles outside the right-of-way must be maintained during a high wind event when the conductors are blown towards the right-of-way edge.

- Sufficient room must be provided within the right-of-way at the support structures to perform transmission line maintenance. See Subsection 4.1 of this document for details of maintenance requirements.

During construction, temporary permission and/or right-of-way would be required from landowners and land-management agencies during construction of temporary components of the Project such as multi-purpose construction yards and helicopter fly yards. During operation, Project land requirements would be restricted to the right-of-way, access roads, series compensation substations, and communication facilities. Access to the right-of-way would be in accordance with the land rights obtained as part of the grant or easement acquisition process. As further details of the final Project design are engineered, the amount of land required may change.

3.1.2 Right-of-Way Acquisition

Rights-of-way for transmission line facilities on private lands would be obtained as perpetual easements. Land for series compensation substations or regeneration stations would be obtained in fee simple where located on private land. Every effort would be made to purchase the land and/or obtain easements on private lands through reasonable negotiations with the landowners. All negotiations with landowners would be conducted in good faith, and the Project's effect on the parcel or any other concerns the landowner may have would be addressed.

In order to achieve the capacity needed to serve present and future loads within the Company's service areas, the North American Electricity Reliability Corporation (NERC) and Western Electricity Coordinating Council (WECC) reliability standards require minimum separation from existing transmission lines that serve substantially the same load as that served by each of the new Gateway South transmission segments. In these cases, it is the Company's minimum separation guideline that the Gateway South transmission line be located at least one span length from the nearest existing 230kV or higher-voltage transmission lines. Land between rights-of-way that are separated to meet reliability criteria would not be encumbered with an easement, but could be limited in some land uses due to the proximity of two or more large transmission lines.

3.1.3 Land Disturbance

Table 3 includes disturbance dimensions of land from construction and operation activities for the Project.

Table 3
Summary of Land Disturbance Required for Construction and Operation of the 500- and 345-kilovolt Transmission Lines

Feature	Description
500kV Transmission Line	
Line length	Approximately 400 to 540 miles (depending on route selected)
Span length	Self-supporting steel-lattice 1,000 to 1,500 feet
	H-frame 1,200 to 1,300 feet
Structures per mile	Self-supporting steel-lattice approximately 4 to 5
	H-frame approximately 4
Right-of-way width	250 feet
Land Temporarily Disturbed	
Structure work area	250 by 250 feet per structure
Wire-pulling/tensioning	250 by 400 feet; two every 3 to 5 miles
Splicing sites	100 by 100 feet every 9,000 feet
Guard structures	150 by 75 feet; approximately 1.4 structures per 1 mile

Table 3 Summary of Land Disturbance Required for Construction and Operation of the 500- and 345-kilovolt Transmission Lines	
Feature	**Description**
Multi-purpose construction yards	30-acre site located approximately every 20 miles on private and/or public land (locations to be determined) [1]
Helicopter fly yards	15-acre site located approximately every 5 miles[2]
Access roads (improve existing, spur, and new)	Improve existing, spur, and new roads would be a minimum of 14-foot-wide travel surface (in steeper terrain the travel surface width could be a maximum of 22 feet for radius of curves) plus disturbance for grading and drainage features (total distance to be determined)
Land Permanently Required	
Area occupied by structure (pad)	60 by 60 feet per structure (self-supporting steel-lattice)
Series compensation stations	Two at 160 acres each
Communication regeneration station	100 by 100 feet with 75- by 75-foot fenced areas and a 12- by 32-foot building; one station approximately every 55 miles
Access roads (improve existing, spur, and new)	Improved existing, spur, and new roads would typically have a 14-foot-wide travel surface (in steeper terrain the travel surface width could be a maximum of 22 feet for radius of curves) plus disturbance for grading and drainage features (total distance to be determined)
345kV Transmission Lines	
Line lengths	Three segments totaling approximately 6.6 miles
Span length	H-frame – to 1,200 feet
	Single- and double-circuit mono-pole – 700 to 800 feet
Structures per mile	H-frame approximately 4 to 7 per mile
	Single- and double-circuit mono-pole approximately 6 to 8 per mile
Right-of-way width	Segments 4a and 4b on existing right-of-way, Segment 4c 150 feet
Land Temporarily Disturbed	
Structure work area	150 by 200 feet per structure
Wire-pulling/tensioning	150 by 400 feet; one site located at each end of Project
Splicing site	100 by 100 feet; one site for segments 4a and 4b
Guard structures	150 by 75 feet approximately 1.4 structures per 1 mile
Multi-purpose construction yards	10-acre site; one site located near Clover Substation
Helicopter fly yard	15-acre site located near Clover Substation (location to be determined)[2]
Access roads (improve existing, spur, and new)	Improve existing, spur, and new roads would be 14 feet wide
Land Permanently Required	
Area occupied by structure (pad)	5 by 40 feet per structure (H-frame)
Access roads (improve existing, spur, and new)	Improve existing, spur, and new roads would be 14 feet wide

NOTES:
[1]Multi-purpose construction yards include concrete batch plants, which would occur approximately every 60 miles except in areas where the Project could be serviced by existing concrete batch plants. Helicopter landing and refueling also would occur in the multi-purpose construction yards.
[2]Helicopter fly yards, which are used to transport materials to structure work areas during construction, also may include space dedicated for refueling helicopters.

3.2 Transmission Line Construction

The following sections describe the transmission-line construction activities and procedures for Gateway South. Figure 9 illustrates the transmission line construction sequence. Substation construction is described in Subsection 2.4 of this appendix. Various construction activities would occur during the

construction process, with several construction crews operating simultaneously at different locations on three transmission line segments (spreads).

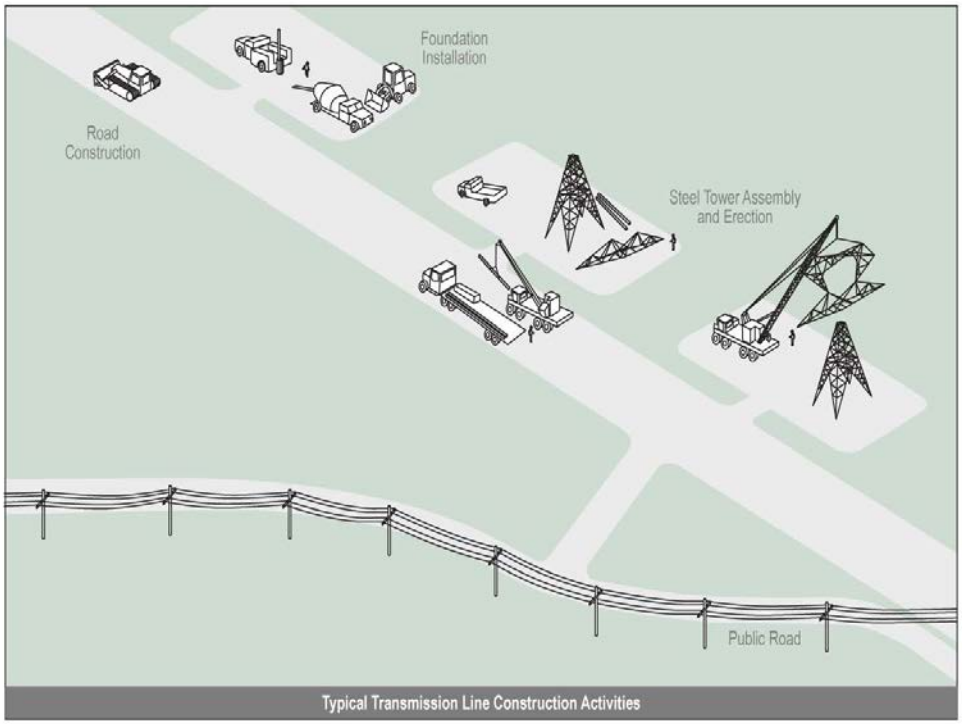


Figure 9 Transmission Line Construction Sequence

Approximately 400 to 540 miles (depending on alternative route selected) of 500kV transmission lines and associated support structures would be constructed, between Aeolus Substation and Clover Substation. Less than 10 miles of three segments (Segments 4a, 4b, and 4c) would be 345kV construction between the Clover and Mona substations.

3.2.1 Transmission Line System Access

Construction of the 500kV and 345kV transmission lines would require vehicle, truck, and crane access to each new structure site for construction crews, materials, and equipment. Similarly, construction of other Project components such as staging yards and substation sites would require vehicle access.

Transmission line right-of-way access would be a combination of new access, improvements to existing access, and use of existing access as is. New access or improvements to existing access would be constructed using a bulldozer or grader, followed by a roller to compact and smooth the ground. Front-end loaders would be used to move the soil locally or off site. Typically, access to the transmission line right-of-way and structure sites requires a 14-foot-wide travel way for straight sections and a 16- to 22-foot-wide travel way at curves to facilitate safe movement of equipment and vehicles. However, in certain areas, access widths through curves may exceed 22 feet. Wherever possible, new access would be constructed within the proposed transmission line right-of-way, or existing access would be used. In other cases, access would be required between the proposed transmission line and existing access. Erosion control and sedimentation measures such as crossroad drainage, at-grade water bars, culverts, sediment basins, or perimeter control would be installed as required to minimize erosion during and subsequent to construction of the Project.

After Project construction, existing and new permanent access would be used by maintenance crews and vehicles for inspection and maintenance activities. New access created to construct structures would be revegetated only. Temporary construction access not required for future maintenance would be restored after completion of Project construction. For example, access to multi-purpose yards (see description below) would not be required once the yard is regraded and vegetated. Gates (or other barriers) would be installed as required to restrict unauthorized vehicular access to the right-of-way. Access retained for operations would be seeded with a seed mix required by the agencies and allowed to revegetate. For normal maintenance activities, an 8-foot-wide portion of access would be used and vehicles would drive over the vegetation. For nonroutine maintenance requiring access by larger vehicles, the full width of the access may be used. Access areas would be repaired, as necessary, but not be routinely graded. Vegetation (e.g., taller shrubs and trees) that may interfere with the safe operation of equipment would be managed on a cyclical basis.

3.2.2 Geotechnical Investigations within the Right-of-way

The purpose of the geotechnical investigation is to perform tests and collect samples to aid in preparation of soil parameters to be used in the final design of structure foundations. This activity is necessary help ensure the system is designed and constructed to be safe, reliable, cost efficient, and can reduce the overall temporary and permanent land disturbance within the right-of-way during initial build and the life of the Project.

The geotechnical investigations would consist of the drilling and sampling of soils to a typical depth of 50 to 60 feet below the existing ground. The borehole depth may exceed 60 feet if soil conditions indicate. The boreholes would have a diameter of approximately 8 inches and typically would be backfilled with auger cuttings and on-site soils. Access roads and overland access routes as designed for the final right-of-way grant would be used exclusively.

Helicopter and/or manually transported drill rigs may be used for geotechnical exploration in areas where existing roads do not provide adequate access or where overland travel is prohibited. Geophysical exploration techniques would be employed to assist in subsurface characterization. Geophysical techniques cannot replace drilling. One form of geophysical testing, refraction microtremor (ReMi) uses instrumentation combined with surface actuation to identify subsurface soil and rock stratification. The actuation can be low impact, such as a person jumping up and down. However, a larger actuation, such as that produced by a hammer striking a steel plate lying on the ground, provides more detail in the testing.

The geotechnical investigation would be conducted at both substation/series compensation locations and along the transmission line right-of-way. A description of activities is provided below broken down by facility and type of drilling to accomplish the geotechnical investigation.

The geotechnical exploration program for the transmission line planned according to the Company's standard TA 071. Explorations are specified at all planned angle points and dead-ends, intervals not to exceed 3 miles in long tangent sections of the line, and any additional locations needed to address areas of concern identified in the Geotechnical Desktop Report. The geotechnical exploration for this Project is anticipated to consist of site examinations, access to the bore site by a drill rig and support vehicles, geotechnical drilling, down-hole geotechnical testing, select geophysical surveys, and laboratory testing. In general, drilling depths are anticipated to be 50 to 60 feet. If competent bedrock is encountered, coring would be advanced 5 to 15 feet into competent rock. Access to the boreholes would be made along routes selected and analyzed in the Project EIS. All disturbance associated with the geotechnical exploration program is to be contained completely within the area analyzed for disturbance associated with the transmission line construction.

GEOTECHNICAL DRILLING ACTIVITIES

Anticipated drilling methods to accomplish the exploration depths described above include the following.

Hollow Stem Auger Drilling

Auger drilling consists of rotating a hollow drill stem to advance a toothed bit into the subsurface materials. The materials are brought up from the borehole by the rotation of a continuous helical fin on the outside of the drill stem. The drill stem is added in pieces (flights) as the boring advances downward. This is a dry method of drilling that typically requires no water, drilling mud, or pressurized air as a circulating fluid. The support equipment for auger drilling includes a water truck, either truck or track mounted, and the geologist/engineer's vehicle.

Mud Rotary Drilling

Mud rotary drilling consists of rotating a smooth-walled hollow drill stem and advancing a variety of drill bits at the end of the drill stem. The materials are brought up from the borehole by pumped water, typically travelling down through the drill stem, out the bit, and flowing up the outside of the drill stem. The drilling mud and/or water pumped through the rods carries drill cuttings to the ground surface. A tub at the surface collects the drill cuttings and holds the water for recirculation. The equipment for mud rotary drilling includes the drill rig, a support vehicle for rods and equipment, a water truck, and the geologist/engineer's vehicle.

Air Rotary Drilling

The air rotary drilling method is similar in principle to mud rotary drilling. However, this method uses compressed air as the circulating medium rather than water or mud slurry. Drill cuttings are retrieved from under a hood placed over the borehole or a cyclone. A special type of air rotary drilling involves the use of an air hammer. Compressed air is pumped through the drill pipe to an air hammer bit in the borehole. The pneumatic bit strikes the rock very rapidly. The equipment for air rotary drilling includes the drill, a support vehicle with drilling steel towing an air compressor, and the geologist/engineer's vehicle.

Sonic Drilling

Sonic drilling uses a rotating drill string as with other drilling methods; however, this method uses a sonic drill head to impart a high-frequency vibration on the drill stem and open pipe casing/core barrel that is advanced into the subsurface materials. As the casing is advanced, soil and rock samples are forced up into the casing, providing a continuous sample of the subsurface soil and rock. The frequency of vibration can be changed to match the subsurface conditions, making this type of drilling generally faster than the other drilling methods. Sonic drills are normally mounted on larger transport vehicles. The support equipment for sonic drilling included a vehicle to carry the drill, a support vehicle for rods, and the geologist/engineer's vehicle.

Under-Reamer Type Drilling (ODEX System)

The under-reamer drilling method uses tooling in which an outer drill casing is advanced along with the drill bit (more or less simultaneously, depending on the manufacturer). The drill bit has a section that moves outward through eccentric action when the drill rods are rotated, thereby making the borehole larger than the casing. The larger-diameter hole allows the casing to follow along behind the bit by being hammered or pushed as the hole is drilled. The bit is typically a tungsten carbide button bit that is driven by a percussion air hammer during rotation. A common name for this type of drilling is ODEX, which is an acronym for overburden drilling with eccentric bit. Drill cuttings are removed by compressed air travelling down the drill rod to the bit and returning via the annulus between the drill rod and casing lifting the cuttings to the surface. The air path can be reversed similar to the method used by reverse circulation drilling. The support equipment for under-reaming drilling includes an air compressor, a support vehicle to carry casing, and the geologist/ engineer's vehicle.

Cone Penetration Test Drilling

The cone penetration test (CPT) is a testing method used to determine the engineering properties of soils and delineate soil lithology. The test method consists of pushing an instrumented cone at a constant rate. The instruments measure tip (cone) resistance and friction resistance along the sides. The CPT delineates soil layers from the ratio of cone to side friction resistance. CPT drilling provides excellent geotechnical information in softer formations but typically reaches refusal in soils with gravel, medium dense sands or hard fine grained soils. The CPT drill typically is mounted in a box truck or on a track/all-terrain rig. The support equipment for CPT drilling includes a support truck for equipment, and the geologist/engineer's vehicle.

Drilling Rig Types

The drilling equipment described above is commonly mounted on road-legal two-wheel-drive and four-wheel-drive trucks, tracked vehicles, an oversized-tire ATV, or on platform rigs. Platform rigs can be transported in pieces to the site via helicopter. Additionally, a man-portable drill rig may be used where access is not available. This rig type is transported, in pieces, as closely as possible to the borehole site using road-legal vehicles or off-highway vehicles. The pieces are packed into the site by personnel or livestock and assembled on site to perform the drilling. The type of drilling rig used is dependent on the access difficulties to the borehole location and the sampling methods required. Other vehicles and equipment normally mobilized to each boring location may include a water truck and/or support vehicle, large air compressor, geologist's pickup truck or utility vehicle, and possibly another support truck. In some areas, earthwork equipment may be required to assist with access to the boring location. Tracked support vehicles including the water truck may be required. The drilling subcontractor must be equipped to provide drilling vehicles as demanded by access requirements and the terrain.

3.2.3 Multi-purpose Yards

Construction of Gateway South would begin with the establishment of multi-purpose yards along the Project alignment. The multi-purpose yards would serve as field offices; reporting locations for workers; parking space for vehicles and equipment; and sites for material storage, fabrication assembly, concrete batch plants, and stations for equipment maintenance. The yards, about 30 acres each for 500kV transmission-line construction and one 10-acre site in the Clover Substation area for 345kV transmission-line construction, would be located near each end of each segment of the transmission-line right-of-way, and approximately every 20 miles along the route. Additionally, helicopter fly yards for helicopter operations would be located approximately every 5 miles along the route where helicopter construction is

planned, and would occupy approximately 15 acres each. Lighting would be the minimum required to meet safety and security standards.

Multi-purpose yards and helicopter fly yards may be fenced, have locked gates and may have security guards stationed where needed. Yard locations would be finalized following discussion with the land-management agency or negotiations with landowners. In some areas, the multi-purpose yards may need to be scraped by a bulldozer and a temporary layer of rock laid to provide an all-weather surface. Unless otherwise directed by the land-management agency or landowner, the rock would be removed from the yards upon completion of construction and the area would be restored.

Typically, helicopter fly yards would be located in relatively flat areas with easy, existing access to minimize site grading and new road construction. When possible, these areas would be located in previously disturbed sites or in areas of minimal vegetative cover.

3.2.4 Site Preparation

Individual structure work areas would be cleared to install the transmission-line support structures and facilitate access for future transmission line and structure maintenance. Clearing of individual structure work areas would be required to install the structures. Clearing individual structure sites would be done using a bulldozer to blade the required area, and to the extent practical, blading of native plant communities would be minimized. At each single-circuit 500kV structure location, an area approximately 250 feet by 250 feet would be needed for construction laydown, structure assembly, and erection at each structure site, depending on slope. An area approximately 150 feet by 200 feet would be required for 345kV structure locations. This area would provide a safe working space for placing equipment, vehicles, and materials. For all structure types, the structure work area would be cleared of vegetation only to the extent necessary and any removal of topsoil would be stockpiled and stabilized to limit erosion. After construction, all areas not needed for normal transmission line maintenance, including fire and personnel safety clearance areas, would be graded to blend as near as possible with the natural contours, topsoil replaced, then revegetated as required.

Additional equipment may be required if solid rock is encountered at a structure location. Rock-hauling, hammering, or blasting may be required to remove the rock. Excess rock that is too large in size or volume to be spread at the individual structure sites would be hauled away and disposed of at approved locations or at a location specified by the landowner.

3.2.5 Install Structure Foundations

Each 345kV H-frame typically would require the poles be directly embedded in the ground. Holes would be drilled in the ground using a truck- or track-mounted auger. When the pole is placed in the hole, native or select backfill would be used to fill the voids around the perimeter of the hole. When backfill must be imported, material would be obtained from commercial sources or from areas free of noxious weed species. Similarly, where solid rock is encountered, blasting may be required.

Each 345kV mono-pole support structure and 500kV steel H-frame structure would require the installation of foundations, which typically are drilled concrete piers. The holes would be drilled using truck- or track-mounted augers of various sizes depending on the diameter and depth requirements of the hole to be drilled. Each foundation would extend approximately 2 feet above the ground level.

Where solid rock is encountered, blasting, rock hauling, or the use of a rock anchoring or micro-pile system may be required. Micro-piles are high capacity, small diameter (5-inch to 12-inch) drilled and grouted in-place piles designed with steel reinforcement to primarily resist structural loading. The rock

anchoring or micro-pile system would be used in areas where site access is limited or adjacent structures could be damaged as a result of blasting or rock-hauling activities.

In environmentally sensitive areas with very soft soils, additional equipment such as a HydroVac, which uses water pressure and a vacuum, may be used to excavate material into a storage tank. Alternatively, a temporary casing may be used during drilling to hold the excavation open, after which the casing is withdrawn as the concrete is placed in the hole. In areas where it is not possible to operate large drilling equipment due to access or environmental constraints, hand digging may be required.

Reinforced steel anchor-bolt cages would be installed after excavation and prior to structure installation. These cages are designed to strengthen the structural integrity of the foundations and would be assembled at the nearest multi-purpose yard and delivered to the structure site via flatbed truck or helicopter. These cages would be inserted in the holes prior to pouring concrete. The excavated holes containing the reinforcing anchor bolt cages would be filled with concrete.

LATTICE STEEL STRUCTURE FOUNDATIONS

Each 500kV support structure would require the installation of foundations, which typically are drilled concrete piers. First, four holes would be excavated for each structure. The holes would be drilled using truck- or track-mounted augers of various sizes depending on the diameter and depth requirements of the hole to be drilled. Each foundation would extend approximately 2 feet above the ground level.

Where solid rock is encountered, blasting, rock hauling, or the use of a rock anchoring or micro-pile system may be required. Micro-piles are high capacity, small diameter (5-inch to 12-inch) drilled and grouted in-place piles designed with steel reinforcement to primarily resist structural loading. The rock anchoring or micro-pile system would be used in areas where site access is limited or adjacent structures could be damaged as a result of blasting or rock-hauling activities.

In environmentally sensitive areas with very soft soils, additional equipment such as a HydroVac, which uses water pressure and a vacuum, may be used to excavate material into a storage tank. Alternatively, a temporary casing may be used during drilling to hold the excavation open, after which the casing is withdrawn as the concrete is placed in the hole. In areas where it is not possible to operate large drilling equipment due to access or environmental constraints, hand digging may be required.

Reinforced-steel anchor bolt cages would be installed after excavation and prior to structure installation. These cages are designed to strengthen the structural integrity of the foundations and would be assembled at the nearest Yard and delivered to the structure site via flatbed truck or helicopter. These cages would be inserted in the holes prior to placing concrete. The excavated holes containing the reinforcing anchor bolt cages would be filled with concrete.

Typically, and because of the remote location of much of the transmission line route, concrete would be provided from portable batch plants set up approximately every 60 miles along the line route in one of the multi-purpose yards. Concrete would be delivered directly to the site in concrete trucks with a capacity of up to 10 cubic yards. In the more developed areas along the route and in proximity to the substations, the construction contractor may use local concrete providers to deliver concrete to the site when economically feasible.

3.2.6 Erect Support Structures

The 500-kV lattice-steel and H-frame structures would be assembled on site, except where helicopter delivery is employed. Steel members for each structure would be delivered to the site by flatbed truck. Assembly would be facilitated on site by a truck-mounted crane. Subsequent to assembly, the structures

would be lifted onto foundations using a large crane designed for erecting structures. The crane would move along the right-of-way from structure site to structure site erecting the structures.

The 345kV H-frame, single-circuit and double-circuit mono-pole structures would be framed on site. Two methods of assembly can be used to accomplish this, the first of which is to assemble the poles, braces, cross arms, hardware, and insulators on the ground. A crane is then used to set the fully framed structure by placing the poles in the excavated holes. Alternatively, aerial framing can be used by setting the poles in the ground first and assembling the braces, cross arms, hardware, and insulators in the air. A crane would move along the right-of-way from structure site to structure site setting the structures.

3.2.7 String Conductors, Shield Wire, and Fiber Optic Ground Wire

Conductor, shield wire, and OPGW would be placed on the transmission-line support structures by a process called stringing. The first step to wire stringing would be to install insulators (if not already installed on the structures during ground assembly) and stringing sheaves. Stringing sheaves are rollers that are attached temporarily to the lower portion of the insulators at each transmission line support structure to allow conductors to be pulled along the line. Figure 10 illustrates the sequence of steps in installing conductors.

Additionally, temporary clearance structures (also called guard structures) would be erected where required prior to stringing any transmission lines. The temporary clearance structures typically are vertical wood poles with cross arms and are erected at road crossings or crossings with other energized electric and communication lines to prevent contact during stringing activities. Bucket trucks also may be used to provide temporary clearance. Bucket trucks are trucks fitted with a hinged arm ending in an enclosed platform called a bucket, which can be raised to let the worker in the bucket service portions of the transmission structure as well as the insulators and conductors without climbing the structure.

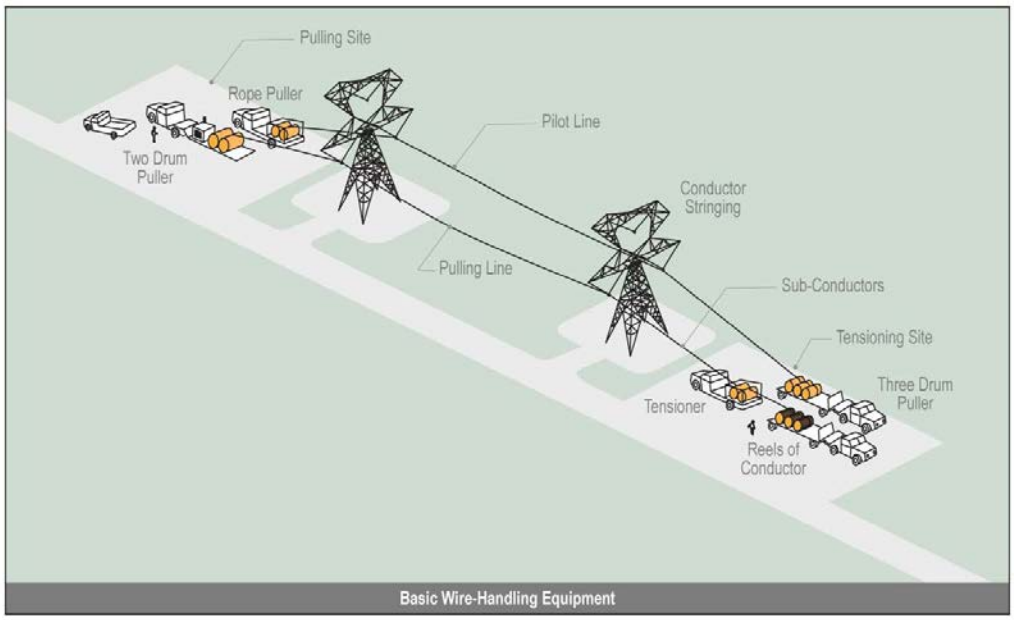


Figure 10 Conductor Installation

Once the stringing sheaves and temporary clearance structures are in place, the initial stringing operation would commence with the pulling of a lighter weight sock line through the sheaves along the same path the transmission line would follow. Typically, the sock line is pulled in via helicopter. The sock line is

attached to the hard line, which follows the sock line as it is pulled through the sheaves. The hard line would be attached to the conductor, shield wire, or OPGW to pull them through the sheaves into their final location. Pulling the lines may be accomplished by attaching them to a specialized wire stringing vehicle. Following the initial stringing operation, pulling and tensioning the line would be required to achieve the correct sagging of the transmission lines between support structures.

Line splicing sites for 500kV construction would be required approximately every conductor length on a standard size reel (approximately 9,000 feet) along the right-of-way and would measure approximately 100 by 100 feet with two wire pulling-and-tensioning sites occurring approximately every 3 to 5 miles measuring 250 by 400 feet each to accommodate required equipment. A pulling–and-tensioning site would be needed for each of the for 345kV segments requiring approximately 150 by 400 feet each to accommodate required equipment. Equipment at sites required for pulling-and-tensioning activities would include cranes, tractors, and trailers with spooled reels that hold the conductors and trucks and trailers with the pulling-and-tensioning equipment mounted. To the extent practicable, pulling and tensioning sites would be located within the right-of-way. Depending on topography, grading may be required at some sites to create level pads for equipment. Finally, the tension and sag of conductors and wires would be fine-tuned, stringing sheaves would be removed, and the conductors would be attached permanently to the insulators at the support structures.

At the tangent and small angle structures, the conductors would be attached to the insulators using clamps to “suspend” the conductors from the bottom of the insulators. At the larger angle dead-end structures, the conductors cannot be pulled through and so are cut and attached to the insulator assemblies at the structure “dead ending” the conductors. There are two primary methods to attach the conductor to the insulator assembly at the dead-end structure. The first method, hydraulic compression fittings, uses a large press and pump that closes a metal clamp or sleeve onto the conductor. This method requires heavy equipment and is time consuming. The second method, implosive fittings, uses explosives to compress the metal together. Implosive fittings do not require heavy equipment, but do create noise similar to a loud explosion when the primer is struck. The implosive type sleeve is faster to install and results in a secure connection between the conductor and the sleeve. Both implosive and conventional compression sleeves are planned for the Project.

The 500kV single-circuit lines use a three conductor bundle for each phase. At each single-circuit 500kV dead-end structure, nine compression or implosive dead-end bodies along with nine compression or implosive terminal connectors to connect the jumpers (three per phase, one for each of the three subconductors on each of the three phases) on each side of the structure would be required, for a total of 18 dead-end bodies and terminal connectors for each single-circuit dead-end structure. The 345kV single-circuit lines use a two-conductor bundle for each phase. Each 345kV dead-end structure would require 12 compression or implosive dead-end bodies along with 12 compression or implosive terminal connectors to connect the jumpers.

3.2.8 Site Reclamation

Multi-purpose yards, helicopter fly yards, and any other locations used for the purpose of the Project, as well as access roads would be kept in an orderly condition throughout the construction period. Approved enclosed refuse containers would be used throughout the Project. Refuse and trash would be removed from the sites and disposed of in an approved manner. Oils or chemicals would be hauled to a disposal facility authorized to accept such materials. Open burning of construction trash would not be allowed.

Disturbed areas not required for access roads and maintenance areas around structures would be restored and revegetated, as required by the landowner or land-management agency as soon as possible to limit the spread and establishment of noxious weed species. Multi-purpose yards, helicopter fly yards, structure

work areas, wire pulling-and-tensioning sites, wire-splicing sites, guard structures, and temporary roads would be decompacted and the topsoil replaced unless otherwise specified by the landowner or land-management agency. The landowner, land-management agency, or local Natural Resources Conservation Service would be consulted regarding the appropriate seed mix and rate to revegetate the areas. Temporary culverts would be removed. Drivable at-grade waterbars would be installed where needed with frequency proportional to road slope to prevent erosion of the roadbed. All practical means would be made to restore the land outside the minimum areas needed for safe operation to its original contour and to restore natural drainage patterns along the right-of-way.

The seed mix used for any restoration and revegetation project would be determined in consultation with the landowner or land-management agency. All seed and plant material used on federal land would be approved by the federal land-management agency. All seed would meet all of the requirements of the Federal Seed Act and applicable Wyoming, Colorado, and Utah laws regarding seeds and noxious weeds. Only seed certified as “noxious weed free” would be used. If requested, the Company or its contractor would provide the landowner with evidence of seed certification. Any seed mixture would not contain aggressive, non-native species that might invade the site. Where necessary, the surface of the ground would be prepared prior to seeding. Where practical, the Company would follow these guidelines for preparing the seedbed:

1. The road surface would be cleared of foreign materials, such as garbage, paper, and other materials, but all rocks, limbs, or minor woody debris would be left in place. The Company or its contractor would prepare the seedbed immediately prior to seeding.

2. Under favorable soil-moisture conditions, a standard disk or spring bar harrow would be used (where ripping is not required) to roughen the topsoil layer to create the desired surface texture before the seed is applied. Dirt clods and chiseled voids resulting from the roughening process increase the surface area for water collection and provide micro-sites for seed establishment. The soil should be disked or harrowed to no more than 2 inches deep at a time when soil moisture allows the surface to remain rough, with clods approximately 2 to 4 inches in diameter.

3. Ripping, disking, or harrowing would be performed parallel to surface contours. In this way, downslope alignment of furrows can be avoided. In areas that already have the desired soil characteristics; the seedbed does not need to be prepared.

After the seedbed has been prepared, the Company or its contractor would broadcast the seed on the disturbed area, after which the seed would be lightly harrowed into the roadbed or raked into the ground. Mulch and fertilizers would be added if necessary. An area would not be seeded when wind velocities prohibit the seed mix from being applied evenly. If the seed does not germinate and establish to an agreed-upon level of vegetation cover (e.g., consistent with adjacent site conditions) after two growing seasons, the Company or its contractor would reseed during a period acceptable to the landowner. On National Forest System land, the Company would be responsible for monitoring the effectiveness of soil protection and restoration measures and would take corrective measures as needed to ensure long-term soil protection.

Other seeding methods, such as drilling, hydroseeding, or aerial application, may be used depending on the area that requires reclamation and site conditions.

3.3 Communications System

OPGW for the communications system would be installed at the same time as the conductors on each of the transmission line structures. It would be tensioned in the same way.

3.3.1 Regeneration Stations

Similar to the substations, the selected area is graded, vegetation is removed, and a layer of crushed rock is installed. Typically, a 12-foot by 32-foot by 9-foot-tall building or equipment shelter (metal or concrete) would be constructed on the site. An emergency generator with a liquid-petroleum-gas-fuel tank would be installed, in accordance with current regulations, at the site inside the fenced area. Two diverse communication cable routes (aerial and/or buried) from the transmission right-of-way to the equipment shelter would be installed.

3.3.2 Access Road

Regeneration station roads would be constructed using a bulldozer or grader, followed by a roller to compact and smooth the ground. Front-end loaders would be used to move the soil locally or off site. Either gravel or asphalt would be applied to the prepared base layer. The all-weather road surface would be graveled and would have crossroad drainage where applicable.

3.4 Substation/Series Compensation Substation Construction

As mentioned in Section 1.2 of this appendix, construction activities at the Aeolus, Clover, and Mona substations, including expansions and areas needed for equipment installation for Gateway South will be or have been completed as components of other projects of the Energy Gateway program. The two series compensation substations would be constructed as part of the Gateway South Project. A description of typical substation construction follows.

A typical construction sequence for substations and series compensation sites is described below. All equipment and materials would be hauled to the site via truck.

The first activity is grading of the site and access road. The amount of equipment and manpower would vary depending on the size of the site and the terrain. However, large earth moving equipment would be used including dump trucks, water trucks, graders, back hoes and dozers. Dump trucks would be used to haul away unsuitable materials and to bring in fill materials if necessary and access road surfacing.

The earth moving equipment would be used to grade the site relatively flat with a small slope for drainage, and depending on site design, drainage features and/or retention ponds. The water trucks would be used to control dust from site work activities.

The perimeter fence would then be constructed to provide site security and control access.

Foundations would then be installed. There are typically two types of foundations: drilled piers and slabs. Foundations are excavated using a large drill rig or backhoe depending on the type of foundation. Reinforcing steel and/or anchor bolts are placed in the excavation and forms are placed to form the sides of the top portion of the foundation. The entire excavation is then filled with concrete. The spoils from the excavations are hauled from the site and disposed of, or spread on the site if the material is suitable. On a large site, multiple crews would be used.

The control building would be constructed at the same time as the foundation construction. The building would be constructed of masonry block or would be pre-engineered steel construction depending on design.

The remaining below-grade construction is then completed, including grounding conductors and ground rods, conduit, and concrete cable trench. Excavations are made with trenchers and backhoes, the conductor or conduit is placed in the excavation, connections are made, and then backfilled. In some cases, bedding material, such as sand, is placed in the excavation prior to back filling.

Equipment and steel structures are set on the completed foundations and connected. Equipment includes circuit breakers; disconnect switches, transformers, reactors, capacitors, series capacitors, surge arresters, and instrument transformers. Rigid tubular bus is used for the main conductors, with flexible cable connections to the equipment. All high-voltage conductors are supported on insulators. Construction equipment includes cranes and man lifts. On a large site, multiple crews would be used.

Control and protection panels would be installed in the control building and would be connected to equipment in the yard using control and power cables installed in the cable trenches and conduits.

The final step is to cover the entire site with a crushed rock surfacing. Dump trucks would be used to haul the material to the site. Back hoes, skid steers, dozers and graders would be used to spread and compact the material over the site.

All equipment, protection and control systems would be tested prior to energizing.

3.4.1 Substation Roads

Substation roads would be constructed using a bulldozer or grader, followed by a roller to compact and smooth the ground. Front-end loaders would be used to move the soil locally or off-site. Either gravel or asphalt would be applied to the prepared base layer and would have crossroad drainage where applicable.

3.4.2 Geotechnical Drilling

Although the expansions and areas needed for Gateway South equipment installation were analyzed as part of other Energy Gateway program projects, geotechnical evaluation is required at both substation sites, as well as the two series compensation substation sites, to quantify subsurface conditions, determine engineering properties of soil for foundation design and provide recommendations for site development.

The substation geotechnical exploration program would consist of drilling approximately 25 to 30 borings at each substation and each series compensation station. Borings would be advanced to an approximate depth of 50 feet (depending on the depth of anticipated cuts, fills, and structure foundations) using hollow-stem auger, air-rotary, and/or ODEX drilling methods. If competent bedrock is encountered, coring would be advanced 5 to 15 feet into competent rock. Refraction microtremor and field resistivity testing would be completed at each of the two substation sites and the two series compensation station sites. Field resistivity measurements would be conducted in general accordance with the Wenner 4-pin method.

3.4.3 Clearing and Grading

Clearing of all vegetation would be required for the entire series compensation substation area, including a distance of about 10 feet outside the fence. This is required for personnel safety due to grounding concerns and because of lower clearances to energized conductors within the substations as compared to transmission lines. These lower clearances are allowed by the NESC because the entire substation is fenced.

An insulating layer of gravel on the surface of the substation is required to protect personnel from high currents and voltages during electrical fault conditions. Typically, vegetation is removed and a 4- to 6-inch layer of crushed rock is applied to the finished surface of the substation. Then the substation is usually treated with a soil sterilizer to prevent vegetation growth because the vegetation would degrade the insulating qualities of the crushed rock. The entire substation area would be graded essentially flat, with just enough slope to provide for runoff of precipitation. The substation would be graded to use existing drainage patterns to the extent possible. In some cases, drainage structures, such as ditches, culverts, and sumps, may be required. Clearing and grading material would be disposed of in compliance with local ordinances. Material from off site would be obtained at existing borrow or commercial sites and would be trucked to the substation using existing roads and the substation access road.

3.4.4 Multi-purpose Yards

Multi-purpose yards may be located outside the substation fenced area near the substation site. These yards may be part of the substation property or leased by the contractor. After construction is completed, all debris and unused materials would be removed and the yards returned to preconstruction conditions by the construction contractor.

3.4.5 Grounding

A grounding system is required in each substation for detection of faults and for personnel safety. The grounding system typically consists of buried copper conductor arranged in a grid system and driven ground rods, typically 8 to 10 feet long. The ground rods and any equipment and structures are connected to the grounding conductor grid. The amount of conductor and length and number of ground rods required are calculated based on fault current and soil characteristics.

3.4.6 Fencing

Security fencing is installed around the entire perimeter of each new or expanded substation to protect sensitive equipment and prevent accidental contact with energized conductors by third parties. This 7-foot-high fence would be constructed of chain link with steel posts. One foot of barbed wire or other similar material is installed on top of the chain link yielding a total fence height of 8 feet. Locked gates would be installed at appropriate locations for authorized vehicle and personnel access.

3.4.7 Foundation Installation

Foundations for supporting structures are of two types: spread footings or drilled piers. Spread footings are placed by excavating the foundation area, placing forms and reinforced-steel and anchor bolts, and pouring concrete into the forms. After the foundation has been poured, the forms would be removed, and the surface of the foundation dressed. Pier foundations are placed in a hole generally made by a truck-mounted auger. Reinforced-steel and anchor bolts are placed into the hole using a truck-mounted crane. The portion of the foundation above ground would be formed. The portion below ground uses the undisturbed earth of the augered hole as the form. After the foundation has been poured, the forms would be removed, the excavation would be backfilled, and the surface of the foundation dressed.

Equipment foundations for circuit breakers and transformers would be slab-on-grade type. These foundations are placed by excavating the foundation area; placing forms, reinforced steel, and anchor bolts (if required); and placing concrete into the forms. After the foundations have been poured, the forms would be removed, and the surface of the foundation dressed. Where necessary, provision would be made in the design of the foundations to mitigate potential problems due to frost. Reinforced steel and anchor bolts would be transported to each site by truck, either as a prefabricated cage or loose pieces, which

would be fabricated into cages on the site. Concrete would be hauled to the site in concrete trucks. Excavated material would be spread at the site or disposed of in accordance with local ordinances. Structures and equipment would be attached to the foundations by means of threaded anchor bolts embedded in the concrete. Some equipment such as transformers and reactors may not require anchor bolts.

3.4.8 Oil Containment

Some types of electrical equipment, such as transformers and some types of reactors and circuit breakers, are filled with an insulating mineral oil. Containment structures are required to prevent equipment oil from getting into the ground or water bodies in the event of a rupture or leak. These structures take many forms depending on site requirements, environmental conditions, and regulatory restrictions. The simplest type of oil containment is a pit, of a calculated capacity, under the oil-filled equipment that has an oil-impervious liner. The pit is filled with rock to grade level. In case of an oil leak or rupture, the oil captured in the containment pit is pumped into tanks or barrels and transported to a disposal facility. If required, more elaborate oil containment systems can be installed. This may take the form of an on- or off-site storage tank and/or oil-water separator equipment depending on site requirements.

3.4.9 Structure, Control Building, and Equipment Installation

Supporting steel structures are erected on concrete foundations as noted above. These are set with a truck-mounted crane and attached to the foundation anchor bolts by means of a steel base plate. These structures would be used to support the energized conductors and certain types of equipment. This equipment is lifted onto the structure by means of a truck-mounted crane and bolted to the structures; electrical connections are then made. Some equipment, such as transformers, reactors, and circuit breakers, are mounted directly to the foundations without supporting structures. These are set in place by means of a truck-mounted crane. Some of this equipment requires assembly and testing on the pad. Electrical connections to the equipment are then made.

3.4.10 Control Building Construction

One or more control buildings are required at each substation to house protective relays, control devices, battery banks for primary control power, and remote monitoring equipment. The size and construction of the building depends on individual substation requirements. Typically, the control building would be constructed of concrete block, pre-engineered metal sheathed, or composite surface materials. Once the control house is erected, equipment is mounted and wired inside. All stand-alone regeneration stations and substations (with the exception of the Aeolus Substation) would require an emergency propane or diesel generator just outside the control house within the substation fenced area.

3.4.11 Conductor Installation

The two main types of high-voltage conductors used in substations are tubular aluminum for rigid bus sections and/or stranded-aluminum conductor for strain bus and connections to equipment. Rigid bus would be a minimum of 4 inches in diameter for this Project and would be supported on porcelain or polymer insulators on steel supports. The bus sections would be welded together and attached to special fittings for connection to equipment. Stranded-aluminum conductors would be used as flexible connectors between the rigid bus and the station equipment.

3.4.12 Conduit and Control Cable Installation

Most substation equipment requires low-voltage connections to protect relaying and control circuits. These circuits allow metering, protective functions, and control (both remote and local) of the power system. Connections are made from the control building to the equipment through multi-conductor control cables installed in conduits and/or pre-cast concrete cable trench system.

3.4.13 Construction Cleanup

The cleanup operation would be performed after construction activities are completed. All waste and scrap material would be removed from the site and deposited in approved locations or local permitted landfills in accordance with local ordinances. Ruts and holes outside the substation fence due to construction activities would be regraded.

3.4.14 Reclamation

Revegetation and restoration would be conducted as required and desired vegetation established to limit the spread and establishment of noxious weed species in disturbed areas.

3.5 Special Construction Techniques

3.5.1 Blasting

Typical 500kV steel-lattice structure foundations and the 345kV mono-pole structure foundations normally would be installed using drilled shafts or piers and 345kV H-frame structures would be embedded directly. If hard rock is encountered within the planned drilling depth, blasting may be required to loosen or fracture the rock in order to reach the required depth to install the structure foundations. Precise locations where blasting is expected would be identified based on a site-specific geotechnical study carried out as part of detailed design. A blasting plan would be developed and approved by the agencies as part of the Construction POD.

3.5.2 Helicopter Use

Helicopters may be used to construct in rough terrain where access is difficult or where access through environmentally sensitive areas cannot be avoided. A small helicopter may be used to move personnel and to install pulling lines (called “sock-lines”) in order to facilitate installing conductor. Larger, heavy-lift helicopters could be used to ferry construction equipment, concrete, or structures to a specific site.

Project construction activities potentially facilitated by helicopters may include delivery of construction laborers, equipment, and materials to structure sites; structure placement; hardware installation; and wire-stringing operations. Helicopters also may be used to support the administration and management of the Project by the construction contractor or Company.

Helicopters would set down in areas identified to receive temporary disturbance. The operating area of the helicopters would be limited to helicopter fly yards and multi-purpose yards and positions along the utility corridors that previously have been identified for this purpose, and are safe locations for landing. When a portion of the transmission line requires construction using helicopter support, the multi-purpose yards would serve as a helicopter support yard for fueling, maintenance, and transporting both material and personnel to and from the structure site locations.

Final siting requirements of all helicopter fly yards and support yards and site requirements would be conducted with the input of the helicopter contractor, and affected private landowners and land-management agencies, such as the Bureau of Land Management (BLM) and U.S. Forest Service (USFS). The size of each helicopter fly yard and support yard would be dependent on the size and number of structures to be installed within safe flying range.

The area required for these fly yards can range in size and depends on road access and topography. The yards should be as level as possible, and be located strategically throughout the area of helicopter-supported construction activity. In some instances, because of the presence of vegetation and/or an uneven surface, the area required for a specific yard may need to be brushed, grubbed, and/or graded, including removal of trees in some instances. Ideally they should be located at a higher elevation than the structure sites they would support, as it is safer and more fuel efficient to fly down toward the structure site with heavy loads than it is to fly up to the structure site. Additionally, the fly yards must be accessible by road to facilitate the delivery of structure steel, rebar, concrete, construction tools, equipment, and other materials used in the construction of the structures.

The following are activities that may take place at helicopter fly yards:

- Structure steel, bolts, fittings, and blocking would be hauled and stored for use.
- Structure sections would be preassembled using a rough terrain crane.
- Rebar for assembling cages and/or preassembled rebar cages for structure foundations would be delivered, then flown out of this yard to each structure site.
- Concrete would be staged by truck delivery or batch plant, which would generate the required concrete to be loaded into a concrete transport bucket that would be attached to a helicopter and flown out to the structure sites.
- Refueling the helicopter and necessary light maintenance; a fuel truck and a mechanics truck would be located at these yards.
- Transporting personnel, tools, and small equipment by helicopter to and from the yards and the construction sites.
- Temporary parking for a fuel truck, a mechanics truck, and transport vehicles for personnel.
- Yards may serve as a safe landing area for the helicopter in case of an emergency.

The specific types of helicopters used would be based upon the Project need, the weight of the load being transported, and the altitude of the structure location. The various needs would range from light loads (crew/inspector transportation, and conductor stringing) to medium-to-heavy loads (tool and material delivery/removal, and structure removal/construction activities). The specific helicopters used also would vary, depending on availability and Project schedule.

Construction workers and equipment would be dropped off at pulling-and-tensioning sites, structure locations, or other work areas to receive temporary disturbance.

Large heavy-lift helicopters would be used to transport a structure to a location where the ground crew is waiting to spot the structure onto a preconstructed foundation. The helicopter would fly from predetermined yards and transport the preassembled structure sections to each structure site. Depending on the size and weight of the load, several round trips may be required from the helicopter fly yard to fully construct each structure. Each fly yard can support several structure sites and must be located no farther away from the structure-site locations than is within the safe round-trip-flight distance limitation

of the helicopter(s) being used. The typical safe round trip flight distance for a heavy-lift helicopter is a 2- to 3-mile radius, depending upon altitude and load.

During helicopter operations, public access to defined areas would be restricted. Temporary road closures, traffic detours, and posted notices and signs would be used to restrict public access to construction areas. This would be in addition to general public access restrictions to protect public health and safety.

3.5.3 Water Use

Construction of the transmission lines and series compensation substations would require water. Major water uses are for transmission line structure and station foundations, and dust control during right-of-way and substation grading and site work. A minor use of water during construction would include the establishment of substation landscaping where required. Table 4 (based on the Company's preferred route) lists the approximate amount of water required for the Project.

Table 4
Estimated Water Usage

Transmission Line Spread	**Total Million Gallons**
Spread 1	59
Spread 2	27
Spread 3	21
Total Transmission Line Water Usage	107
Series Compensation Substations	**Total Million Gallons**
Series Compensation Substation 1	7
Series Compensation Substation 2	10
Total Series Compensation Substations	17
Total Million Gallons Water Required	**124**

Water would be used for two primary purposes: foundation construction and right-of-way and access-road dust control. The required water would be procured from municipal sources, from commercial sources, or under a temporary water-use agreement with landowners holding existing water rights. No new water rights would be required. In the construction of foundations, water is transported to the batch-plant site where it would be used to produce concrete. From the batch plant, the wet concrete would be transported to the structure site in concrete trucks for use in foundation installation.

Construction of the transmission lines and related facilities would generate a temporary increase in fugitive dust. If the level of fugitive dust is too high in specific Project areas, as determined in cooperation with the landowner or land-management agency, water would be applied to disturbed areas to minimize dust.

Water usage for substation construction is primarily for dust control during site preparation work. During this period, construction equipment would be cutting, moving, and compacting the subgrade surface. As a result, water trucks patrolling the site to control dust would make as many as one pass per hour over the station site. Once site preparation work is complete, concrete for the placement of foundations becomes the largest user of water and dust control becomes minimal.

Once site grading is complete, the balance of the substation construction work would be performed on bare subgrade soil or subgrade with a thin layer of rock. Fire risk would be minimal due to the bare ground or rock surface, and would be contained within the confines of station fenced area.

3.6 Construction Elements

3.6.1 Construction Workforce

The proposed Project would be constructed primarily by contract personnel, with the Company responsible for Project administration and inspection. The construction workforce for the transmission line would consist of laborers, craftsmen, supervisory personnel, support personnel, and construction management personnel who would perform the construction tasks see Table 5 for work force estimates.

Site grading requires a small number of people including a surveyor, heavy equipment operators, foreman, and construction-management personnel. Each series compensation station would require numerous concrete crews in order to complete the below grade construction and concrete placement on schedule. Concrete most likely would be provided by a batch plant producing approximately 160 cubic yards per day delivered in 8-cubic-yard trucks. Other below-grade crews would be needed to install conduit, cable trench, and ground mat material. The below-grade crews would be on site overlapping the schedule of the concrete crew. Several three-man crews working with boom trucks and bucket trucks would erect the steel and install the physical equipment in the yard (Table 6 – Manpower and Equipment for Series Compensation Stations). Electrical installation would be handled by several two-man teams alternating between indoor and outdoor activity. Construction generally would occur between 7 a.m. and 7 p.m., Monday through Saturday. Additional hours may be necessary to make up schedule deficiencies or to complete critical construction activities.

3.6.2 Construction Equipment and Traffic

Equipment required for construction of Gateway South would include, but would not be limited to, that listed in Table 7 – Typical Equipment and Duration of Use. This table includes the equipment type and the anticipated daily duration of use for each equipment type.

Estimated Personnel and Equipment for 500kV Transmission Line Construction access would occur at several locations along the transmission line route, resulting in dispersed construction traffic. Truck deliveries normally would be on weekdays between 7:00 a.m. and 5:00 p.m.

3.6.3 Construction Equipment and Traffic

Equipment required for construction of Gateway South would include, but would not be limited to, that listed in Table 7 – Typical Equipment and Duration of Use. This table includes the equipment type and the anticipated daily duration of use for each equipment type.

Estimated Personnel and Equipment for 500kV Transmission Line Construction access would occur at several locations along the transmission line route, resulting in dispersed construction traffic. Truck deliveries normally would be on weekdays between 7:00 a.m. and 5:00 p.m.

The equipment required for transmission line construction is similar for both the 500kV and 345kV lines. The highest level of traffic would be when the wire-stringing operations begin while several other operations are occurring at the same time, which would likely include excavating holes, installing foundations, hauling steel, assembling structures, and erecting structures.

Table 5
Work Force Estimation – Duration and Totals for Construction of a 500-kilovolt Transmission Line

Work Item	Estimated Duration (Weeks)			Number of Crews			Number of Workers per Crew			Total Number of Workers		
	Spread 1	Spread 2	Spread 3	Spread 1	Spread 2	Spread 3	Spread 1	Spread 2	Spread 3	Spread 1	Spread 2	Spread 3
Construction management/ supervision – contractor	121	91	107	1	1	1	10	10	10	10	10	10
Construction maintenance and repairs	121	91	107	1	1	1	8	8	8	8	8	8
Construction management – owner	121	91	107	1	1	1	5	5	5	5	5	5
Inspection	121	91	107	1	1	1	12	12	12	12	12	12
Contractor mobilization	16	16	16	3	3	3	3	3	3	9	9	9
Receive and handle materials	114	82	98	2	2	2	4	4	4	8	8	8
Survey/stake access roads and structure pads	85	47	44	2	2	2	3	3	3	6	6	6
Construct access roads and structure pads	85	47	44	1	1	2	9	9	9	9	9	18
Survey/stake new structure locations	85	47	44	1	1	1	3	3	3	3	3	3
Tree removal/clearing	0	21	32	0	2	2	0	9	9	0	18	18
Excavate structure holes	84	42	33	2	2	2	2	2	2	4	4	4
Tie and haul rebar	84	42	33	1	1	1	5	5	5	5	5	5
Set forms and pour concrete	84	42	33	1	1	1	13	13	13	13	13	13
Batch plant(s) and concrete trucks	84	42	33	1	1	1	13	13	13	13	13	13
Haul steel and materials	84	42	33	1	1	1	3	3	3	3	3	3
Haul blocking and shake-out steel	84	42	33	1	1	1	4	4	4	4	4	4
Assemble structures – tangent	84	42	33	6	6	6	9	9	9	54	54	54
Assemble structures – dead-end	84	42	33	2	2	2	12	12	12	24	24	24
Bottom setting crews (legs and body ext.)	84	42	33	1	1	1	8	8	8	8	8	8
Structure torqueing crew	84	42	33	1	1	1	5	5	5	5	5	5
Erect structures	72	37	28	2	2	2	10	10	10	20	20	20
Backbolt and torque after erection	72	37	28	2	2	2	3	3	3	6	6	6
Load, haul, and spot overhead optical ground wires, overhead optical ground wire, and conductors	68	35	33	1	1	1	5	5	5	5	5	5

Table 5
Work Force Estimation – Duration and Totals for Construction of a 500-kilovolt Transmission Line

Work Item	Estimated Duration (Weeks)			Number of Crews			Number of Workers per Crew			Total Number of Workers		
	Spread 1	Spread 2	Spread 3	Spread 1	Spread 2	Spread 3	Spread 1	Spread 2	Spread 3	Spread 1	Spread 2	Spread 3
Install and remove guard structures	68	35	33	1	1	1	5	5	5	5	5	5
Install overhead optical ground wire, overhead optical ground wire, and conductors	68	35	33	1	1	1	12	12	12	12	12	12
Sage, dead-end, clip, dampers, spacers	68	35	33	6	6	6	6	6	6	36	36	36
Final clean up (gig sheet)	63	33	33	1	1	1	4	4	4	4	4	4
Reclamation/restoration	63	33	33	2	2	2	4	4	4	8	8	8
									Total per spread	299	317	326
									Total workers	942		

NOTES:
Spread 1 of the Company's preferred route, approximately 228 miles consisting of Links W15, W21, W35, W36, W30, W32, W101, W125, W108, W116, W113, W410, W411, C31, C61, C91, C175, C186, C188
Spread 2 of the Company's preferred route, approximately 103 miles consisting of Links U242, U280, U285, U300, U400, U401, U404, U406
Spread 3 of the Company's preferred route, approximately 76 miles consisting of Links U525, U435, U545, U546, U548, U600, U636, U637, U639, U650, U640

Table 6 Equipment and Manpower Needed for Series Compensation Stations	
Equipment	**Quantity**
Site Development (90 acres)	
Scraper – Cat 631	4
Dozer – Cat D9 (pushing and ripping)	1
Dozer – Cat D8 (fill Cat)	1
Grader – Cat 16G	2
Roller Compacter – Cat 583	2
Excavator – Cat 330 (slopes and ditching)	1
Water truck	2
Water storage	1
Water self-loader tower	1
Pump (4-inch)	1
Water tanker	2
GPS laser	1
All-terrain vehicle grader	1
Mechanic truck	1
Fuel truck	1
Pickup – 3/4-ton extended cab	2
Pickup – 1-ton crew cab	6
Office trailer	1
Port-a-potty	4
Dumpster	2
Manpower	35 to 40 days
Foundations	
Drill – Texoma 600 (for bus supports – typical)	1
Drill – Watson 3100 (for towers – typical)	1
Boom truck – 33-ton, National 14110	1
Boom truck – 17-ton, JLG1700JBT	1
Excavator – Cat 315	1
Roller compactor – Bomag BW124	1
Plate compactor – Wacker WP1550	2
Rubber-tire backhoe – Cat 326	1
End dump	1
Water truck	1
Mechanic truck	1
Fuel truck	1
GPS laser	1
All-terrain vehicle for grader	1
Pickup – ¾-ton extended cab	2
Pickup – 1-ton crew cab	2
All-terrain vehicle (golf cart look alike)	3
Office trailer	1
Port-a-potty	4
Dumpster	3
Manpower	30 to 40 days

Table 6 Equipment and Manpower Needed for Series Compensation Stations	
Equipment	**Quantity**
Steel Structures	
Crane – Grove RT600E	1
Boom truck – 33-ton, National 14110	2
Boom truck – 17-ton, JLG1700JBT	1
Manlift	2
Manpower	12 to 40 days
Equipment Install, Insulators and Bus	
Boom truck – 33-ton, National 14110	2
Boom truck – 17-ton, JLG1700JBT	2
Manlift	4
Welder truck	4
Tools and materials – Conex	2
Manpower	20 to 40 days
Control Wiring	
Boom truck – 17-ton, JLG1700JBT	2
Manlift	4
Small puller	3
Reel stand on trailer	2
Flatbed truck – 10-ton	1
Van – ¾-ton	4
Tools and materials – Conex	2
Fiber splicer van	1
Office trailer	1
Port-a-potty	3
Dumpster	3
Manpower	20 to 40 days

Table 7
Typical Equipment and Duration of Use
for Construction of a 500-kilovolt Transmission Line

Equipment	Spread 1				Spread 2				Spread 3			
	Quantity	Hours per Day	Days per Week	Estimated Duration (weeks)	Quantity	Hours per Day	Days per Week	Estimated Duration (weeks)	Quantity	Hours per Day	Days per Week	Estimated Duration (weeks)
Project Management/Inspection												
Truck – pickup	15	6	6	121	15	6	6	91	15	6	6	107
Project Supervision – Contractor												
Truck – pickup	10	8	6	121	10	8	6	91	10	8	6	107
Main121tenance – Contractor												
Truck – pickup	1	6	6	121	1	6	6	91	1	6	6	107
Truck – flatbed (1-ton)	2	6	6	121	2	6	6	91	2	6	6	107
Truck – mechanics (2-ton)	5	8	6	121	5	8	6	91	5	8	6	107
Survey												
Truck – pickup	1	4	6	85	1	4	6	47	1	4	6	44
Truck – flatbed (1-ton)	1	4	6	85	1	4	6	47	1	4	6	44
Multi-purpose Yards												
Truck – pickup	1	4	6	114	1	4	6	92	1	4	6	98
Truck – flatbed (1-ton)	1	2	6	114	1	2	6	92	1	2	6	98
Truck – flatbed (2-ton)	1	2	6	114	1	2	6	92	1	2	6	98
Forklift (5-ton)	1	8	6	114	1	8	6	92	1	8	6	98
Forklift (10-ton)	1	8	6	114	1	8	6	92	1	8	6	98
Crane RT (20-ton)	1	2	6	114	1	2	6	92	1	2	6	98
Trailer – office	1	10	6	114	1	10	6	92	1	10	6	98
Generator – portable (office)	1	10	6	114	1	10	6	92	1	10	6	98
Tree Clearing												
Truck – pickup	Not applicable				2	8	6	21	2	8	6	32
Truck – flatbed (1-ton)					2	4	6	21	2	4	6	32
Truck – flatbed (2-ton)					1	4	6	21	1	4	6	32
Truck – semi-trailer					4	8	6	21	4	8	6	32
Trailer – timber haul, with pup					4	8	6	21	4	8	6	32
Loader – with grapple					2	6	6	21	2	6	6	32
Loader – bucket					2	6	6	21	2	6	6	32
Slasher					2	6	6	21	2	6	6	32
Chain saws					6	8	6	21	6	8	6	32
Road Building												
Truck – pickup	1	2	6	85	1	2	6	47	2	2	6	44
Truck – flatbed (1-ton)	1	2	6	85	1	2	6	47	2	2	6	44
Truck – flatbed (2-ton)	1	4	6	85	1	4	6	47	2	4	6	44
Truck – water	1	6	6	85	1	6	6	47	1	6	6	44

Table 7
Typical Equipment and Duration of Use
for Construction of a 500-kilovolt Transmission Line

Equipment	Spread 1				Spread 2				Spread 3			
	Quantity	Hours per Day	Days per Week	Estimated Duration (weeks)	Quantity	Hours per Day	Days per Week	Estimated Duration (weeks)	Quantity	Hours per Day	Days per Week	Estimated Duration (weeks)
Truck – fuel	1	4	6	85	1	4	6	47	1	4	6	44
Truck – dump (10Y)	2	6	6	85	2	6	6	47	4	6	6	44
Truck – semi-trailer	2	6	6	85	2	6	6	47	4	6	6	44
Trailer – lowboy	2	6	6	85	2	6	6	47	4	6	6	44
Backhoe – with bucket	1	6	6	85	1	6	6	47	2	6	6	44
Loader – with bucket	2	6	6	85	2	6	6	47	4	6	6	44
Loader – with brusher/grubber	2	8	6	85	2	8	6	47	2	8	6	44
Grader – road	1	8	6	85	1	8	6	47	2	8	6	44
Dozer – with blade	2	8	6	85	2	8	6	47	4	8	6	44
Dozer – with ripper	1	8	6	85	1	8	6	47	1	8	6	44
Foundations												
Truck – pickup	3	8	6	84	3	8	6	42	3	8	6	33
Truck – flatbed (1-ton)	6	4	6	84	6	4	6	42	6	4	6	33
Truck – flatbed (2-ton)	2	5	6	84	2	5	6	42	2	5	6	33
Truck – water	1	6	6	84	1	6	6	42	1	6	6	33
Truck – fuel	1	4	6	84	1	4	6	42	1	4	6	33
Truck – dump (10Y)	2	6	6	84	2	6	6	42	2	6	6	33
Truck – semi-trailer	2	8	6	84	2	8	6	42	2	8	6	33
Trailer – lowboy	1	6	6	84	1	6	6	42	1	6	6	33
Trailer – flatbed	2	6	6	84	2	6	6	42	2	6	6	33
Truck – flatbed with boom (5-ton)	1	6	6	84	1	6	6	42	1	6	6	33
Truck – concrete	4	6	6	84	4	6	6	42	4	6	6	33
Drill rig – digger	2	8	6	84	2	8	6	42	2	8	6	33
Drill rig – pneumatic wagon	1	6	6	84	1	6	6	42	1	6	6	33
Backhoe – with bucket	1	4	6	84	1	4	6	42	1	4	6	33
Dozer – with blade	1	4	6	84	1	4	6	42	1	4	6	33
Loader – with bucket	1	4	6	84	1	4	6	42	1	4	6	33
Crane RT (20-ton)	1	4	6	84	1	4	6	42	1	4	6	33
Forklift (5-ton)	1	4	6	84	1	4	6	42	1	4	6	33
Loader – bobcat	1	4	6	84	1	4	6	42	1	4	6	33
Generator – portable (5 horsepower)	2	4	6	84	2	4	6	42	2	4	6	33
Trailer – office	1	10	6	84	1	10	6	42	1	10	6	33
Generator – portable (office)	1	10	6	84	1	10	6	42	1	10	6	33

Table 7
Typical Equipment and Duration of Use
for Construction of a 500-kilovolt Transmission Line

Equipment	Spread 1				Spread 2				Spread 3			
	Quantity	Hours per Day	Days per Week	Estimated Duration (weeks)	Quantity	Hours per Day	Days per Week	Estimated Duration (weeks)	Quantity	Hours per Day	Days per Week	Estimated Duration (weeks)
Material Hauling												
Truck – flatbed (1-ton)	1	4	6	114	1	4	6	42	1	4	6	33
Truck – flatbed (2-ton)	1	4	6	114	1	4	6	42	1	4	6	33
Truck – semi-trailer	1	8	6	114	1	8	6	42	1	8	6	33
Truck – flatbed with boom (5-ton)	1	4	6	114	1	4	6	42	1	4	6	33
Trailer – flatbed	6	8	6	114	6	8	6	42	6	8	6	33
Forklift (10-ton)	1	4	6	114	1	4	6	42	1	4	6	33
Steel Assembly												
Truck – pickup	4	8	6	84	4	8	6	42	4	8	6	33
Truck – flatbed (1-ton)	20	4	6	84	20	4	6	42	20	4	6	33
Truck – flatbed (2-ton)	3	8	6	84	3	8	6	42	3	8	6	33
Truck – water	1	6	6	84	1	6	6	42	1	6	6	33
Crane RT (20-ton)	6	4	6	84	6	4	6	42	6	4	6	33
Compressor – pneumatic	6	6	6	84	6	6	6	42	6	6	6	33
Generator – portable (5 horsepower)	2	2	6	84	2	2	6	42	2	2	6	33
Trailer – office	1	10	6	84	1	10	6	42	1	10	6	33
Generator – portable (office)	1	10	6	84	1	10	6	42	1	10	6	33
Steel Erection – Conventional[1]												
Truck – pickup	3	8	6	72	3	8	6	37	3	8	6	28
Truck – flatbed (1-ton)	6	4	6	72	6	4	6	37	6	4	6	28
Truck – flatbed (2-ton)	2	4	6	72	2	4	6	37	2	4	6	28
Crane RT (20-ton)	2	6	6	72	2	6	6	37	2	6	6	28
Crane RT (75-ton)	2	6	6	72	2	6	6	37	2	6	6	28
Crane (150- to 250-ton)	2	6	6	72	2	6	6	37	2	6	6	28
Dozer – with blade	2	6	6	72	2	6	6	37	2	6	6	28
Compressor - pneumatic	2	4	6	72	2	4	6	37	2	4	6	28
Steel Erection – Helicopter[2]												
Truck – pickup	3	8	6	24	3	8	6	12	3	8	6	12
Truck – flatbed (1-ton)	6	4	6	24	6	4	6	12	6	4	6	12
Truck – flatbed (2-ton)	2	4	6	24	2	4	6	12	2	4	6	12
Crane RT (20-ton)	1	6	6	24	1	6	6	12	1	6	6	12
Crane RT (75-ton)	1	6	6	24	1	6	6	12	1	6	6	12
Crane (150- to 250-ton)	1	6	6	24	1	6	6	12	1	6	6	12

Table 7
Typical Equipment and Duration of Use
for Construction of a 500-kilovolt Transmission Line

Equipment	Spread 1				Spread 2				Spread 3			
	Quantity	Hours per Day	Days per Week	Estimated Duration (weeks)	Quantity	Hours per Day	Days per Week	Estimated Duration (weeks)	Quantity	Hours per Day	Days per Week	Estimated Duration (weeks)
Dozer – with blade	2	6	6	24	2	6	6	12	2	6	6	12
Compressor - pneumatic	2	4	6	24	2	4	6	12	2	4	6	12
Truck – pickup	2	8	6	12	2	8	6	6	2	8	6	6
Truck – flatbed (1-ton)	2	4	6	12	2	4	6	6	2	4	6	6
Truck – mechanics (2-ton)	1	4	6	12	1	4	6	6	1	4	6	6
Truck – fuel	1	2	6	12	1	2	6	6	1	2	6	6
Helicopter – skylift (large)	1	8	6	12	1	8	6	6	1	8	6	6
Wire Installation												
Truck – pickup	6	8	6	68	6	8	6	35	6	8	6	33
Truck – flatbed (1-ton)	10	6	6	68	10	6	6	35	10	6	6	33
Truck – flatbed (2-ton)	2	8	6	68	2	8	6	35	2	8	6	33
Truck – water	1	6	6	68	1	6	6	35	1	6	6	33
Truck – flatbed with boom (5-ton)	6	8	6	68	6	8	6	35	6	8	6	33
Truck – splicing	1	4	6	68	1	4	6	35	1	4	6	33
Truck – semi-trailer	3	8	6	68	3	8	6	35	3	8	6	33
Trailer – flatbed	4	4	6	68	4	4	6	35	4	4	6	33
Trailer – lowboy	3	4	6	68	3	4	6	35	3	4	6	33
Trailer – reel stand	12	4	6	68	12	4	6	35	12	4	6	33
Crane RT (35-ton)	3	2	6	68	3	2	6	35	3	2	6	33
Puller – triple drum	1	2	6	68	1	2	6	35	1	2	6	33
Puller – single drum	1	2	6	68	1	2	6	35	1	2	6	33
Puller – sockline	2	2	6	68	2	2	6	35	2	2	6	33
Tensioner – conductor	1	2	6	68	1	2	6	35	1	2	6	33
Tensioner – shield wire	1	2	6	68	1	2	6	35	1	2	6	33
Dozer – sagging	2	2	6	68	2	2	6	35	2	2	6	33
Dozer – with blade	2	2	6	68	2	2	6	35	2	2	6	33
Backhoe – with bucket	1	2	6	68	1	2	6	35	1	2	6	33
Drill rig – digger	1	2	6	68	1	2	6	35	1	2	6	33
Compressor – pneumatic	1	2	6	68	1	2	6	35	1	2	6	33
Generator – portable (5 horsepower)	2	2	6	68	2	2	6	35	2	2	6	33
Helicopter – pilot line (small)	1	8	6	68	1	8	6	35	1	8	6	33

Table 7
Typical Equipment and Duration of Use
for Construction of a 500-kilovolt Transmission Line

Equipment	Spread 1				Spread 2				Spread 3			
	Quantity	Hours per Day	Days per Week	Estimated Duration (weeks)	Quantity	Hours per Day	Days per Week	Estimated Duration (weeks)	Quantity	Hours per Day	Days per Week	Estimated Duration (weeks)
Restoration												
Truck – pickup	3	6	6	63	3	6	6	33	3	6	6	33
Truck – flatbed (1-ton)	3	6	6	63	3	6	6	33	3	6	6	33
Truck – flatbed (2-ton)	1	4	6	63	1	4	6	33	1	4	6	33
Truck – water	1	6	6	63	1	6	6	33	1	6	6	33
Truck – dump (10Y)	1	6	6	63	1	6	6	33	1	6	6	33
Truck – semi-trailer	1	6	6	63	1	6	6	33	1	6	6	33
Trailer – lowboy	1	6	6	63	1	6	6	33	1	6	6	33
Backhoe – with bucket	1	4	6	63	1	4	6	33	1	4	6	33
Loader – with bucket	1	4	6	63	1	4	6	33	1	4	6	33
Grader – road	1	8	6	63	1	8	6	33	1	8	6	33
Dozer – with blade	1	8	6	63	1	8	6	33	1	8	6	33
Tractor – 4-wheel drive with chisel and/or seeder	1	8	6	63	1	8	6	33	1	8	6	33

NOTES:
[1]Steel erection – conventional: use this set of equipment values if structure erection is considered to be by conventional ground based methods.
[2]Steel erection – helicopter: use this set of equipment values if structure erection is considered to include heavy-lift helicopter methods.
Spread 1 of the Company's preferred route, approximately 228 miles consisting of Links W15, W21, W35, W36, W30, W32, W101, W125, W108, W116, W113, W410, W411, C31, C61, C91, C175, C186, C188
Spread 2 of the Company's preferred route, approximately 103 miles consisting of Links U242, U280, U285, U300, U400, U401, U404, U406
Spread 3 of the Company's preferred route, approximately 76 miles consisting of Links U525, U435, U545, U546, U548, U600, U636, U637, U639, U650, U640

For the substation work, the highest level of traffic would be during site grading and foundation installation. It is estimated that 2,000 to 4,000 cubic yards of topsoil would not be suitable for re-use on each site and would have to be disposed of off-site at a remote location. Dump trucks would be leaving and returning to the site constantly each day for the duration of the site grading. Each site would require between 4,000 and 7,000 cubic yards of concrete. Delivering, placing, and finishing concrete is labor intensive. Once concrete placement is complete, traffic on the surrounding roads would subside. Workers would arrive in the morning and leave at the end of the day. The balance of daily traffic would be material deliveries from storerooms, which would probably be one or two trips per day. Each substation would require the delivery of permitted loads such as transformers and/or reactors. Each reactor or transformer bank required would require four large multiple-wheel lowboy trucks. Delivery would be scheduled to match the completion of their respective foundations.

3.6.4 Removal of Facilities and Waste Disposal

Substation and right-of-way construction would generate a variety of solid wastes including concrete, hardware, and wood debris. The solid wastes generated during construction would be recycled or hauled away for disposal at a suitable facility based on their properties. Excavation along the right-of-way and at substations would generate solid wastes that could potentially be used as fill; however, surplus excavated material would be removed for disposal. Excavated material that is clean and dry would be spread along the right-of-way.

The majority of surplus excavated materials associated with substation construction results from spoils created during site grading. Very little of the soil excavated during foundation installation is waste product. Above-grade waste may consist of packing material such as crates, pallets, and paper wrapping to protect equipment during shipping. It is assumed a 12-yard dumpster would be filled once a week with waste material for the duration of each substation project.

3.6.5 Construction Schedule

The Company intends to continue to refine the design of the Gateway South during the agency approval process in order to commence construction immediately when the Project is approved. Final engineering surveys would determine the exact locations of structures, access roads, and other features prior to the start of construction and would be included in the Construction POD. Due to the broad scope of construction, the varied nature of construction activities, and the geographic diversity of the Project area, the Company intends to hire multiple contractors to complete Project work within the projected timeframe and in accordance with industry performance standards. Construction would likely involve multiple construction contracts over a probable 3 to 4-year period ending in December 2020. Multiple spreads would be under construction at the same time. The Company developed a Project construction schedule based on this strategy (Table 8 – Project Duration Schedule). The most construction activity (access disturbance, structure construction, substation expansion, series compensation station development and line stringing) would occur in the first 2 years.

Although the construction rate of progress would be reduced in the winter, it is anticipated that construction would continue through the winter months in the lower-elevation areas of the Project, except during winter storms. In the higher-elevation areas of the Project, winter storms and snow would limit access to the right-of-way. In these areas, it is expected that construction would be suspended on some portions of the right-of-way during the peak winter months and construction resources would either be demobilized or shifted to other segments of the Project.

Transmission-line construction commences with contractor mobilization. The contractor would mobilize equipment and personnel to the construction site at various stages in the Project schedule depending on operational requirements. This would cumulatively require approximately 6 weeks throughout the

schedule for Segments 1, 2, and 3. Construction management, engineering support, inspection, materials handling, and administration are required throughout the Project. First, surveyors would start at one end of the segment and stake the locations of access roads. Road construction can start 1 to 2 weeks after the surveyors begin, which may require clearing in higher elevations where tree removal is required prior to road construction. After a couple of weeks of road construction another survey crew can begin staking the structure locations. A week or two after the survey crew starts staking structure locations; excavation of holes for foundations can begin. The installation of the concrete pier foundations would begin immediately after that. The foundations need time to cure and develop to full structural strength (i.e., compression capacity) before lattice structures or mono-pole structures can be installed. A couple weeks after foundation installation has begun, lattice-structure and mono-pole hauling, assembly, and erection can begin. For 345kV H-frame construction, structure assembly and setting can begin immediately after the excavation of holes has begun. The wire installation crews would start approximately 8 to 12 weeks after assembly and erection/setting begins. This would be followed by final cleanup, reclamation, and restoration. Substation construction includes five activities: (1) site grading (grading and access road development); (2) below-grade construction (primarily the installation of foundations; (3) above-grade construction (steel erection and building construction); (4) electrical (installation and termination of control wiring); and (5) testing (functional testing of control and monitoring schemes). Typically, these activities overlap and complement each other, allowing the construction of a substation to proceed more quickly than transmission-line construction. It is estimated that the site-grading activity and access-road work for Gateway South series compensation substations would take 4 to 8 weeks to complete, depending on the size of the site.

Below-grade construction can be completed in 3 months or less for all substations that are expansions of existing substations. In these cases the basic infrastructure is already in place, having been installed with the initial substation and designed for the future expansion requirements. Only the new substations would take longer to complete.

Above-grade construction duration is highly dependent on the level of construction workforce the contractor chooses. Due to the size of each station, many crews can work on steel erection and equipment assembly without interfering with each other. The greatest amount of schedule recovery or acceleration in a station's construction schedule can be achieved during this timeframe. It is estimated that, for the series compensation substations, the erection of steel, bus assembly, and major equipment assembly can be completed in between 4 and 6 months.

Electrical construction is a long and labor-intensive task. Although multiple crews can work in a yard at any given time, the space in a control building is very limited and would determine the length of this task. In the case of each of these stations, given the size and type of equipment to be installed, there would be miles of cable to be pulled into conduit and duct banks and thousands of connections to be made and double checked prior to the start of testing. The series compensation substations would take longer than existing substations that already have the basic infrastructure in place.

Prior to starting construction, the Company may be required to conduct on-site environmental surveys in accordance with applicable protocols or mitigation measures adopted by BLM and other agencies as Project conditions. Accordingly, adjustments might occur to the Project schedule as necessary to avoid sensitive resources and comply with the approved Construction POD. Pre-construction activities, including pre-construction environmental surveys, materials procurement, design, contracting, right-of-way acquisition, and permitting efforts, are not shown in the summary schedule.

The schedule is predicated upon the Company's ability to complete the following tasks in a timely manner:

- Secure all necessary permit approvals
- Secure agency approval
- Complete biological and cultural survey work
- Construct within environmental time constraints
- Order and receive equipment
- Secure construction contractor resources and associated construction equipment. Maintain continuous construction activity with no delay due to environmental, administrative, or legal issues.

Table 8a
Project Duration Schedule – Months 1 to 8

Spread 1 – 228 Miles (W15, W21, W35, W36, W30, W32, W101, W125, W108, W116, W113, W410, W411, C31, C61, C91, C175, C186, C188)	**2015**																																		
	Month 1				**Month 2**				**Month 3**					**Month 4**				**Month 5**				**Month 6**					**Month 7**				**Month 8**			
	1/3	1/10	1/17	1/24	1/31	2/7	2/14	2/21	2/28	3/7	3/14	3/21	3/28	4/4	4/11	4/18	4/25	5/2	5/9	5/16	5/23	5/30	6/6	6/13	6/20	6/27	7/4	7/11	7/18	7/25	8/1	8/8	8/15	8/22
	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126	132	138	144	150	156	162	168	174	180	186	192	198	204
	Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7	Wk 8	Wk 9	Wk 10	Wk 11	Wk 12	Wk 13	Wk 14	Wk 15	Wk 16	Wk 17	Wk 18	Wk 19	Wk 20	Wk 21	Wk 22	Wk 23	Wk 24	Wk 25	Wk 26	Wk 27	Wk 28	Wk 29	Wk 30	Wk 31	Wk 32	Wk 33	Wk 34
Inspection	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Project yard(s) layout and make ready for construction	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16																		
Receipt and storage and Project materials	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34
Survey and stake access roads and work areas									1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
Construct access roads and structure pads											1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Tree clearing																																		
Install foundations																			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Haul and assemble structures																										1	2	3	4	5	6	7	8	9
Erect structures																																		
Install overhead optical ground wire, overhead ground wire, and conductors																																		
Cleanup and restoration																																		

Spread 2 – 103 Miles (U242, U280, U285, U300, U400, U401, U404, U406)	**2015**																																		
	Month 1				**Month 2**				**Month 3**					**Month 4**				**Month 5**				**Month 6**					**Month 7**				**Month 8**			
	1/3	1/10	1/17	1/24	1/31	2/7	2/14	2/21	2/28	3/7	3/14	3/21	3/28	4/4	4/11	4/18	4/25	5/2	5/9	5/16	5/23	5/30	6/6	6/13	6/20	6/27	7/4	7/11	7/18	7/25	8/1	8/8	8/15	8/22
	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126	132	138	144	150	156	162	168	174	180	186	192	198	204
	Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7	Wk 8	Wk 9	Wk 10	Wk 11	Wk 12	Wk 13	Wk 14	Wk 15	Wk 16	Wk 17	Wk 18	Wk 19	Wk 20	Wk 21	Wk 22	Wk 23	Wk 24	Wk 25	Wk 26	Wk 27	Wk 28	Wk 29	Wk 30	Wk 31	Wk 32	Wk 33	Wk 34
Inspection														1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Project yard(s) layout and make ready for construction														1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16					
Receipt and storage and project materials														1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Survey and stake access roads and work areas																							1	2	3	4	5	6	7	8	9	10	11	12
Construct access roads and structure pads																											1	2	3	4	5	6	7	8
Tree clearing																					1	2	3	4	5	6	7	8	9	10	11	12	13	14
Install foundations																																		1
Haul and assemble structures																																		
Erect structures																																		
Install overhead optical ground wire, overhead ground wire, and conductors																																		
Cleanup and restoration																																		

Spread 3 – 76 Miles (U525, U435, U545, U546, U548, U600, U636, U637, U639, U650, U640)	**2015**																																		
	Month 1				**Month 2**				**Month 3**					**Month 4**				**Month 5**				**Month 6**					**Month 7**				**Month 8**			
	1/3	1/10	1/17	1/24	1/31	2/7	2/14	2/21	2/28	3/7	3/14	3/21	3/28	4/4	4/11	4/18	4/25	5/2	5/9	5/16	5/23	5/30	6/6	6/13	6/20	6/27	7/4	7/11	7/18	7/25	8/1	8/8	8/15	8/22
	6	12	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126	132	138	144	150	156	162	168	174	180	186	192	198	204
	Wk 1	Wk 2	Wk 3	Wk 4	Wk 5	Wk 6	Wk 7	Wk 8	Wk 9	Wk 10	Wk 11	Wk 12	Wk 13	Wk 14	Wk 15	Wk 16	Wk 17	Wk 18	Wk 19	Wk 20	Wk 21	Wk 22	Wk 23	Wk 24	Wk 25	Wk 26	Wk 27	Wk 28	Wk 29	Wk 30	Wk 31	Wk 32	Wk 33	Wk 34
Inspection																															1	2	3	4
Project yard(s) layout and make ready for construction																															1	2	3	4
Receipt and storage and Project materials																															1	2	3	4
Survey and stake access roads and work areas																																		
Construct access roads and structure pads																																		
Tree clearing																																		
Install foundations																																		
Haul and assemble structures																																		
Erect structures																																		
Install overhead optical ground wire, overhead ground wire, and conductors																																		
Cleanup and restoration																																		

Table 8b
Project Duration Schedule – Months 9 to 16

Spread 1 – 228 Miles (W15, W21, W35, W36, W30, W32, W101, W125, W108, W116, W113, W410, W411, C31, C61, C91, C175, C186, C188)	**2015**																		**2016**																
	Month 9					**Month 10**				**Month 11**				**Month 12**					**Month 13**				**Month 14**				**Month 15**					**Month 16**			
	8/29	9/5	9/12	9/19	9/26	10/3	10/10	10/17	10/24	10/31	11/7	11/14	11/21	11/28	12/5	12/12	12/19	12/26	1/2	1/9	1/16	1/23	1/30	2/6	2/13	2/20	2/27	3/5	3/12	3/19	3/26	4/2	4/9	4/16	4/23
	210	216	222	228	234	240	246	252	258	264	270	276	282	288	294	300	306	312	318	324	330	336	342	348	354	360	366	372	378	384	390	396	402	408	414
	Wk 35	Wk 36	Wk 37	Wk 38	Wk 39	Wk 40	Wk 41	Wk 42	Wk 43	Wk 44	Wk 45	Wk 46	Wk 47	Wk 48	Wk 49	Wk 50	Wk 51	Wk 52	Wk 53	Wk 54	Wk 55	Wk 56	Wk 57	Wk 58	Wk 59	Wk 60	Wk 61	Wk 62	Wk 63	Wk 64	Wk 65	Wk 66	Wk 67	Wk 68	Wk 69
Inspection	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69
Project yard(s) layout and make ready for construction	35	36	37	38	39	40	41	42	43	44	45	46	47																						
Receipt and storage and Project materials														48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69
Survey and stake access roads and work areas	35	36	37	38	39	40	41	42	43	44	45	46	47	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61
Construct access roads and structure pads	27	28	29	30	31	32	33	34	35	36	37	38	39	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59
Tree clearing	25	26	27	28	29	30	31	32	33	34	35	36	37																						
Install foundations														30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51
Haul and assemble structures	17	18	19	20	21	22	23	24	25	26	27	28	29	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44
Erect structures	10	11	12	13	14	15	16	17	18	19	20	21	22	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Install overhead optical ground wire, overhead ground wire, and conductors					1	2	3	4	5	6	7	8	9	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
Cleanup and restoration													1												1	2	3	4	5	6	7	8	9	10	11

Spread 2 – 103 Miles (U242, U280, U285, U300, U400, U401, U404, U406)	**2015**																		**2016**																
	Month 9					**Month 10**				**Month 11**				**Month 12**					**Month 13**				**Month 14**				**Month 15**					**Month 16**			
	8/29	9/5	9/12	9/19	9/26	10/3	10/10	10/17	10/24	10/31	11/7	11/14	11/21	11/28	12/5	12/12	12/19	12/26	1/2	1/9	1/16	1/23	1/30	2/6	2/13	2/20	2/27	3/5	3/12	3/19	3/26	4/2	4/9	4/16	4/23
	210	216	222	228	234	240	246	252	258	264	270	276	282	288	294	300	306	312	318	324	330	336	342	348	354	360	366	372	378	384	390	396	402	408	414
	Wk 35	Wk 36	Wk 37	Wk 38	Wk 39	Wk 40	Wk 41	Wk 42	Wk 43	Wk 44	Wk 45	Wk 46	Wk 47	Wk 48	Wk 49	Wk 50	Wk 51	Wk 52	Wk 53	Wk 54	Wk 55	Wk 56	Wk 57	Wk 58	Wk 59	Wk 60	Wk 61	Wk 62	Wk 63	Wk 64	Wk 65	Wk 66	Wk 67	Wk 68	Wk 69
Inspection	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56
Project yard(s) layout and make ready for construction																																			
Receipt and storage and Project materials	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56
Survey and stake access roads and work areas	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
Construct access roads and structure pads	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43
Tree clearing	15	16	17	18	19	20	21																												
Install foundations	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
Haul and assemble structures							1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
Erect structures																1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Install overhead optical ground wire, overhead ground wire, and conductors																											1	2	3	4	5	6	7	8	9
Cleanup and restoration																																			

Spread 3 – 76 Miles (U525, U435, U545, U546, U548, U600, U636, U637, U639, U650, U640)	**2015**																		**2016**																
	Month 9					**Month 10**				**Month 11**				**Month 12**					**Month 13**				**Month 14**				**Month 15**					**Month 16**			
	8/29	9/5	9/12	9/19	9/26	10/3	10/10	10/17	10/24	10/31	11/7	11/14	11/21	11/28	12/5	12/12	12/19	12/26	1/2	1/9	1/16	1/23	1/30	2/6	2/13	2/20	2/27	3/5	3/12	3/19	3/26	4/2	4/9	4/16	4/23
	210	216	222	228	234	240	246	252	258	264	270	276	282	288	294	300	306	312	318	324	330	336	342	348	354	360	366	372	378	384	390	396	402	408	414
	Wk 35	Wk 36	Wk 37	Wk 38	Wk 39	Wk 40	Wk 41	Wk 42	Wk 43	Wk 44	Wk 45	Wk 46	Wk 47	Wk 48	Wk 49	Wk 50	Wk 51	Wk 52	Wk 53	Wk 54	Wk 55	Wk 56	Wk 57	Wk 58	Wk 59	Wk 60	Wk 61	Wk 62	Wk 63	Wk 64	Wk 65	Wk 66	Wk 67	Wk 68	Wk 69
Inspection	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
Project yard(s) layout and make ready for construction	5	6	7	8	9	10	11	12	13	14	15	16																							
Receipt and storage and Project materials	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39
Survey and stake access roads and work areas	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Construct access roads and structure pads								1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Tree clearing																			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Install foundations																																			
Haul and assemble structures																																			
Erect structures																																			
Install overhead optical ground wire, overhead ground wire, and conductors																																			
Cleanup and restoration																																			

Table 8c
Project Duration Schedule – Months 17 to 24

Spread 1 – 228 Miles (W15, W21, W35, W36, W30, W32, W101, W125, W108, W116, W113, W410, W411, C31, C61, C91, C175, C186, C188)	**2016**																																		
	Month 17				**Month 18**					**Month 19**				**Month 20**				**Month 21**					**Month 22**				**Month 23**				**Month 24**				
	4/30	5/7	5/14	5/21	5/28	6/4	6/11	6/18	6/25	7/2	7/9	7/16	7/23	7/30	8/6	8/13	8/20	8/27	9/3	9/10	9/17	9/24	10/1	10/8	10/15	10/22	10/29	11/5	11/12	11/19	11/26	12/3	12/10	12/17	12/24
	420	426	432	438	444	450	456	462	468	474	480	486	492	498	504	510	516	522	528	534	540	546	552	558	564	570	576	582	588	594	600	606	612	618	624
	Wk 70	Wk 71	Wk 72	Wk 73	Wk 74	Wk 75	Wk 76	Wk 77	Wk 78	Wk 79	Wk 80	Wk 81	Wk 82	Wk 83	Wk 84	Wk 85	Wk 86	Wk 87	Wk 88	Wk 89	Wk 90	Wk 91	Wk 92	Wk 93	Wk 94	Wk 95	Wk 96	Wk 97	Wk 98	Wk 99	Wk 100	Wk 101	Wk 102	Wk 103	Wk 104
Inspection	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104
Project yard(s) layout and make ready for construction																																			
Receipt and storage and Project materials	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104
Survey and stake access roads and work areas	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85											
Construct access roads and structure pads	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85									
Tree clearing																																			
Install foundations	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84		
Haul and assemble structures	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
Erect structures	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66
Install overhead optical ground wire, overhead ground wire, and conductors	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58
Cleanup and restoration	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46

Spread 2 – 103 Miles (U242, U280, U285, U300, U400, U401, U404, U406)	**2016**																																		
	Month 17				**Month 18**					**Month 19**				**Month 20**				**Month 21**					**Month 22**				**Month 23**				**Month 24**				
	4/30	5/7	5/14	5/21	5/28	6/4	6/11	6/18	6/25	7/2	7/9	7/16	7/23	7/30	8/6	8/13	8/20	8/27	9/3	9/10	9/17	9/24	10/1	10/8	10/15	10/22	10/29	11/5	11/12	11/19	11/26	12/3	12/10	12/17	12/24
	420	426	432	438	444	450	456	462	468	474	480	486	492	498	504	510	516	522	528	534	540	546	552	558	564	570	576	582	588	594	600	606	612	618	624
	Wk 70	Wk 71	Wk 72	Wk 73	Wk 74	Wk 75	Wk 76	Wk 77	Wk 78	Wk 79	Wk 80	Wk 81	Wk 82	Wk 83	Wk 84	Wk 85	Wk 86	Wk 87	Wk 88	Wk 89	Wk 90	Wk 91	Wk 92	Wk 93	Wk 94	Wk 95	Wk 96	Wk 97	Wk 98	Wk 99	Wk 100	Wk 101	Wk 102	Wk 103	Wk 104
Inspection	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91
Project yard(s) layout and make ready for construction																																			
Receipt and storage and Project materials	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82									
Survey and stake access roads and work areas																																			
Construct access roads and structure pads	44	45	46	47																															
Tree clearing																																			
Install foundations	37	38	39	40	41	42																													
Haul and assemble structures	30	31	32	33	34	35	36	37	38	39	40	41	42																						
Erect structures	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37																		
Install overhead optical ground wire, overhead ground wire, and conductors	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35									
Cleanup and restoration			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33

Spread 3 – 76 Miles (U525, U435, U545, U546, U548, U600, U636, U637, U639, U650, U640)	**2016**																																		
	Month 17				**Month 18**					**Month 19**				**Month 20**				**Month 21**					**Month 22**				**Month 23**				**Month 24**				
	4/30	5/7	5/14	5/21	5/28	6/4	6/11	6/18	6/25	7/2	7/9	7/16	7/23	7/30	8/6	8/13	8/20	8/27	9/3	9/10	9/17	9/24	10/1	10/8	10/15	10/22	10/29	11/5	11/12	11/19	11/26	12/3	12/10	12/17	12/24
	420	426	432	438	444	450	456	462	468	474	480	486	492	498	504	510	516	522	528	534	540	546	552	558	564	570	576	582	588	594	600	606	612	618	624
	Wk 70	Wk 71	Wk 72	Wk 73	Wk 74	Wk 75	Wk 76	Wk 77	Wk 78	Wk 79	Wk 80	Wk 81	Wk 82	Wk 83	Wk 84	Wk 85	Wk 86	Wk 87	Wk 88	Wk 89	Wk 90	Wk 91	Wk 92	Wk 93	Wk 94	Wk 95	Wk 96	Wk 97	Wk 98	Wk 99	Wk 100	Wk 101	Wk 102	Wk 103	Wk 104
Inspection	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74
Project yard(s) layout and make ready for construction																																			
Receipt and storage and Project materials	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74
Survey and stake access roads and work areas	36	37	38	39	40	41	42	43	44																										
Construct access roads and structure pads	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44																			
Tree clearing	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32																				
Install foundations							1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
Haul and assemble structures														1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
Erect structures																						1	2	3	4	5	6	7	8	9	10	11	12	13	14
Install overhead optical ground wire, overhead ground wire, and conductors																											1	2	3	4	5	6	7	8	9
Cleanup and restoration																																			

Table 8d
Project Duration Schedule – Months 25 to 32

Spread 1 – 228 Miles (W15, W21, W35, W36, W30, W32, W101, W125, W108, W116, W113, W410, W411, C31, C61, C91, C175, C186, C188)	**2017**																																	
	Month 25				**Month 26**				**Month 27**					**Month 28**				**Month 29**				**Month 30**					**Month 31**				**Month 32**			
	12/31	1/7	1/14	1/21	1/28	2/4	2/11	2/18	2/25	3/4	3/11	3/18	3/25	4/1	4/8	4/15	4/22	4/29	5/6	5/13	5/20	5/27	6/3	6/10	6/17	6/24	7/1	7/8	7/15	7/22	7/29	8/5	8/12	8/19
	630	636	642	648	654	660	666	672	678	684	690	696	702	708	714	720	726	732	738	744	750	756	762	768	774	780	786	792	798	804	810	816	822	828
	Wk 105	Wk 106	Wk 107	Wk 108	Wk 109	Wk 110	Wk 111	Wk 112	Wk 113	Wk 114	Wk 115	Wk 116	Wk 117	Wk 118	Wk 119	Wk 120	Wk 121	Wk 122	Wk 123	Wk 124	Wk 125	Wk 126	Wk 127	Wk 128	Wk 129	Wk 130	Wk 131	Wk 132	Wk 133	Wk 134	Wk 135	Wk 136	Wk 137	Wk 138
Inspection	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121																	
Project yard(s) layout and make ready for construction																																		
Receipt and storage and Project materials	105	106	107	108	109	110	111	112	113	114																								
Survey and stake access roads and work areas																																		
Construct access roads and structure pads																																		
Tree clearing																																		
Install foundations																																		
Haul and assemble structures	80	81	82	83	84																													
Erect structures	67	68	69	70	71	72																												
Install overhead optical ground wire, overhead ground wire, and conductors	59	60	61	62	63	64	65	66	67	68																								
Cleanup and restoration	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63																	

Spread 2 – 103 Miles (U242, U280, U285, U300, U400, U401, U404, U406)	**2017**																																	
	Month 25				**Month 26**				**Month 27**					**Month 28**				**Month 29**				**Month 30**					**Month 31**				**Month 32**			
	12/31	1/7	1/14	1/21	1/28	2/4	2/11	2/18	2/25	3/4	3/11	3/18	3/25	4/1	4/8	4/15	4/22	4/29	5/6	5/13	5/20	5/27	6/3	6/10	6/17	6/24	7/1	7/8	7/15	7/22	7/29	8/5	8/12	8/19
	630	636	642	648	654	660	666	672	678	684	690	696	702	708	714	720	726	732	738	744	750	756	762	768	774	780	786	792	798	804	810	816	822	828
	Wk 105	Wk 106	Wk 107	Wk 108	Wk 109	Wk 110	Wk 111	Wk 112	Wk 113	Wk 114	Wk 115	Wk 116	Wk 117	Wk 118	Wk 119	Wk 120	Wk 121	Wk 122	Wk 123	Wk 124	Wk 125	Wk 126	Wk 127	Wk 128	Wk 129	Wk 130	Wk 131	Wk 132	Wk 133	Wk 134	Wk 135	Wk 136	Wk 137	Wk 138
Inspection																																		
Project yard(s) layout and make ready for construction																																		
Receipt and storage and Project materials																																		
Survey and stake access roads and work areas																																		
Construct access roads and structure pads																																		
Tree clearing																																		
Install foundations																																		
Haul and assemble structures																																		
Erect structures																																		
Install overhead optical ground wire, overhead ground wire, and conductors																																		
Cleanup and restoration																																		

Spread 3 – 76 Miles (U525, U435, U545, U546, U548, U600, U636, U637, U639, U650, U640)	**2017**																																	
	Month 25				**Month 26**				**Month 27**					**Month 28**				**Month 29**				**Month 30**					**Month 31**				**Month 32**			
	12/31	1/7	1/14	1/21	1/28	2/4	2/11	2/18	2/25	3/4	3/11	3/18	3/25	4/1	4/8	4/15	4/22	4/29	5/6	5/13	5/20	5/27	6/3	6/10	6/17	6/24	7/1	7/8	7/15	7/22	7/29	8/5	8/12	8/19
	630	636	642	648	654	660	666	672	678	684	690	696	702	708	714	720	726	732	738	744	750	756	762	768	774	780	786	792	798	804	810	816	822	828
	Wk 105	Wk 106	Wk 107	Wk 108	Wk 109	Wk 110	Wk 111	Wk 112	Wk 113	Wk 114	Wk 115	Wk 116	Wk 117	Wk 118	Wk 119	Wk 120	Wk 121	Wk 122	Wk 123	Wk 124	Wk 125	Wk 126	Wk 127	Wk 128	Wk 129	Wk 130	Wk 131	Wk 132	Wk 133	Wk 134	Wk 135	Wk 136	Wk 137	Wk 138
Inspection	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	
Project yard(s) layout and make ready for construction																																		
Receipt and storage and Project materials	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98										
Survey and stake access roads and work areas																																		
Construct access roads and structure pads																																		
Tree clearing																																		
Install foundations	30	31	32	33																														
Haul and assemble structures	23	24	25	26	27	28	29	30	31	32	33																							
Erect structures	15	16	17	18	19	20	21	22	23	24	25	26	27	28																				
Install overhead optical ground wire, overhead ground wire, and conductors	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33										
Cleanup and restoration	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	

4 SYSTEM OPERATION AND MAINTENANCE

The 500kV transmission lines to be constructed as part of the Project comprise critical infrastructure of the Company's transmission system, and of the western U.S. electrical grid. Limiting the duration of unplanned outages and planning for the use of live-line maintenance techniques to minimize the requirement for any outages is an important part of the design, construction, and operation/maintenance requirements for this Project.

Operation and maintenance activities would be performed in accordance with direction in the approved Construction POD and right-of-way grant.

4.1 Routine System Operation and Maintenance

The goal of the Company is to provide its customers with a reliable supply of electricity while maintaining the overall integrity of the regional electrical grid. The Company's obligation to maintain reliable operation of the electrical system is documented in the Company's agreements with the various states through the Public Service Commissions and is directed through compliance with industry standard codes and practices such as the National Electrical Safety Code (ANSI C2), which governs the design and operation of high-voltage electric-utility systems.

In 2005, Congress passed the Energy Policy Act of 2005, which provided a regulatory basis for the implementation of specific incentives (and penalties) for maintaining reliable service, among other issues. As a result of the passage of the Act, the Federal Energy Regulatory Commission selected the NERC to act as the enforcement agency for compliance with electric utility reliability and operating standards, among other issues. The Company is required to be in compliance with the various reliability standards promulgated through the implementation of the NERC policies and procedures. Additionally, the Company is governed by the WECC standards that may be in addition to or more stringent than those currently required by NERC. In response, the Company has prepared internal operation and maintenance policies and procedures designed to meet the requirements of the NERC, WECC, and the state public utility commissions, while remaining in compliance with the applicable codes and standards with respect to maintaining the reliability of the electrical system.

Operation and maintenance activities would include transmission line patrols, climbing inspections, structure and wire inspection and maintenance, insulator washing in selected areas as needed, and access roads repairs. The Company would keep necessary work areas around structures clear of vegetation and would limit the height of vegetation along the right-of-way. Periodic inspection and maintenance of each of the substations and communications facilities is also a key part of operating and maintaining the electrical system. The following sections provide details on the anticipated operation and maintenance activities for Gateway South.

After the transmission line has been energized, land uses that are compatible with safety regulations would be permitted in and adjacent to the right-of-way. Existing land uses such as agriculture and grazing are generally permitted within the right-of-way. Incompatible land uses within the right-of-way include construction and maintenance of inhabited dwellings and any use requiring changes in surface elevation that would affect electrical clearances of existing or planned facilities.

Land uses that comply with local regulations would be permitted adjacent to the right-of-way. Compatible uses of the right-of-way on public lands would have to be approved by the appropriate agency. Permission to use the easement on private lands would have to be obtained from the utility owning the transmission line.

4.1.1 Routine System Inspection, Maintenance, and Repair

Regular inspection of transmission lines, substations, and support systems is critical for safe, efficient, and economical operation of the Project.

4.1.2 Transmission Line Maintenance

Regular ground and aerial inspections would be performed in accordance with the Company's established policies and procedures for transmission line inspection and maintenance. The Company's transmission lines and substations would be inspected for corrosion, equipment misalignment, loose fittings, vandalism, and other mechanical problems. The need for vegetation management would also be determined during inspection patrols.

Inspection of the entire transmission line system would be conducted three times annually. Aerial inspection would be conducted by helicopter on an annual basis and would require two or three crew members, including the pilot. Detailed ground inspections would take place on a semi-annual basis using existing access roads to each structure. Ground inspection would use four-wheel-drive trucks or four-wheel-drive ATVs. The inspector would assess the condition of the transmission line and hardware to determine if any components need to be repaired or replaced, or if other conditions exist that require maintenance or modification activities. The inspector also would note any unauthorized encroachments and trash dumping on the right-of-way that could constitute a safety hazard. The inspector would access each of the structure locations along each line and use binoculars and spotting scopes to perform this inspection.

4.1.3 Hardware Maintenance and Repairs

Routine maintenance activities are ordinary maintenance tasks that historically have been performed and are regularly carried out on a routine basis. The work performed typically is repair or replacement of individual components (no new ground disturbance), performed by relatively small crews using a minimum of equipment, and usually is conducted within a period from a few hours up to a few days. Work requires access to the damaged portion of the line to allow for a safe and efficient repair of the facility. Equipment required for this work may include four-wheel-drive trucks, material (flatbed) trucks, cranes, bucket trucks (low-reach), boom trucks (high-reach), or man lifts. This work is scheduled and typically is required due to issues found during inspections. Typical items that may require periodic replacement on a 500kV structure include insulators, hardware, or structure members. It is expected that these replacements would be required infrequently.

The Company plans to conduct maintenance on the critical 500kV and 345kV system using live-line maintenance techniques. Maintenance on the transmission lines can be completed safely using live-line techniques, thereby avoiding an outage to the critical transmission-line infrastructure. High-reach bucket trucks along with other equipment are used to conduct these activities.

For the 345kV and 500kV structures, this requires that adequate space be available at each structure site so that the high reach bucket truck can be positioned to one side or the other of the structure and reach up and over the lower phases to access the upper center phase for live-line maintenance procedures.

For the 345kV H-frame structures, this requires that adequate space be available at each structure site so that a bucket truck can be positioned to access the outside phases. To allow room at each structure for these activities, in low-slope areas, a pad area of 250 feet (right-of-way width) by 140 feet is required with the structure in the center for the single-circuit 500kV structure, and 150 by 100 feet for the 345kV H-frame structure. Figures 11 and 12 depict the space requirements for live-line maintenance. The size

and location of these required pads near the structures may vary depending on the side slope and access road at each site. The work areas and pads would be cleared to the extent needed to safely complete the work. These pads would remain in place after construction, but would be revegetated after the construction has been completed.

4.1.4 Access Road and Work Area Repair

Right-of-way repairs include grading, vegetation management of existing maintenance access roads and work areas, and spot repair of sites subject to flooding or scouring. All road-maintenance standards, such as maintaining cross-road drainage and replacing road-drainage structures, would be compliant with those of the agency managing the land. Required equipment may include a grader, backhoe, four-wheel-drive pickup truck, and a cat-loader or bulldozer. The cat-loader has steel tracks whereas the grader, backhoe, and truck typically have rubber tires. Repair of the right-of-way would be scheduled as a result of line inspections, or would occur in response to an emergency situation. Scheduling of these activities would attempt to adhere to specific biological seasonal restriction timeframes identified in the Construction POD and would be coordinated ahead of time with land-management agency unless it is an emergency situation.

4.1.5 Vegetation Management

The Company must maintain work areas adjacent to electrical transmission structures and along the right-of-way for vehicle and equipment access required for operations, maintenance, and repair, including for live-line maintenance activities as described above under Section 4.1.3 – Hardware Maintenance and Repairs. Shrubs and other obstructions would be removed regularly near structures to facilitate inspection and maintenance of equipment and to ensure system reliability.

Vegetation management practices along the right-of-way would be in accordance with the Company clearing specifications and vegetation management plans (PacifiCorp 2007). Much of the transmission-line alternative routes traverse arid country characterized by low-growing vegetation, while higher elevations receive more precipitation and exhibit more vegetation. The wire-border zone method to controlling vegetation is an approach used by the Company (PacifiCorp 2007). This method results in two zones of clearing and revegetation. The wire zone is the linear area along the right-of-way under the wires and extending 10 feet outside of the outermost phase conductor. After initial clearing, vegetation in the wire zone would be maintained to consist of native grasses, legumes, herbs, ferns, and other low-growing shrubs that remain under 5-feet tall at maturity. The border zone is the linear area along each side of the right-of-way extending from the wire zone to the edge of the right-of-way.

Vegetation in the border zone would be maintained to consist of tall shrubs or short trees (up to 25-feet tall at maturity), grasses, and forbs. These cover/herbaceous plants benefit the right-of-way by competing with and excluding undesirable plants. The width of the wire and border zones is depicted in Figure 13 for the 345kV H-frame and 500kV single-circuit structure line segments. During operations, vegetation growth would be monitored and managed to maintain the wire-border zone objectives. When conductor ground clearance is greater than 50 feet, for example a canyon or ravine crossing with high ground clearance at mid-span, trees and shrubs would be left in place as long as the conductor clearance to the vegetation tops is 50 feet or more (Figure 14).

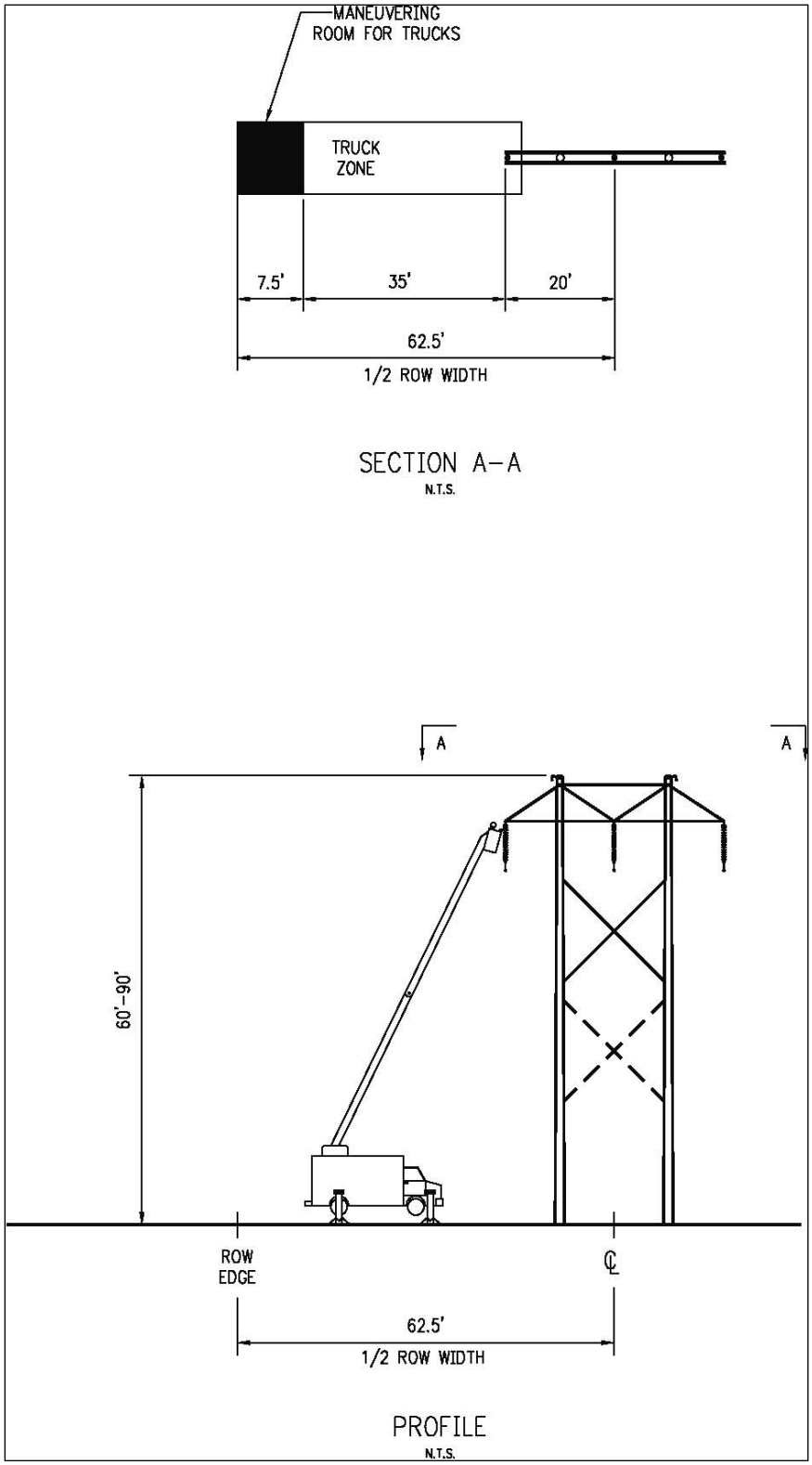


Figure 11 Live-line Maintenance Space Requirements, Single-circuit 345-kilovolt Line

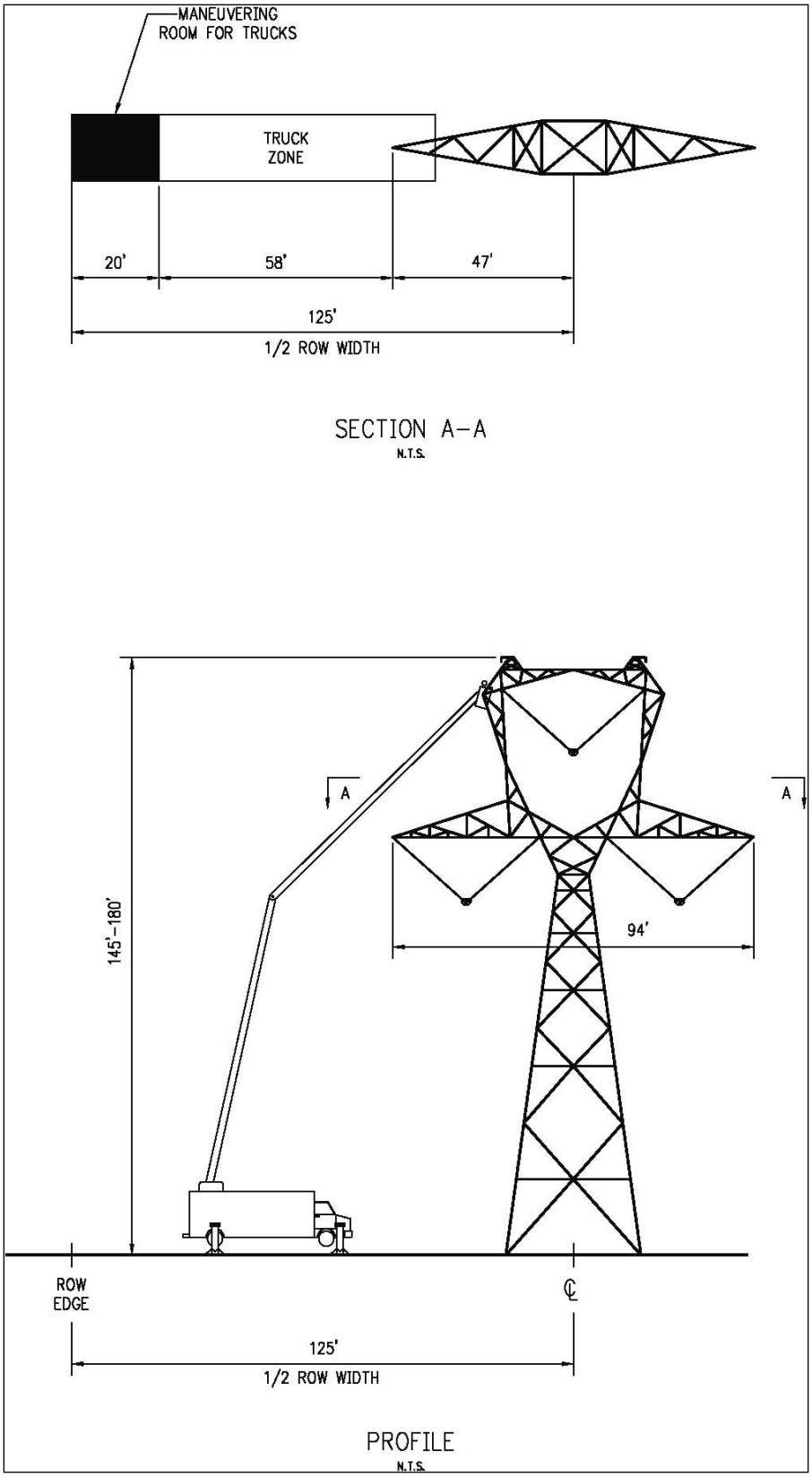


Figure 12 Live-line Maintenance Space Requirements, Single-circuit 500-kilovolt Line

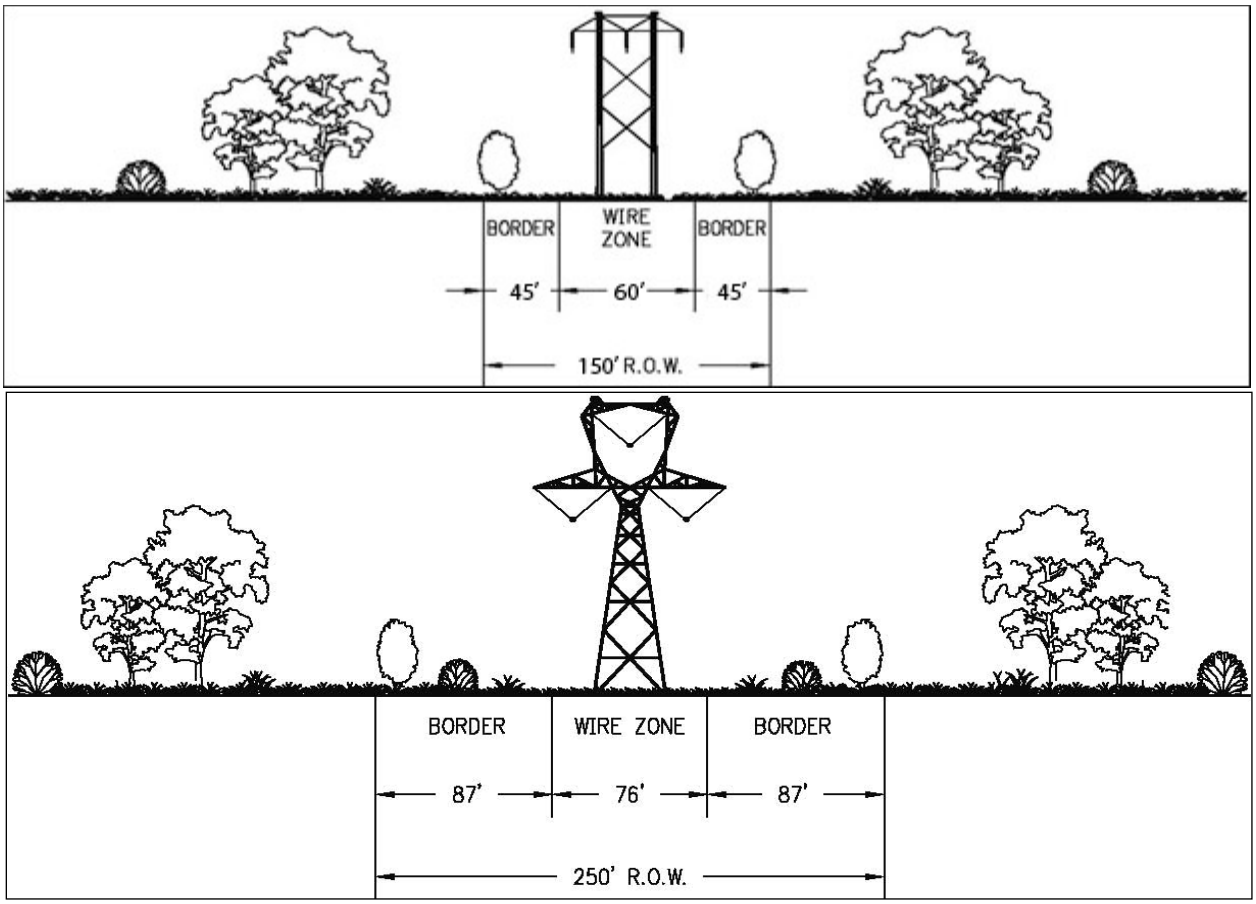


Figure 13 Single-circuit 345-kilovolt Line (top), Single-circuit 500-kilovolt Line (bottom)

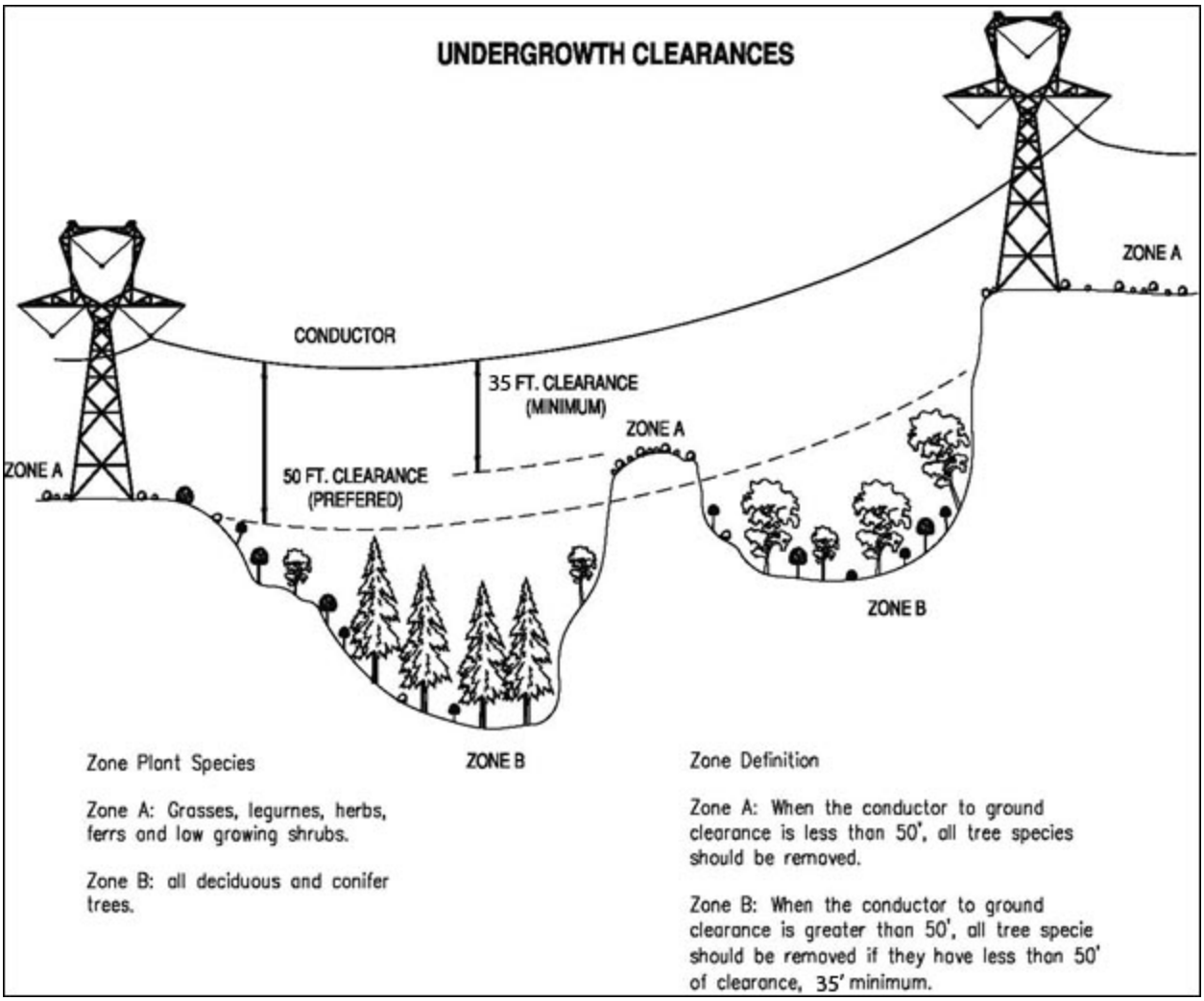


Figure 14 Right-of-way Vegetation Management in Steep Terrain

4.1.6 Substation and Regeneration Station Maintenance

Substation and regeneration station monitoring and control functions are performed remotely from the Company's central operations facilities located at Company's operation center in Portland, Oregon. Unauthorized entry into substations or regeneration stations is prevented with the provision of fencing and locked gates. Warning signs would be posted and entry to the operating facilities would be restricted to authorized personnel. Gateway South substations and regeneration stations would not be staffed; however, a remotely monitored security system would be installed. Several forms of security are planned for each of the locations, although the security arrangements at each of the substations or regeneration stations may differ somewhat. Security measures may include fire detection in the control building via the remote monitoring system; alarming for forced entry; and a perimeter security system coupled with remote sensing infrared camera equipment in the fenced area of the station to provide visual observation/confirmation to the system operator of disturbances at the fence line.

Maintenance activities include equipment testing, equipment monitoring and repair, and emergency and routine procedures for service continuity and preventive maintenance. It is anticipated that maintenance at each substation would require approximately six trips per year by a two- to four-person crew. Routine

operations would require one or two workers in a light utility truck to visit the substations monthly. Typically, once per year a major maintenance inspection would take place requiring up to 15 personnel for 1 to 3 weeks. Regeneration stations would be visited every 2 to 3 months by one individual in a light truck to inspect the facilities. Annual maintenance would be performed by a two man crew in a light truck over a 2- to 5-day period. If substation landscaping is required by the permitting agency, drought-tolerant plant materials would be used to minimize watering requirements after plant establishment.

Safety lighting at the substations would be provided inside the substation fence for the purpose of emergency repair work. Because night activities are not expected to occur more than once per year, the safety lighting inside the substation fence normally would be turned off. One floodlight, mounted near the entry gate to safely illuminate the substation entry gate, may be left on during nighttime hours.

4.2 Emergency Response

The operation of the system is remotely managed and monitored from control rooms at the Company's operation center in Portland, Oregon. Electrical outages or variations from normal operating protocols would be sensed and reported at these operation centers. As well, the substations are equipped with remote monitoring, proximity alarms, and in some cases video surveillance.

The implementation of routine operation and maintenance activities on powerlines would minimize the need for most emergency repairs. Emergency maintenance activities are often those activities necessary to repair natural hazard, fire, or human-caused damages to a line. Such work is required to eliminate a safety hazard, prevent imminent damage to the powerline, or restore service if there is an outage. In an emergency, the Company must respond as quickly as possible to restore power.

The equipment necessary to accomplish emergency repairs is similar to that required to conduct routine maintenance, in most cases. Emergency response to outages may require additional equipment to complete the repairs. For example, where the site of the outage is remote, helicopters may be used to respond quickly to emergencies. Emergency vehicle access to private property also would be maintained.

In practice, as soon as an incident is detected, the control-room dispatchers would notify the responsible operations staff in the area(s) affected and crews and equipment would be organized and dispatched to respond to the incident.

4.2.1 Fire Protection

All federal, state, and county laws, ordinances, rules, and regulations pertaining to fire prevention and suppression would be strictly adhered to. All personnel would be advised of their responsibilities under the applicable fire laws and regulations.

When working on public or National Forest System land, the Company's employees and contractor's vehicles would be equipped with approved suppression tools and equipment. The Applicant or their construction contractor would notify local fire authorities and the BLM or USFS (as appropriate) if a Project-related fire occurs within or adjacent to a construction area a complete fire protection plan would be developed as part of the Construction POD.

If the Company becomes aware of an emergency situation that is caused by a fire on or threatening BLM- or USFS-managed land and that could damage the transmission lines or its operation, it would notify the appropriate agency and emergency office contact. Specific construction-related activities and safety measures would be implemented during construction of the transmission line to prevent fires and to ensure quick response and suppression if a fire occurs. Typical practices to prevent fires during

construction and maintenance/repair activities include brush clearing prior to work, prohibit burning of slash, stationing a water truck at the job site to keep the ground and vegetation moist in extreme fire conditions, enforcing red flag warnings, providing “fire behavior” training to all pertinent personnel, keeping vehicles on or within designated roads or work areas, equip all construction equipment operating with internal combustion engines with spark arresters, and providing fire suppression equipment and emergency notification numbers at each construction site

.

5 DECOMMISSIONING

The proposed transmission line would have a projected operational life of at least 50 years or longer. At the end of the useful life of the Project and if the facility were no longer required, the transmission line would be removed from service. Prior to the decommissioning and 2 years prior to such event, the Company would notify the authorizing agency of their intent to terminate right-of-way and would develop a reclamation plan. The reclamation plan would be reviewed and approved by the agencies and a reclamation bond would be posted and any required NEPA completed prior to commencing any abandonment actions. At such time, conductors, insulators, and hardware would be dismantled and removed from the right-of-way, according to the agency-approved plan. Structures would be removed and foundations removed to below ground surface.

Following removal of the transmission-line structures and equipment from the right-of-way, any areas disturbed during line dismantling would be restored and rehabilitated in accordance with the approved reclamation plan. In the same way, if a substation is no longer required, the substation structures and equipment would be dismantled and removed from the site. The station structures would be disassembled and either re-used at another station or sold for scrap. Major equipment such as breakers, transformers, and reactors would be removed, refurbished, and stored for use at another facility. Foundations would be either abandoned in-place or cut off below ground level and buried according to the approved reclamation plan.

The Company describes roads necessary for the operation and maintenance of transmission lines as access roads, with the sole purpose of providing maintenance crews access to the transmission lines. These roads would not exist if the transmission lines did not exist. In contrast, access roads serve a broader purpose, such as contributing to the federal, county, or state road systems. Access roads provide direct or indirect access to the transmission lines, but that access is not their primary purpose. The Company is responsible for the reclamation of access roads following abandonment and in accordance with the land-management agency's or landowner's direction, but is not responsible for reclamation of access roads unless mutually agreed upon by the Company and the landowner or required by the land-management agency. Access roads would be decommissioned following removal of the structures and lines, and may be decommissioned while the lines are in-service if they are determined to be no longer needed.

The Company may decommission access roads by (1) entering into an agreement with the BLM or USFS under which the agencies restore the road located on federal lands and is reimbursed for costs by the Company or (2) the Company or its contractor implement restoration measures as described below.

When an access road has been identified as no longer needed, the road would be reclaimed and seeded as soon as possible during the optimal seeding season. In some cases, reseeding may not be necessary, given the existing amount of soil compaction and vegetation currently in place. Where required by the land-management agency, compacted areas would be ripped and appropriate sediment control measures would be implemented.

Restoration and reclamation of the Project right-of-way would be in accordance with Section 3.2.8 – Site Reclamation and in accordance with the Project Construction POD.

REFERENCES

Institute of Electrical and Electronics Engineers (IEEE). 2007. National Electric Safety Code. IEEE Standards Association. New York, New York.

PacifiCorp. 2007. Transmission and Distribution Vegetation Management Program: Specification Manual. PacifiCorp System Forester. Salt Lake City, Utah. June 1.

Attachment A – Access Road Standards

Avian-Safe Transmission Structures

A. Scope

This standard provides information regarding the protection of birds of prey (raptors) and other large birds from electrocution resulting from contact with overhead transmission power lines.

B. Background and Regulations

Raptors and other large birds can get electrocuted from coming into contact with overhead power lines. In addition to bird mortalities, such electrocutions can cause interruption of power, resulting in reduced reliability and restoration costs. Various government agencies, conservation groups and the general public demand both higher service reliability and better protection of avian populations and their habitats. PacifiCorp's Bird Management Program and Avian Protection Plans use proactive, reactive and preventative measures to reduce bird mortalities and bird-related outages. Additional information can be found on the Environmental Services intranet website.

The following federal laws in the U.S. Protect almost all avian species:

- The Migratory Bird Treaty Act (MBTA) of 1918
- The Bald and Golden Eagle Protection Act of 1940
- The Endangered Species Act (ESA) of 1973

The MBTA protects over 800 species of native North American migratory birds, with the other two acts placing further emphasis on preservation of eagles and endangered species of birds. Failure to comply with these laws can result in substantial fines and criminal prosecution. Therefore transmission system owners must actively attempt to prevent avian electrocutions.

C. Avian Electrocutions

Birds can be electrocuted by simultaneously contacting two energized conductors or an energized conductor and grounded structures, conductors, hardware, or equipment. Electrocutions may occur when the bird is landing, perching or taking off. The electrical design factor most crucial to avian electrocutions on structures is the physical seperation between energized and/or grounded components that can be bridged by birds. As a general, rule electrocutions occur on structures with the following:

1. Phase conductors separated by less than the wrist-to-wrist distance or height of a bird. See Figure 1.
2. Grounded hardware (e.g. grounded wires, bolts, etc.) separated from and energized phase conductor by less than the wrist-to-wrist distance or height of a bird.

Dry feathers provide insulation, so birds must typically contact electrical equipment with fleshy parts that are conductive for electrocution to occur. Fleshy parts include the feet, mouth bill and the wrists from which the primary feathers originate. For a large golden eagle with a 90″ wingspan, the distance from the fleshy tip of one wrist to the tip of the other can measure up to 42 inches; the height (head to foot) of an eagle can reach up to 28 inches.

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Figure 1 — Typical eagle dimensions

D. Avian-Safe Symbol

"Avian-Safe" structures have been designed to provide adequate distances between energized and/or grounded components in order to allow birds to perch without risk of electrocution. Avian-safe overhead transmission construction standards are marked at the top of the first page with the symbol shown in Figure 2.

May be used
In raptor areas

Figure 2 — Avian-safe symbol

E. Avian Protection

Transmission structures generally have sufficient separation between phases, but there are many shielded structures that do not have adequate separation between energized and grounded components. Installing avian protection devices, such as covers, can greatly reduce bird fatalities. This method of protection is preferred for existing structures because of lesser cost of retrofitting and no line outage.

For new construction, the preferred method of protection is to provide adequate horizontal and vertical separation between all energized and grounded components of the structure, and/or between phases, such that large birds cannot bridge that distance.

The industry standard for avian protection on power lines, which is also used by PacifiCorp, is **60 inches of horizontal separation** and **40 inches of vertical separation.**

These clearances shall apply to all grounded structures such as concrete, steel, or grounded wood poles, or where phase-to-phase distance is inadequate. The separations are intended to allow sufficient clearance for an eagle. Applying this standard will

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also protect smaller birds, such as ospreys, hawks, owls, wading birds and song birds. Several transmission structure types with minimum distances labeled are shown in Figure 3 and Figure 4.

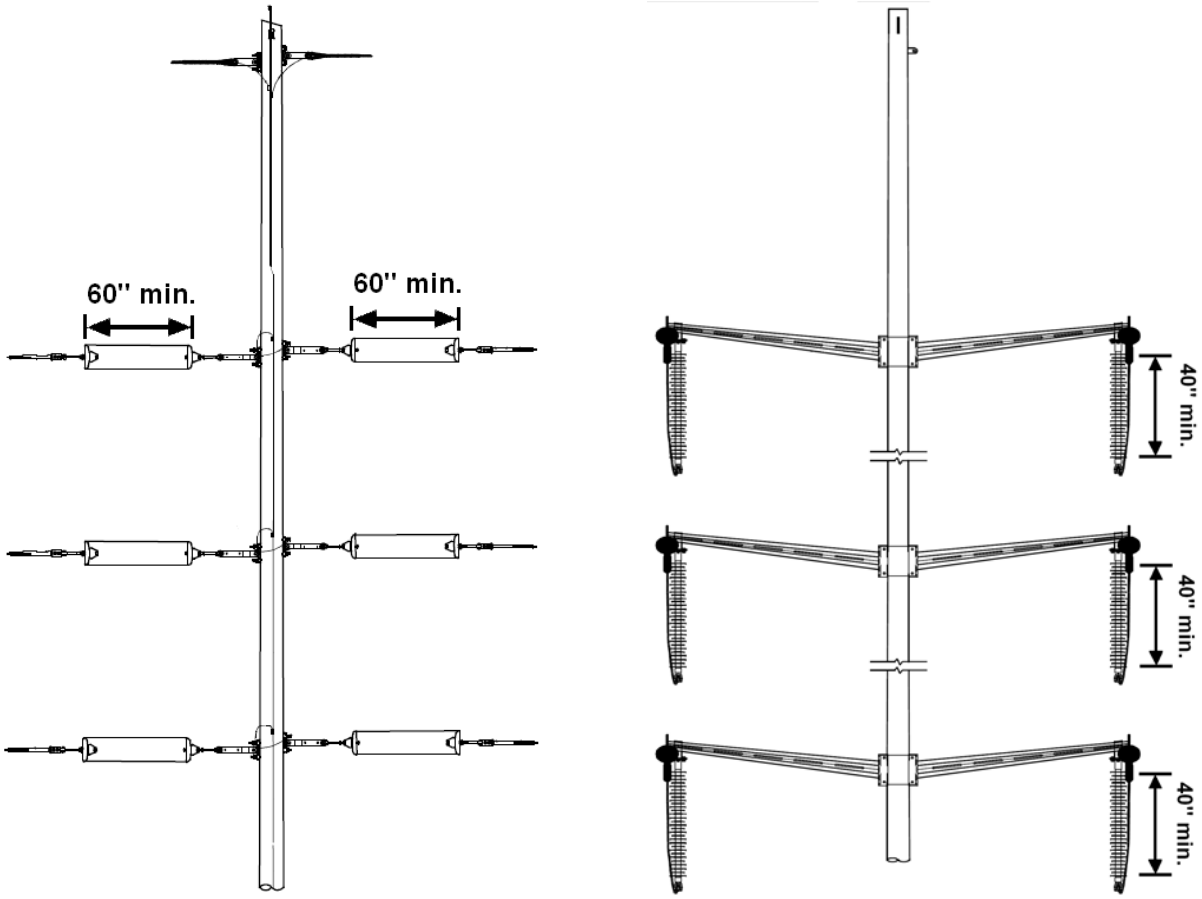

Figure 3 — Deadend transmission structures showing minimum required distances

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Sr. Engineer (C. Wright): CLW

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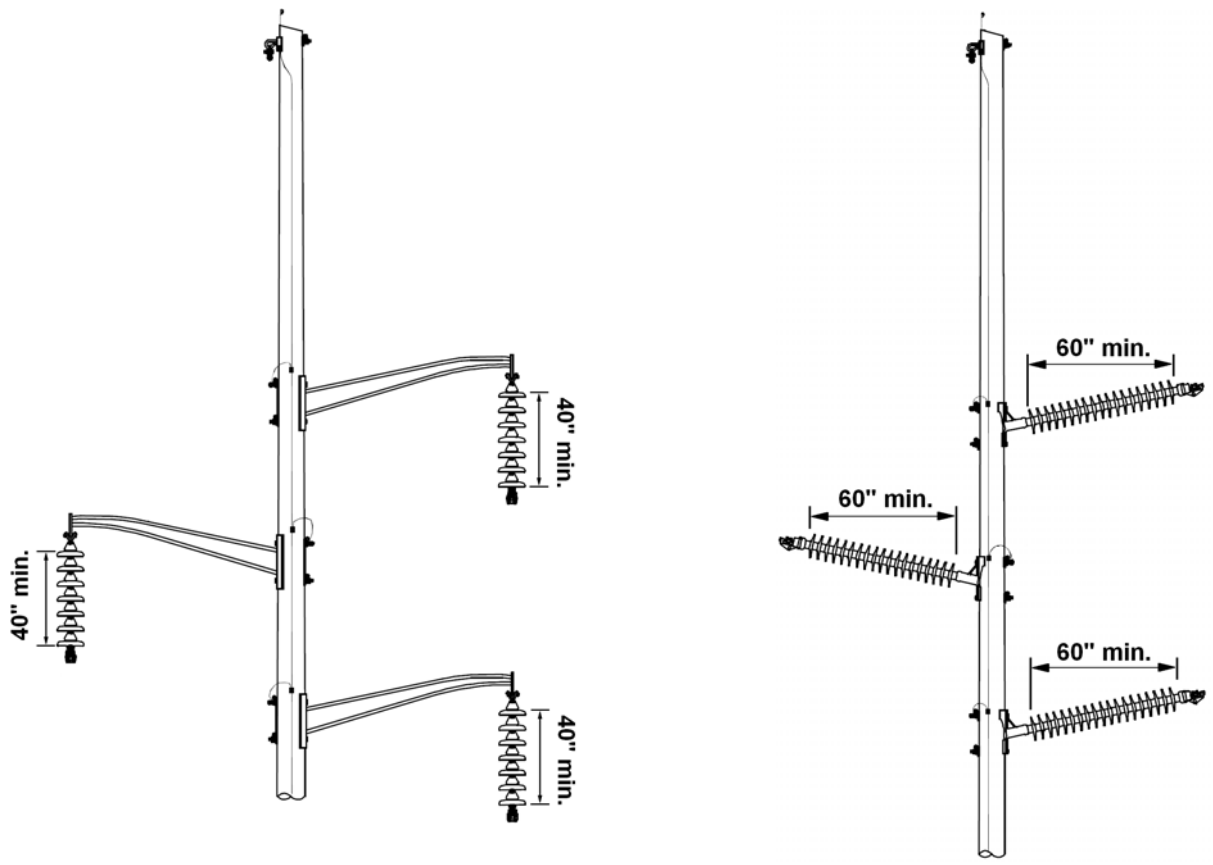

Figure 4 — Tangent transmission structures showing minimum required distances

The required minimum distances between energized conductors and grounded equipment apply to grounded structures only. There are two main types of transmission poles which fall under this category:

- Steel or concrete poles, which are always grounded.
- *Shielded* wood poles, which have a grounded wire running the length of the pole with all hardware bonded.

Unshielded wood poles do not have a grounding wire running the length of the pole, and birds do not get electrocuted by contacting the pole and energized conductor simultaneously.

The minimum lengths discussed in this standard are intended to guide design and installation of transmission structures from 46/69 kV through 138 kV. Transmission structures for 161 kV and above have sufficiently long insulators to meet all the minimum clearance requirements described above.

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F. Reporting Mortalities and Problem Nests

Dead birds of protected species found on, below or near PacifiCorp distribution and transmission facilities or substations must be reported using PacifiCorp's Bird Mortality Tracking System (BMTS). All required data for entry into the BMTS should be collected by field personnel that discovered the mortality.

All birds, excluding eagles and threatened or endangered species, should be buried on site after data is collected, unless the carcass has a leg band, radio transmitter, neck collar or other special marker. If it is not possible to bury or dispose of the carcass, leave it on site and notify the local manager. A mortality record must be entered into the BMTS and appropriate remedial action taken, as described below.

The BMTS website may be found here:

PacifiCorp Intranet Home Page

→ *Environment*

→ *Environmental Resources*

→ *PP or RMP Environmental Support*

→ *Avian*

→ *Bird Mortality/Problem Nest Incident Reporting*

Click "Add Mortality" to review all the information required in reporting a bird mortality.

Eagle or other endangered/threatened bird mortalities must be reported to Environmental Services immediately upon discovery. Environmental Services will notify USFWS of dead eagles, which will be retrieved by the agency. File a report using the BMTS as described above, including detailed directions to the site for retrieval of the carcass. The local manager must be notified immediately regarding any eagle, endangered/threatened species or marked bird mortalities. Endangered and threatened species that may be seen at PacifiCorp's facilities include California condor, bald eagle, whooping crane and spotted owl.

Although electrocution of birds nesting on power line equipment is relatively rare, nests may cause operational problems. Problem nests may also be reported using the BMTS Nests which do not interfere with power operations should be left in place. In most cases, a permit is required to remove or relocate a nest. If a nest is causing immediate danger of fire, safety risk to crew, risk of bird electrocution or threat to human life or property, then PacifiCorp crews may take immediate action prior to receiving a permit. In this case, Environmental Services must be notified immediately to report "imminent danger" action taken.

Training presentation on bird protection are conducted by Environmental Services for field personnel. Training materials are also available on the Environment intranet website. Environmental Services staff will assist with site-specific prescriptions as necessary. Each district is responsible for ensuring that all employees likely to find dead birds or nests are familiar with the proper procedures for reporting and documentation, and other aspects of PacifiCorp's Bird Management Program.

The BMTS is a searchable database of bird mortalities and problem nests. To avoid entering redundant mortalities or nests, search for past reported incidents and confirm that it has not already been reported.

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G. New Construction and Maintenance

All new or rebuilt power lines and poles shall be built to avian-safe standards.

Poles where a protected bird was killed must be retrofitted to prevent additional electrocutions. Retrofitting could include the following:

- Applying covers
- Installing longer insulators
- Reframing or replacing the structure

For more information on all of the avian-safe topics discussed here, refer to PacifiCorp's Bird Management Program Guidelines and other related documents on the Avian Program site:

PacifiCorp Intranet Home Page

→ *Environment*

→ *Environmental Resources*

→ *PP or RMP Environmental Support*

→ *Avian*

→ *Bird Management Guidance Documents*

→ *Bird Management Policies*

→ *Raptor Safe Construction Standards*

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Roads—Clearing for Installation and Maintenance of Roads

A. Scope

This standard supplies information about clearing necessary for installation of transmission line access and rights-of-way roads. Clearing width for the construction of new roads or maintenance of existing roads shall be three (3) feet beyond the edge of the roadway on level ground. On hillside cuts or fills, the clearing shall be sufficient width to install the cut or fill without interference. (See figure 1).

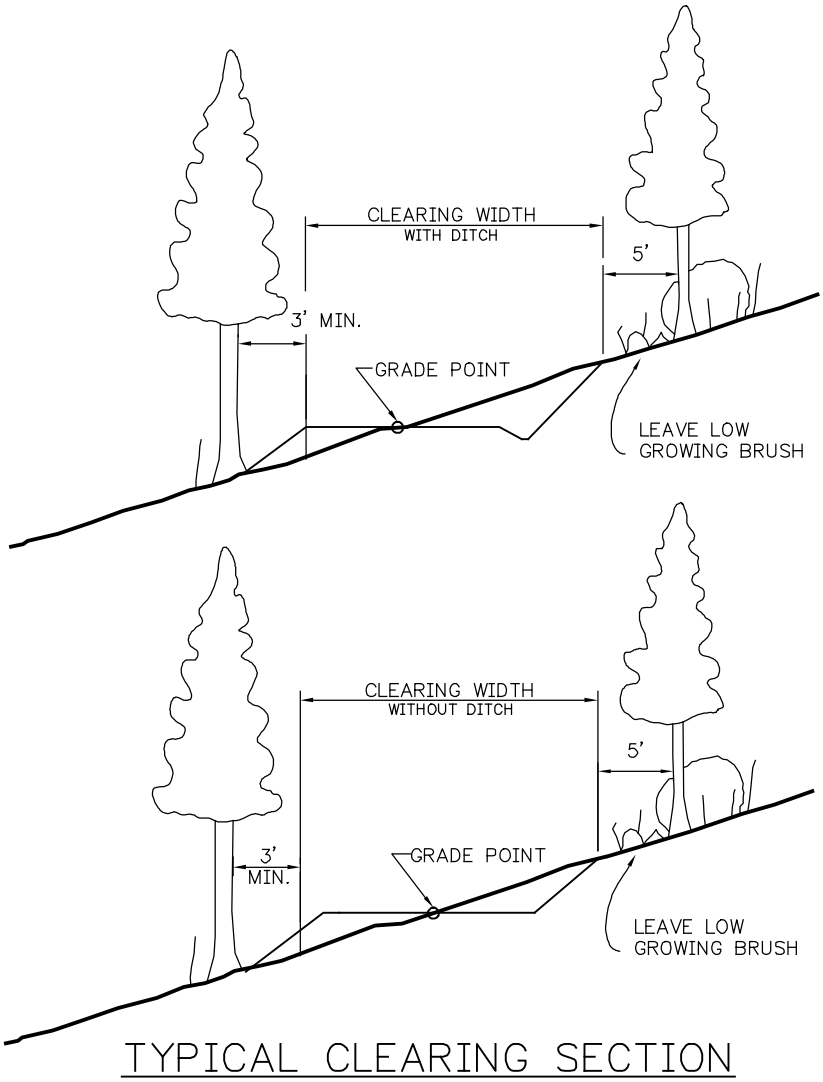

Figure 1—Road Clearing Cross Section

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Roads—Clearing for Installation and Maintenance of Roads

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5 Oct 11

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Table 1 — Clearing Width

Side Slope (%)	Cut Slope	Clearing Width (ft)	Clearing Width (ft)	Clearing Width For Turnouts (ft)	
		w/o Ditch	w/ Ditch	w/o Ditch	w/ Ditch
0		24	27	30	33
10	1.5 : 1	26	30	32	35
20	1.5 : 1	27	31	33	37
30	1.5 : 1	29	32	36	40
40	1.5 : 1	31	35	39	43
50	1.5 : 1	34	39	44	49
60	3/4 : 1±	37	44	48	55
70	3/4 : 1±	45	52	55	62
80	1/2 : 1±	37	43	47	53

Notes:

1. See specifications for additional information on clearing and grubbing.
2. ± full bench
3. For clearing purpose only.

Where it is necessary to fell trees in streamside areas, fell trees away from streams, retaining all non-hazardous vegetation. Do not skid trees in, through, or across streams.

All operations on federal government property shall comply with applicable statutes and regulations, including stipulations contained in right-of-way permits.

No trees shall be cut or removed before they are marked for removal.

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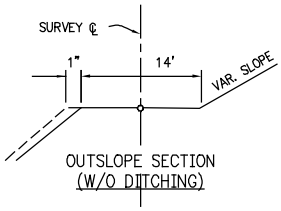
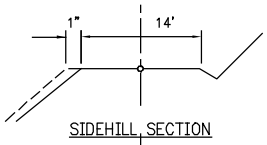
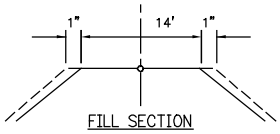
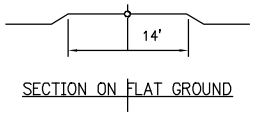
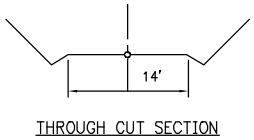
Roads—Construction

A. Scope

This standard provides information about constructing transmission line access. All road construction/improvements, fords, structure/equipment landings, and lay-down yards shall be held to a minimum. On level terrain, road construction may only require back-dragging a blade to remove brush to facilitate construction. In undulating or mountainous terrain the following standards shall apply.

B. Index

The index below provides a quick reference to detailed figures contained in this standard for road construction with varying slopes and conditions.

Referenced Road Cross Section	ACCESS ROAD SECTION
Figure 2	
Figure 3 Figure 4 Figure 5	
Figure 2	
Figure 2	
Figure 2	

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C. Planning

Before construction can take place. the road system must be planned and located properly. Poor planning or road location is associated with the following most common causes of road failure (Furniss et al. 1991):

- Improper placement and construction of road fills.
- Insufficient culvert sizes.
- Very steep road grades.
- Improper placement or sidecast of excess materials.
- Removal of slope support by undercutting.
- Altering drainage by interception and concentration of surface and subsurface flows.

A plan showing existing and new road locations shall be developed and shall be shown on the company's access road charts, plan maps, and transportation plan map. Road locations shall be marked on the ground by survey stakes and blue-and-white, striped flagging. GPS coordinates shall be obtained to define the road center–line. These coordinates shall be used to create the transportation plan map. Road information shall also be placed on transmission line plan maps.

In the event of conflict between the drawings and the staked locations, the latter shall take precedence and transportation plan maps and the transmission line plan maps shall be revised accordingly. Any culverts and gates listed in access road charts are required. Fords, drainage improvements, rip-rap fills and crushed rock requirements listed in the access road charts are anticipated; however, requirements will be determined based on actual site conditions encountered. If changes are made in the field, the maps shall be revised to show these changes.

Because roads are long-term features, their location must be carefully chosen to provide safe access, avoid long-term maintenance problems, reduce potential for degrading water quality, and minimize costs over the short and long term. For more information see the references in Section H.

D. Road Construction

Roads shall be constructed in a manner that will support equipment for construction of the transmission line and to provide access roads for line inspection and maintenance equipment after the line has been constructed.

All construction access roads on federally managed public lands are subject to approval prior to construction. Other federal, state, and local landowners may require approvals before road construction commences on their property. Where side slopes exceed 60 percent, a full bench cut will be reburied. No side-casting of material will be allowed in these areas; end-haul of material will be required to a designated location approved by the federal agency or other property owner. Close coordination with the federal agency will be required.

The detail drawings provided in this standard for completing cuts and fills, providing drainage, and installing culverts are furnished as guidelines for the road construction. Actual road construction cut slopes, fill slopes, drainage requirements, rip-rap, and

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crushed rock needs will be determined during construction based on site conditions. Cut and fill quantities shall balance when possible, reducing the material removed or brought in for road completion.

During road construction, consideration shall be given to restoration required after construction completion, including re-vegetation, rock cover, and other drainage and erosion control factors. Clearing and grading shall be minimized to reduce the restoration requirements for disturbed areas. The visual impact of roads on the surrounding areas shall be considered at all times during construction.

Crushed rock shall be sound, hard, durable, angular, or sub-angular rock, suitable for road base courses. Crushed rock shall be well graded 2″ to 1/4″ size (3″ to minus-size skip-graded is a minimum acceptable substitute).

Rip Rap shall be sound, hard, durable, rock ranging in size from 2″ to 8″ as specified on drawings and as required by conditions.

Any improvements made, including spur roads, fords, bridges, equipment landings and lay-down areas, shall be held to a minimum. Following completion of the work, the removal of these improvements shall be at the discretion of company or its representative.

Roads shall be sufficiently wide, but not less than 14′ in width. The construction shall provide bench cuts, grading, filling, compaction, and ditches necessary to accommodate heavy construction equipment and other heavily loaded vehicles. Roads shall be installed in accordance with the figures in this standard.

All roads shall be constructed with a smooth, uniform surface and shall be outsloped where practical to provide drainage and minimum erosion. Avoid outsloped roads where they will direct runoff onto erodible fill, embankments, or where they would cause off-camber curves. Where outsloping is not practical, sufficient water dips, water bars, or ditching, shall be installed as shown in the Section E of this standard. See standards TA 503, *Roads—Water Bars and Water Dips* and TA 504, *Roads—Culvert Installation* for further detail on proper drainage.

Outsloping a road means building the road surface so that it is tilted outward 2-3 percent so water can run off the road surface (see Figure 1). Outsloping works well under the right conditions. The following conditions are favorable for use of outsloped roads with no ditch:

- Short back slopes.
- Terrain slope less than 20 percent.
- Road grades steeper than 3 percent.
- Seasonal road use.
- Light traffic.
- Fast re-vegetation of cut and fill slopes.

Outslopes become a problem if roads are not maintained when ruts begin to form. The ruts will then act as channels.

The following conditions are unfavorable for outsloping:

- Long back slopes.

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- Terrain steeper than 20 percent.
- Steep, continuous road grade.
- Where ruts occur and allow water to concentrate and run along the road.
- Where winter hauling is required.

To minimize rutting and erosion of the right-of-way, road construction shall be completed during predominantly dry conditions. Fills, which will essentially consist of native soils, shall not be made when the moisture content of the soils will not permit adequate compaction.

As a minimum level of compaction, common fill shall be placed in 12″-thick, loose lifts and each lift compacted by walking or tracking in with a heavy dozer or rubber-tired (pneumatic) equipment. Each lift shall be compacted by at least four passes with the equipment.

In areas of dense vegetation, the surface organic material shall be stripped from the ground within the roadway and cut and fill areas. Stripping to a maximum depth of 6″ will be adequate unless otherwise directed by the company or its representative. Stripped and disturbed areas shall be compacted as specified above or as shown in the drawings or access road charts.

Personnel constructing the access road system shall be aware of the definition of a wetland such that potential wetlands may be identified before work is begun. In some cases where wetlands have been identified, road construction personnel shall comply with requirements as directed by the company or its representative.

Ditches, installed culverts, and/or installed surface drains to drain wet areas resulting from springs, seeps, or poor surface drainage may be required to construct the road. Drainage ditches shall be shallow, not to exceed 18″ in depth. The ditch bottom shall have a width of approximately 1′ and side slopes shall not exceed 1.5 to 1 (see Figure 5).

All earthwork and grading, cut and fill slopes, and other disturbed areas shall be re-vegetated with seed. Unless otherwise specified, the seed mix shall consist of 45 percent rye grass, 45 percent orchard or fescue grass, and 10 percent clover. The seed shall be applied at a minimum of 60 pounds per acre. At locations where the ground slope is greater than 10 percent, the seeds shall be covered with straw- or wood-fiber mulch applied at a rate of one ton of mulch per acre. The seed shall be spread in early fall when weather permits.

All phases of operation, including the construction of truck and tractor roads, shall be conducted to minimize as much as practical the damage to the soil and to prevent gullies and creation of other conditions conducive to soil erosion. Repair of all erosion damage shall be accomplished as soon as it occurs to prevent further loss of material into existing drainages. Cut slopes shall be stabilized. Care shall be taken to avoid creation of wet land conditions.

Crew movement on the right-of-way, including access routes, shall be limited so as to minimize damage to land or property. Crews shall endeavor to avoid marring the lands. Ruts and scars shall be obliterated, damage to ditches, terraces, roads and other features of the land shall be corrected, and the disturbed land beyond the access roads and structure landings shall be restored, as nearly as practical, to its original condition before final acceptance of the work.

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Erosion control measures shall be installed to minimize the transport of eroded sediments to streams and other waterways. Erosion control measures may include, but are not necessarily limited to, straw bales and silt fences.

E. Road Cross Sections

This section provides road cross sections, including required dimensions, cleared right-of-way width, and other information. See general road construction notes in Section G and references in Section H.

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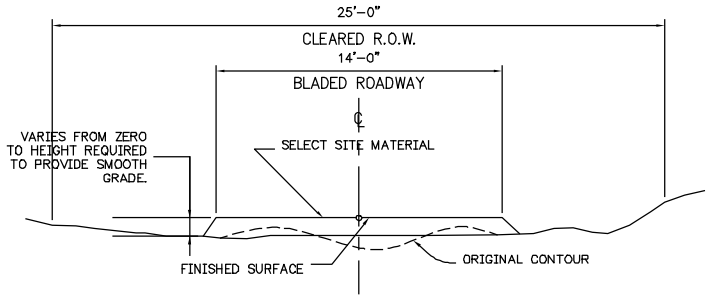
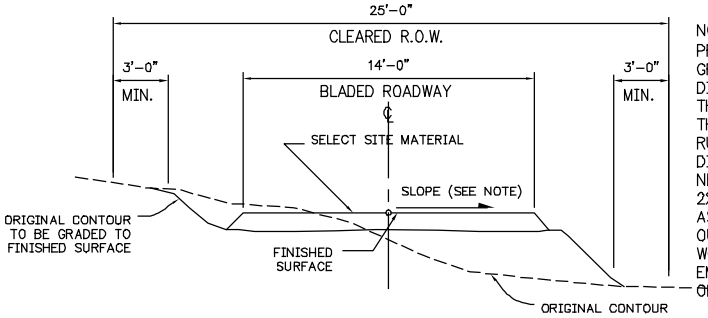
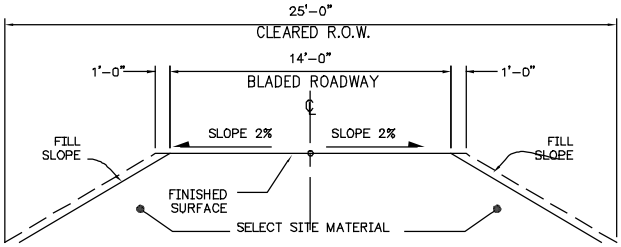


TYPICAL SECTION ON FLAT GROUND

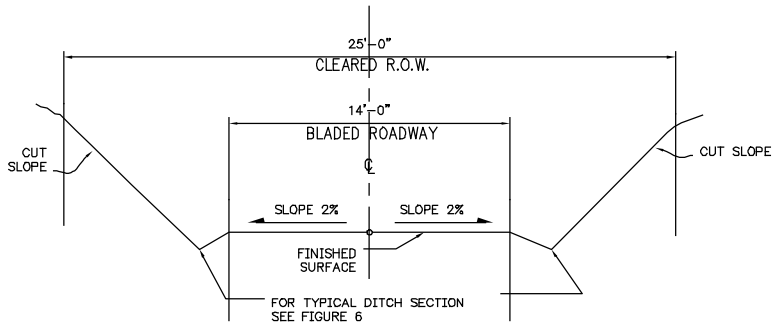


NOTE:
PROVIDE "OUTSLOPED" ROAD CROSS-SECTION, BY GRADING ROADS TO SLOPE IN THE SAME DIRECTION AS THE SURROUNDING TOPOGRAPHY. SO THAT THE UPHILL EDGE OF THE ROAD IS HIGHER THAN THE DOWNHILL EDGE. BESIDES ALLOWING RUNOFF TO EXIT THE ROADWAY IN AS SHORT A DISTANCE AS POSSIBLE. THIS ELIMINATES THE NEED FOR ROADSIDE DITCHES. PROVIDE A MINIMUM 2% OUTSLOPE ON ROADS WITH GRADES AS STEEP AS 15% ON STEEPER ROADS. PROVIDE 4% OUTSLOPE. AVOID OUTSLOPED ROADS WHERE THEY WOULD DIRECT RUNOFF ONTO ERODIBLE FILL, EMBANKMENTS OR WHERE THEY WOULD CAUSE OFF-CAMBER CURVES.

TYPICAL "OUTSLOPE" SECTION



TYPICAL FILL SECTION



TYPICAL THROUGH CUT SECTION

Figure 1—Typical Road Sections for Different Terrains

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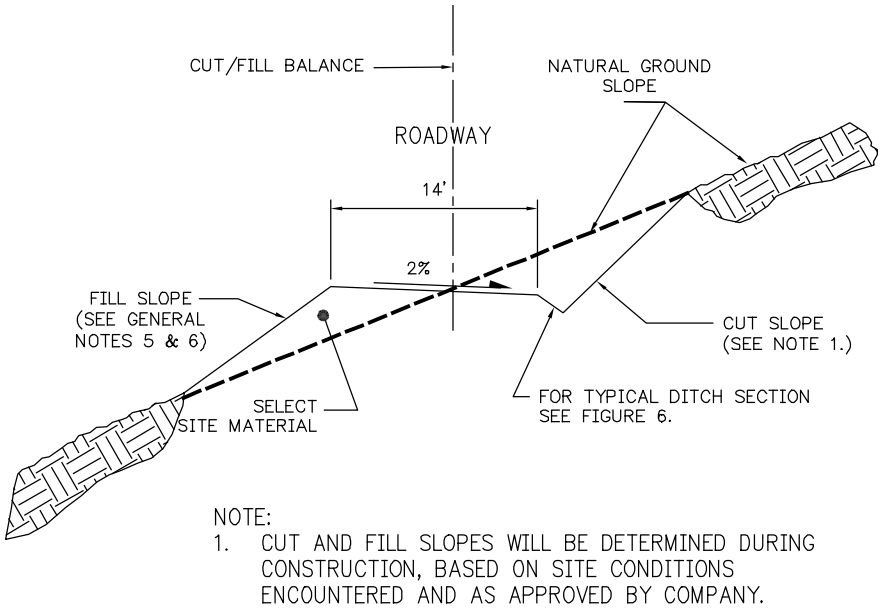

Figure 2—Typical Cut and Fill Insloped Road Section
for Natural Side Slopes Less Than 30 Percent (15°)

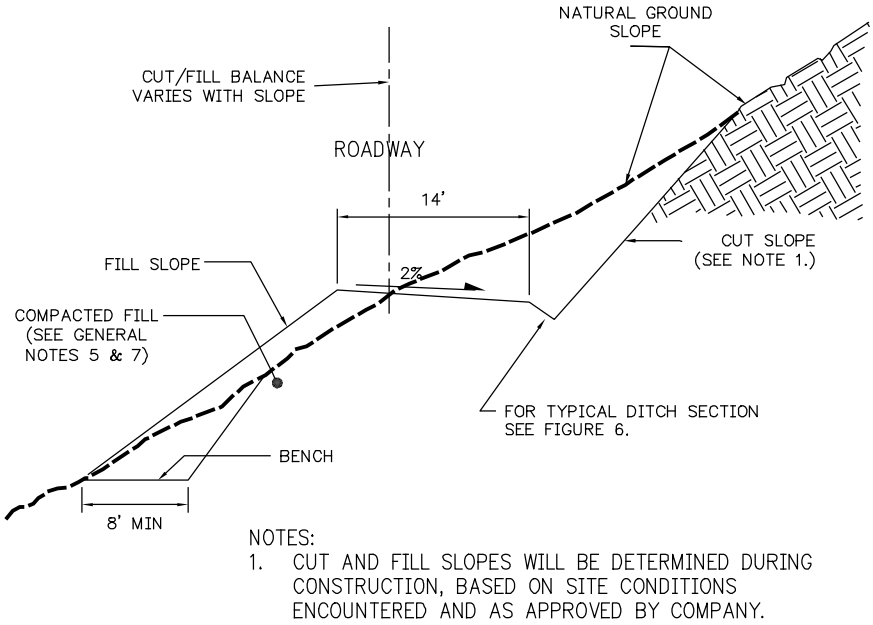

Figure 3—Typical Cut and Fill Insloped Road Section
for Natural Side Slopes Greater Than 30 Percent (15°) and Less Than 60 Percent (30°)

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Engineer (C. Wright): CLW
Standards Manager (G. Lyons): GS

Roads—Construction

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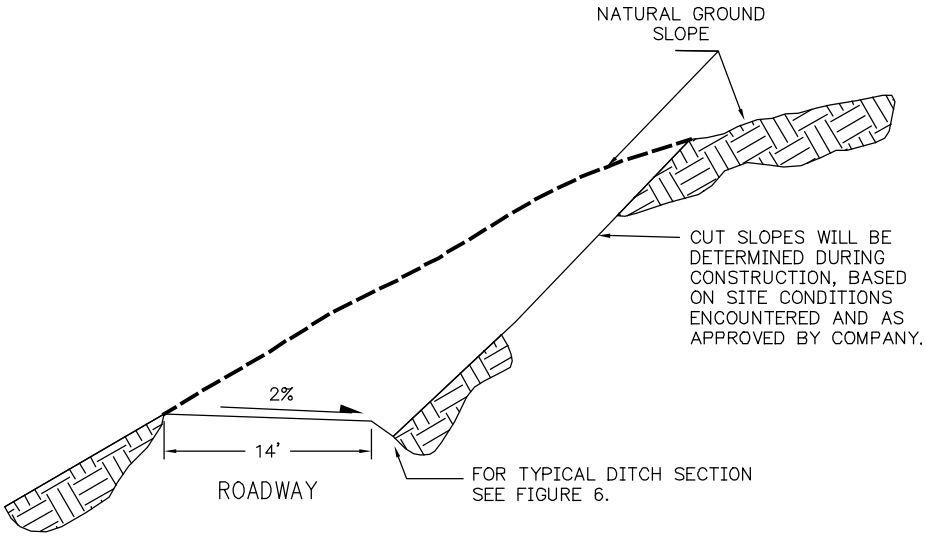

Figure 4—Typical Cut and Fill Section
for Natural Side Slopes Greater than 60 Percent (30°)

F. Typical Ditch Section

Typical ditch construction is depicted in Figure 6. Many of the road cross sections shown above use this ditch construction.

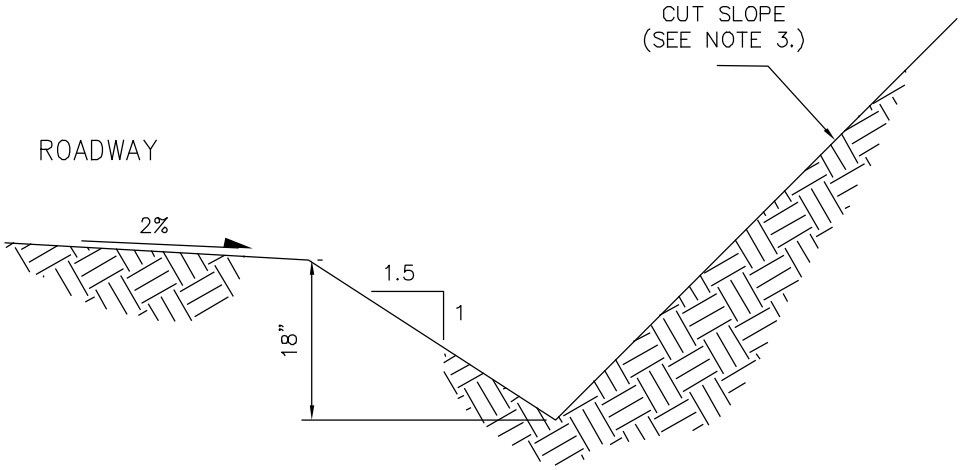

Figure 5—Ditch Section

Notes:

1. Slope the ditch so that it will drain; ditch shall have a minimum slope of 1 percent and not to exceed 3 percent.
2. Remove all soil, rock, and other material loosened by grading from ditch.
3. Cut slopes will be determined during construction based on site conditions and as approved by the company representative.

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G. General Road Construction Notes

1. Roads shall follow natural contours as much as practical.
2. Maximum grade for roads shall be 10 percent. Grades up to 20 percent will be allowed for a distance of 1000 feet where unavoidable and approved by the company.
3. Radius of curves shall be 200 feet, with a minimum of 80 feet when approved by company. When curves are less than 200 feet, roadbed shall be widened as shown in Table 2.
4. Cut and fill slopes will be determined during construction based on site conditions encountered and as approved by the company.
5. Unless specified otherwise by the company, fill material shall consist of site material excavated from RG-1 cuts. Fill material shall have a maximum particle size of 12″.
6. Fills placed on side slopes of 30 percent or less shall be placed in nominal 9″ lifts and compacted by walking in with at least four passes of earthwork equipment.
7. Fills placed on side slopes greater than 30 percent shall be placed in nominal 12″-thick lifts and compacted to at least 90 percent of the maximum dry density as determined by the ASTM D 696 method of compaction.
8. Allow 1′ additional road width on fill slopes for sloughing. When fills are over 6′ high at shoulder, allow 2′ additional road width.
9. Road construction across wetland areas may require placement of fragmented 6″ minus rock. Rock shall be placed in 8″-thick lifts and compacted by a heavy dozer or vibratory roller until well keyed. RB-(1) rock will be provided and installed by the contractor. Proper construction shall be use in wetlands so conditions as shown in Figure 7 do not develop.
10. Geotextile fabric material shall consist of MIRAF1212 OHP or equivalent, as approved by the company.

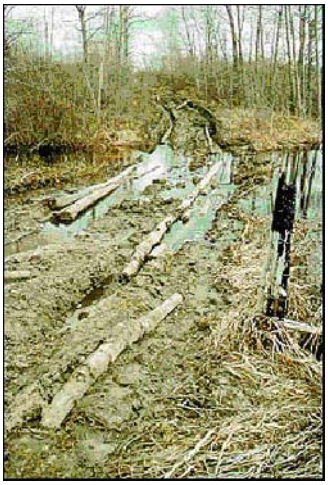

Figure 6—Poor Road Construction in Wetland Area

Table 2—Road Width for Different Road Curves

Curve Radius (feet)	Roadbed Width (feet)
200 or >	14
150 to 200	16
100 to 150	18
80 to 100	20

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H. References

1. *Handbook for Forest and Ranch Roads*, William E. Weaver, PHD. and Danny K. Hagans, 1994.

2 *A Landowner's Guide to Building Forest Access Roads,* United States Department of Agriculture, Forest Service, Northeastern Area State and Private Forestry, July 1998.

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Roads—Water Bars and Water Dips

A. Scope

This standard describes drainage methods, including water bars, water dips, ditches, and outsloping, which can be used where intermittent or permanent streams cross roadways. Depending on the method used, drainage structures should be installed during or after basic road construction (see TA 501, *Roads—Construction*). For information on ditches and culverts see TA 504, *Roads—Culvert Installation*.

On level terrain, road construction may only require back-dragging a blade to remove brush to facilitate construction. Water bars and dips may not be necessary.

In undulating or mountainous terrain, water bars or water dips shall be used to control erosion.

The BLM or US Forest Service may require special designs for road design.

On privately owned land, both PacifiCorp and the property owner shall approve a plan to best control erosion on rights-of-way roads.

Figure 1—A water bar effectively intercepts the surface water and diverts it from the road

B. Water Bars

Water bars are narrow structures which can be constructed at various depths. Deep bars are generally used on roads closed to vehicle traffic. Figure 1 shows a typical shallow water bar constructed across a road.

Water bars can be constructed with hand tools, but bulldozers are most commonly used. It is best to start at the end of the road and work outward so the bars are not damaged with frequent crossing by heavy machinery.

Table 1—Distance Required Between Water Bars

Road grade (%)	Distance (feet)
2	250
5	135
10	80
15	60
20	45
25	40
30	35

Source: Kochenderfer 1970, p. 28

Water bars should be installed at an approximate 30° angle downslope. Figure 2 shows dimensions for construction of water bars and water dips with and without drainage

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ditches to be used on access and right-of-way roads. The outflow end of the water bar should prevent water from accumulating and should not flow directly into a stream. This will allow sediment to settle out of the water, preventing erosion. As a supplement to water bars on closed roads, logging slash can be lopped and scattered, grass can be planted, or both. Table 1 shows recommended spacing between water bars for various road grades.

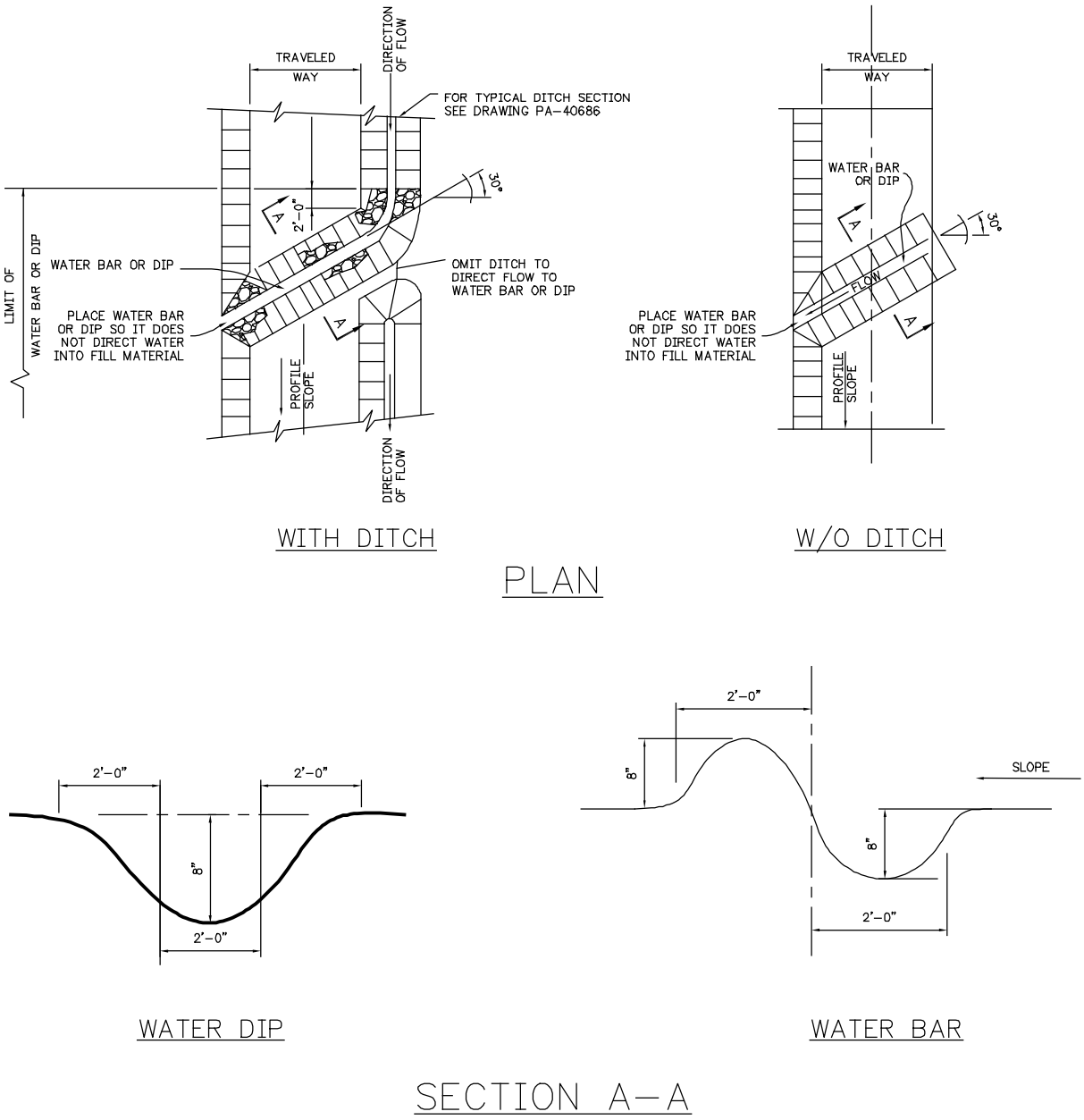

Figure 2—Water Bar and Dip Construction Plan and Profile

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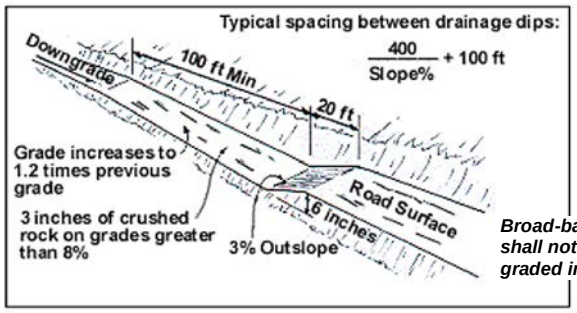
C. Broad-Based Drainage Dips

Broad-based drainage dips are easily maintained and do not increase wear on vehicles or reduce hauling speed when properly installed. These dips shall not be used on roads graded in excess of 10 percent (see Figure 3).

Table 2 lists the spacing distances of broad-based dips, as computed with the formula shown in Figure 3.



Broad-based drainage dips shall not be used on roads graded in excess of 10%.

Figure 3—Typical Spacing Between Drainage Dips

Table 2—Minimum Distance Needed Between Drainage Dips

Road grade (%)	Distance (feet)
2 – 4	300 – 200
5 – 7	180 – 160
8 – 10	150 – 140

Source: Kochenderfer 1970, pg.19, 25

As with a water bar, care shall be taken to ensure adequate drainage at the outflow of a dip. Broad-based drainage dips shall never be designed to discharge directly into a stream. The discharge area shall be protected with stone, grass, sod, heavy litter cover, brush, logs, or other natural material which will reduce the velocity of the water. Natural litter may be adequate in many cases if the terrain is not too steep.

Close attention shall be paid to construction of broad-based drainage dips, as they are often made too small. Figure 3 shows minimum dimensions. Dips shall be armored with crushed rock or gravel.

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Figure 4 shows a practical example of how a broad-based drainage dip can be used. A drainage dip is effective in controlling water on the road and does not significantly slow the speed of vehicles. The local drainage shall dictate how often these dips shall be used.

Figure 4—Broad-Based Drainage Dip

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Roads—Culvert Installation

A. Scope

This standard provides information about the construction of surface drainage and the installation of culverts. It is impossible to over-emphasize the importance of drainage in maintaining stable roads and protecting water quality. Roads should be designed and constructed to cause minimal disruption of natural drainage patterns. Provisions for two components of road drainage should be included in every road project: 1) road-surface drainage (including drainage which *originates* from the cutbank, road surface, and fill-slope), and 2) hill-slope drainage (including drainage from large springs, gullies, and streams which *cross* the road alignment).

B. Determining Culvert Diameter

Use pipe no smaller than 24″ in diameter. A drainage table provides help in determining the proper size culvert (see Table 1 and Table 2). The following example illustrates how to choose pipe size (Table 1) using the drainage table (Table 2). To use this method, you will need information on slope, soils, and cover.

Example: The area to be drained is 70 acres on steep slopes with heavy soils and moderate cover. In Table 2 under C opposite 70, find area required: 10.3 square feet. Under the area table for round pipe (Table 1), the pipe size should fall between 42″ and 48″. Use 42″ pipe with an area of 9.6 square feet. If a wood or other type of box culvert is planned, one 3′ by 3.5′ pipe would furnish the required area.

Table 1—Size of Round Pipe Needed for Area of Waterway

Area (square feet)	Pipe diameter (inches)
1.25	24
1.80	24
3.10	24
4.90	30
7.10	36
9.60	42
12.60	48
15.90	54
19.60	60
23.80	66
28.30	72
33.20	78
38.50	84
44.20	90

Source: Figure 45, Haussman and Pruett 1978, p. 36

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Table 2—Drainage Table Based on Talbot's Formula for Rainfall
1-1/4″ per Hour

Area required for waterway								
Acres	**Impervious 100% runoff** †C=1.00	**Steep slopes Heavy soils Moderate cover** C=0.80	C=0.70	**Moderate slopes Heavy to light soils Dense cover** C=0.60	C=0.50	**Gentle slopes Agricultural soil & cover** C=0.40	C=0.30	**Flatland Previous soils** C=0.20
Square Feet								
2	0.5	0.4	0.4	0.3				
4	0.9	0.7	0.6	0.5				
6	1.2	1.0	0.8	0.7	0.6	0.5		
8	1.5	1.2	1.0	0.9	0.7	0.6		
10	1.7	1.4	1.2	1.0	0.9	0.7	0.3	
20	2.9	2.3	2.0	1.8	1.5	1.2	0.5	
30	4.0	3.2	2.7	2.4	2.0	1.6	0.5	0.3
40	4.9	3.9	3.4	3.0	2.5	2.0	0.9	0.4
50	5.8	4.7	4.0	3.5	2.9	2.3	1.2	0.6
60	6.7	5.4	4.6	4.0	3.4	2.7	1.5	0.8
70	7.5	6.0	5.2	4.5	3.8	3.0	1.8	1.0
80	8.3	6.7	5.8	5.0	4.2	3.3	2.0	1.2
90	9.1	7.3	6.3	5.5	4.6	3.6	2.3	1.4
100	9.9	7.9	6.8	5.9	4.9	3.9	2.5	1.5
150	13.5	10.6	9.3	8.0	6.7	5.4	2.7	1.7
200	16.6	13.4	11.5	10.0	8.4	6.7	2.9	1.8
250	19.8	15.8	13.6	11.9	9.9	7.9	4.0	2.0
300	22.9	18.1	15.5	13.6	13.5	9.0	5.0	2.7
350	25.5	20.3	17.5	15.3	12.7	10.1	5.9	3.3
400	28.0	22.5	19.5	17.0	14.0	11.1	6.8	4.0
450	30.9	24.9	21.0	18.5	15.3	12.1	7.5	5.1
500	33.4	26.4	23.0	20.0	16.6	13.3	8.4	5.6
600	38.5	30.8	26.3	23.0	19.0	15.2	9.0	6.2
700	43.0	34.2	29.8	26.0	21.5	17.0	9.9	6.6
800	48.0	38.1	32.9	28.5	23.8	19.0	11.4	7.7
900	52.0	41.5	35.9	31.1	26.0	20.8	12.9	8.6
1000	56.5	45.0	38.9	34.0	28.3	22.5	14.3	9.5

* See Table 1 for size of pipe needed.

† C is the constant factor based on a combination of how much water the soil can hold, slope, and cover. C = .70 is adequate for most conditions prevailing in the Northeast. C = 1.00 represents complete runoff of precipitation (e.g., rock surfaces).

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Table 3 provides a simplified method for determining culvert size. To use this table, determine the size of the drainage area (in acres) above the stream crossing as well as the expected life of the culvert. A private consultant may provide assistance determining the size of a culvert. Make sure they do not size the culverts for a 50- or 100-year storm, unless that is what is required. For low-traffic or temporary roads, a flood frequency of 20 years can be used.

Table 3—Culvert Sizes by Drainage Area

	Recurrence interval (years)		
	10	20	50
Area (acres)	**Culvert diameter (inches)**		
10	24	24	18
20	24	24	20
30	24	24	24
40	24	24	26
50	24	24	28
60	24	24	28
70	24	26	30
80	24	26	30
90	24	28	32
100	26	28	34
125	28	30	36
150	28	32	38
175	30	34	40
200	32	36	42

Source: Table 3, Helvey and Kochenderfer 1988, p. 125

C. Determining Culvert Lengths

The following simplified procedure can be used to determine culvert lengths needed for new stream crossings or ditch-relief drains. Refer to Figure 1 for specific locations and distances described in the step-by-step procedure. A complete example follows these instructions.

1. Estimate the depth of the fill (F) at the running surface on the inside of the road above the culvert inlet (point “a”).
2. Additional width (C) due to fill is then estimated as 1.5 times the fill depth (F) (that is, all fill slopes are assumed to be 1.5:1 in steepness).
3. Add half the road width (1/2 W) and the fill width (C). Measure this distance horizontally upstream from the center line of the road, and place stake at location A. The horizontal

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distance must be converted to slope distance before you can tape it off on the ground. Use Table 4 to convert horizontal distance to slope distance (on-the-ground distance).

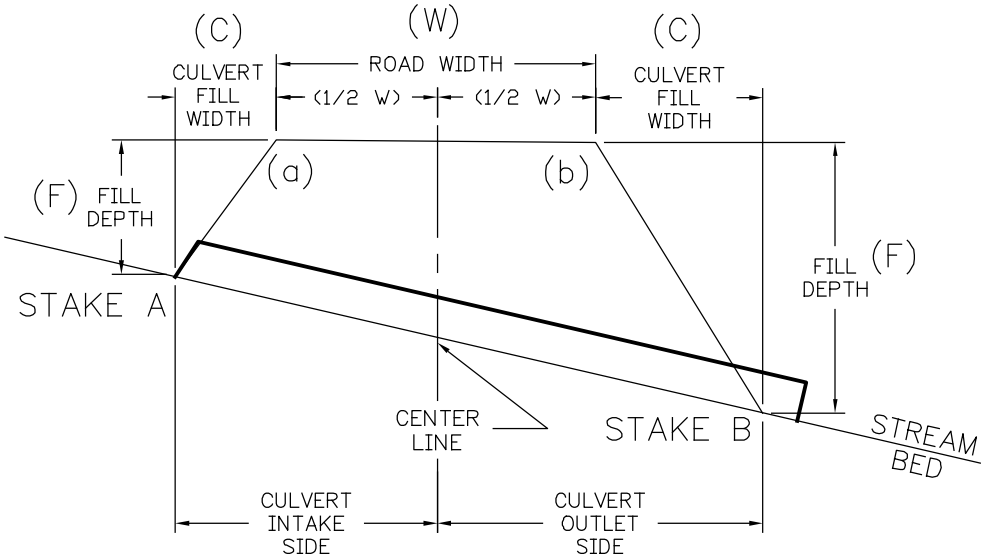

Figure 1—Culvert Length

4. Repeat steps 1 through 3 for the culvert outlet side of the crossing and place stake at location B.
5. Measure the slope length between stakes A and B. This measurement, plus two to four extra feet, is the length of culvert needed for the installation. The extra several feet are added to extend the inlet and outlet beyond the edge of the fill.

   Forty-four feet horizontal distance equals 52.4 feet slope distance on a 65 percent slope.

   horizontal distance × correction factor = slope distance

   (44ft) × (1.19) = 52.4′

   Example: What culvert length is needed for a 14′ wide road crossing a stream with a 55 percent gradient? The estimated inside fill-depth, above the culvert inlet, will be 6′ and the fill-depth above the outlet will be 13′.

   Step 1: Estimated depth of fill (F) at culvert inlet = 6′

   Step 2: (C) = 1.5 × 6′ = 9′

   Step 3: 14′ wide road (W), so 1/2 × 14′ = 7′

   Stake A (the location of the culvert inlet) should be placed on the ground a distance of (9′ + 7′) = 16 horizontal feet up the stream channel from the flagged centerline of the road. According to the correction table, 16 feet horizontally on a 55 percent slope is 18.2′ slope distance (16′ × 1.14 = 18.2′).

   Place the inlet stake (A) 18.2′ up the channel from the centerline of the road.

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Step 4: Estimated depth of fill (F) at culvert outlet =13′

Step 5: (C) = 1.5 ×13′ = 20′

Step 6: 14′ wide road (W), so 1/2 × 14 = 7′

Stake B (the location of the culvert outlet) should be placed on the ground a distance of (13′ + 20′) = 33 horizontal feet down the stream channel from the flagged centerline of the road. According to the correction table, 33 feet horizontally on a 55 percent slope is 37.6′ slope distance (33′ × 1.14 = 37.6′0.

Place the outlet stake (B) 37.6 ′down the channel from the centerline of the road.

Step 7: Length of culvert needed = 18.2′ + 37.6′ = 55.8′ or about 56′.

Approximately 2′–4′ should be added to this length to make sure the culvert inlet and outlet extend sufficiently beyond the base of the fill.

Final culvert length to be ordered and delivered to the site = 56 ′+ 4 ′= 60 ′.

Table 4—Slope Correction Factors to (C) on Vertical-Horizontal Distance to Slope Distance

Hill slope or stream channel gradient (%)	Correction factor (multiplier)	Hill slope or stream channel gradient (%)	Correction factor (multiplier)
10	1.00[1]	45	1.10
15	1.01	50	1.12
20	1.02	55	1.14
25	1.03	60	1.17
30	1.04	65	1.19
35	1.06	70	1.22
40	1.08	75	1.25

[1] For a slope of 10 percent or less, no correction factor is needed.

D. Culvert Installation for Ditch Relief

Insloped roads should be constructed: 1) where road-surface drainage discharged over the fillslope would cause unacceptable erosion or discharge directly into stream channels, 2) where fillslopes are unstable, or 3) where outsloping would create unsafe conditions for use. It is generally preferable to outslope road surfaces in order to disperse road-surface runoff before it has a chance to concentrate.

Insloped roads should be built with an inside drainage ditch to collect and remove road surface runoff (TA 501, *Roads—Construction*). Roads steeper than about 8 percent may be too steep for an inside ditch because of the potential for gullying in the ditch. Inside ditches should also be drained at intervals sufficient to prevent ditch erosion or

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outlet gullying, and at locations where water and sediment can be filtered before entering a watercourse. Filtering can be accomplished with thick vegetation, gentle slopes, settling basins, or filter windrows of woody debris and mulches secured to the slope.

As with outsloped roads, steep insloped road surfaces may be difficult to drain. Rolling dips (for permanent, surfaced roads and seasonal roads) or waterbars (for seasonal or temporary, unsurfaced roads) should be constructed at intervals sufficient to disperse road surface runoff from steep road segments. See TA 503, *Roads—Water Bars and Water Dips* for more information.

Ditches and culverts need occasional maintenance to maintain proper flow. Annual and storm-period inspection can prevent small problems from growing into large failures. When ditches become blocked by cutbank slumps, they need to be cleaned and the spoil deposited in a stable location. However, excessive maintenance (i.e., grading) can cause continuing and persistent erosion, sediment transport, and sediment pollution to local streams. It may also remove rock surfacing.

Ditch relief culverts should be designed and installed along the road at intervals close enough to prevent erosion of the ditch and at the culvert outfall, and at locations where collected water and sediment is not discharged directly into watercourses (Table 5).

Table 5—Maximum Suggested Spacing for Ditch Relief Culverts (ft)

Road grade	**Soil Credibility**				
(%)	**Very High**	**High**	**Moderate**	**Slight**	**Very Low**
2	600–800				
4	530	600–800			
6	355	585	600–800		
8	265	425	525	600–800	
10	160	340	420	555	
12	180	285	350	460	600–800
14	155	245	300	365	560
16	135	215	270	345	490
18	118	190	240	310	435

On new roads, ditch flow should be directed into a culvert and discharged into buffer areas and filter strips before it reaches a watercourse crossing. Ditches should neither be discharged directly into the inlet of a watercourse crossing culvert, nor should ditch relief culverts discharge into a watercourse without first directing flow through an adequate filter strip. In addition to installing ditch relief culverts on either approach to watercourse crossings, it is advisable to consider installing ditch drains before curves, above and below through-cut road sections, and before and after steep sections of the road.

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If a ditch is capable of transporting and delivering sediment to a Class I or Class II watercourse during a flood event, it can be said to function the same as a Class III watercourse. It has a bed and a bank, and it can transport sediment. Ditches which drain directly into watercourse-crossing culverts should be treated and protected from disturbance and erosion, just as is a Class III watercourse. Ditch relief culverts should be installed across ditched roads before water course crossings so that water and sediment can be filtered before reaching the stream.

Ditch relief culverts do not need to be large, since they carry flow only from the cutbank, springs, and a limited length of road surface. In areas of high erosion and/or storm runoff, nominal ditch relief culvert sizes should be 18″, but ditch relief culverts should never be less than 15″ diameter. Smaller culverts are too easily blocked (Figure 2). Generally, culverts should have a grade at least 2 percent greater than the ditch which feeds it to prevent sediment buildup and blockage. Where possible, ditch relief culverts should be installed at the gradient of the original ground slope, so it will emerge on the ground surface beyond the base of the fill. If this is not possible, the fill below the culvert outlet should be armored with rock or the culvert fitted with an anchored downspout to carry erosive flow past the base of the fill. Culverts should never be “shot-gunned” out of the fill, thereby creating highly erosive road drainage waterfalls (Figure 3).

Figure 2—Undersized Culvert

Figure 3—Culvert Not Installed at the Existing Stream Gradient

A 10 percent grade to the culvert will usually be self-cleaning. The culvert should be placed at a 30° angle to the ditch to improve inlet efficiency and prevent plugging and erosion at the inlet. The pipe should be covered by a minimum of 18″ of compacted soil, or to a depth of 1.5 times the culvert diameter, whichever is greater. Finally, inlet protection such as rock armoring or drop structures can be used to help minimize erosion, slow flow velocity, and settle sediment before it is discharged through the pipe.

E. Culvert Installation for Stream Crossings

The importance of proper planning for stream crossings cannot be overstated. If stream crossings are not planned and located before road construction begins, serious problems may arise, including unintended damage to natural resources. Requirements for stream crossings vary from state to state. Often, a permit is required; check with the water division of the local natural resources agency.

Culverts can be considered dams that are designed to fail. The risk of culvert failure is substantial for most crossings, so *how* they fail is critical. In the upper sketch in

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Figure 4, the crossing has failed and the road grade has diverted the stream down the road, resulting in severe erosion and downstream sedimentation. Such damage to aquatic habitats can persist for many years. Stream diversions are easy to prevent, as illustrated by the lower sketch, in which the road grade was such that a failed crossing caused only some loss of road fill.

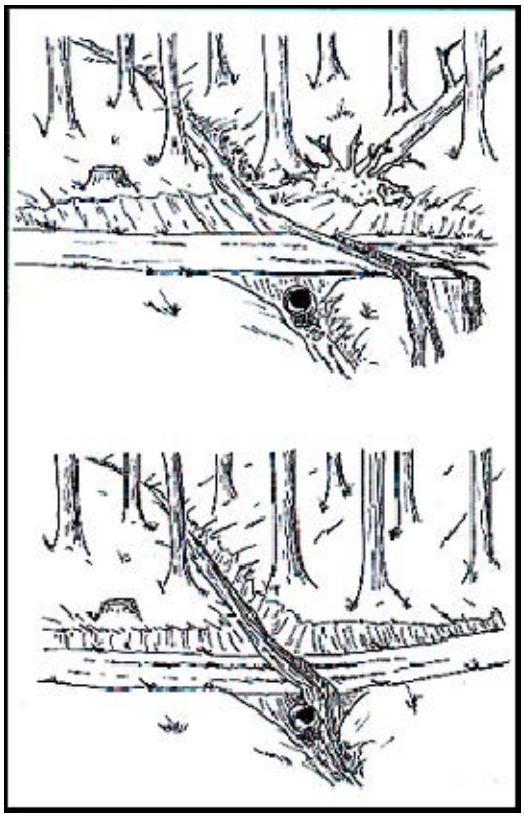

Figure 4—Stream Crossing Failures

Culverts should be installed as road work progresses. The culvert and its related drainage features should be installed via the following steps:

1. Place debris and slash to be used as a filter system, if needed.
2. Construct sediment ponds, if needed.
3. Complete downstream work first, such as energy dissipating devices and large rock riprap.
4. Route stream around work area until pipe is installed.
5. Construct pipe inlet structure.
6. Install culvert pipe.

A culvert inlet should be placed on the same level as the stream bottom. Where the culvert inlet has to be lower than the drainage gradient, a drop box can be constructed. The box provides a place for sediment to settle before water enters the culvert. Drop boxes require frequent maintenance.

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Install culvert pipes as near as possible to the gradient of the natural channel and so there is no change in the stream bottom elevation (Figure 5). Culverts should not cause damming or pooling. Seat the culvert on firm ground and compact the earth at least halfway up the side of the pipe to prevent water from leaking. Pipe culverts must be adequately covered with fill; the rule is a minimum of 30″ or 1.5 times the culvert diameter, whichever is greater.

Figure 5—Culvert Installed at Channel Gradient

If adequate cover cannot be achieved, an arch pipe or two small culverts should be installed. The cover must also be compacted to prevent settling in the road. Debris-laden material should not be used to cover pipe culverts.

The following are additional guidelines for installing culverts in streams:

- Limit construction activity in the water to periods of low or normal flow.
- Minimize use of equipment in streams.
- Use soil stabilization practices on exposed soil at stream crossings. Seed/mulch and install temporary sediment control structures, such as silt fences made of straw bales or geotextiles, immediately after road construction. Maintain these practices until the soil is permanently stabilized.
- Use materials that are clean, non-toxic, and which do not erode.

To prevent erosion and under-cutting of the inlet end of the culvert, provide a headwall. Sandbags containing some cement mixed with the sand, durable logs, concrete, or hand-placed riprap are suitable.

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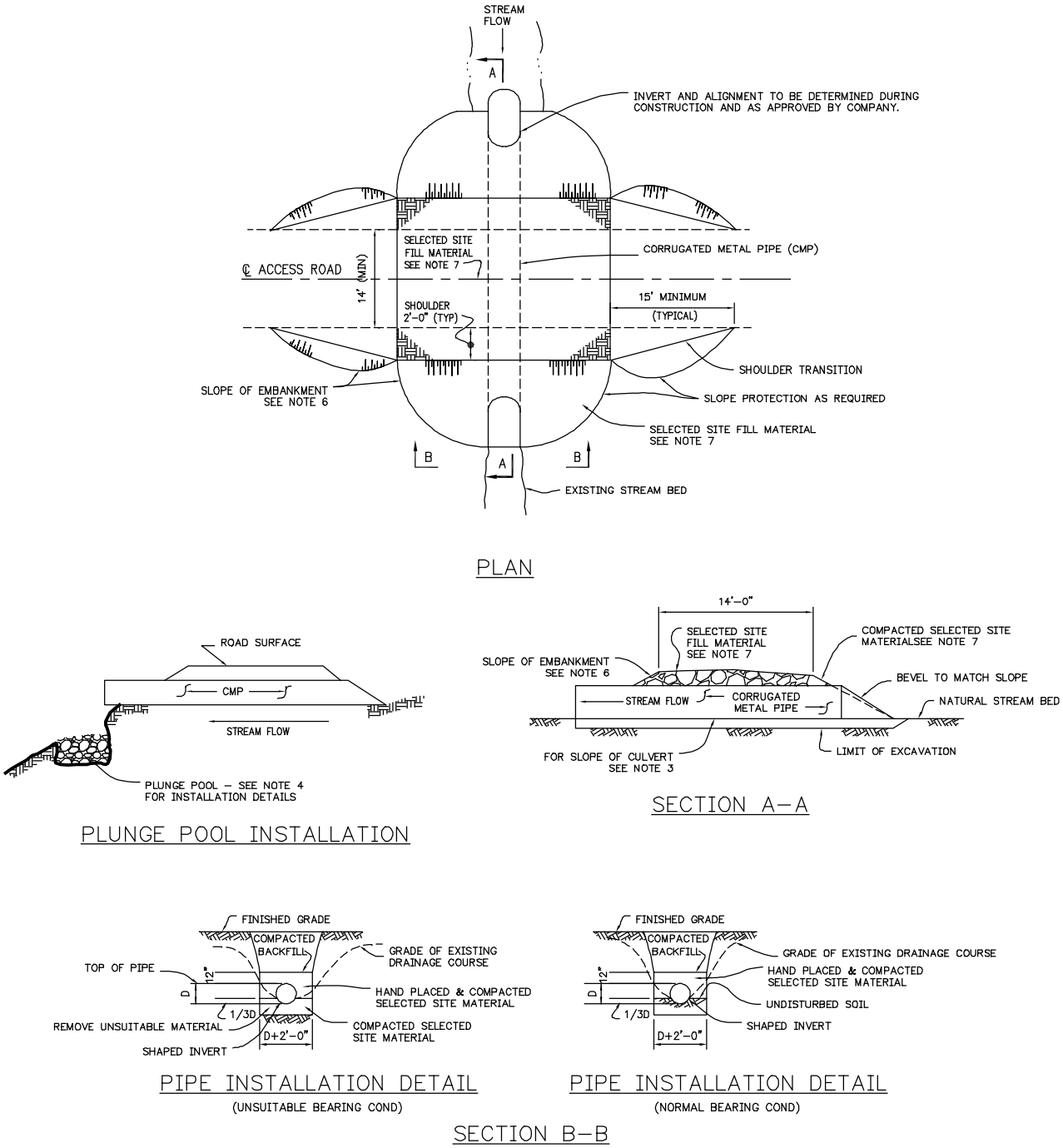

Figure 6—Stream Crossing Culverts

Installation Notes for Figure 6:

1. Culverts for existing drainage shall be aligned with the drainage.

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2. Culverts for roadway and ditch drainage shall be oriented at an angle of 30° to 45° to the roadway. See TA 503, *Roads—Water Bars and Water Dips*, for installation instructions.
3. Culverts shall be sloped a minimum of 1 percent or at least 1 percent steeper than the existing drainage.
4. When the culvert outlet is above grade, a plunge pool shall be constructed with length and width equal to two pipe diameters and a depth of one pipe diameter. Line plunge pool with geotextile fabric filled with 2″ to 8″ rock.
5. Culvert clogging debris located within 50′ of a culvert inlet shall be removed.
6. Cut and fill slopes will be determined during construction based on site conditions and as approved by the company.
7. See TA 501, *Roads—Construction*, for general road construction information.
8. Cover over culverts shall be 18″ or 1.5 times the culvert diameter, whichever is greater. To minimize damage from culvert failure, height of fill over culverts shall be as close to minimum as practical.
9. Outlets on culverts with pipe slopes greater than 3 percent shall be protected with a 30′ × 10′ strip of geotextile fabric fastened to culvert as a bib. Fabric shall be weighted down with 6″to 8″ rock to slow runoff.
10. Bottom of culvert shall be cushioned with fine-grain site material when installed over large rocks.

F. Fords

A ford is an alternative way to cross a water course where the streambed has a firm rock or coarse gravel bottom; the approaches are low and stable enough to support traffic; the stream is small to medium-sized, with water depth less than three feet and stream flows not exceeding 6 fps; and vehicle traffic is light. Dry fords can often be installed and used with minimal impact to the channel system.

The following standards apply when constructing a ford:

1. Install wing ditches, water-bars, dips, and level spreaders before the crossing. These structures should disperse runoff into an established and stable stream buffer.
2. If corduroy, coarse gravel, or gabion is used to create a driving surface, it should be installed flush with the streambed to minimize erosion and to allow fish passage.
3. Crossings should be at right angles to the stream.
4. Stabilize the approaches by using non-erodible material. The material should extend at least 50 feet on both sides of the crossing.
5. Requirements for stream crossings vary from state to state. Often a permit is required; check with the water division of the local natural resources agency.
6. Fords shall be designed for a low-maintenance long-term life. Rock size and grading, depth of rock, fabric underlayment, etc. and approaches shall be designed for the equipment expected to use the road.

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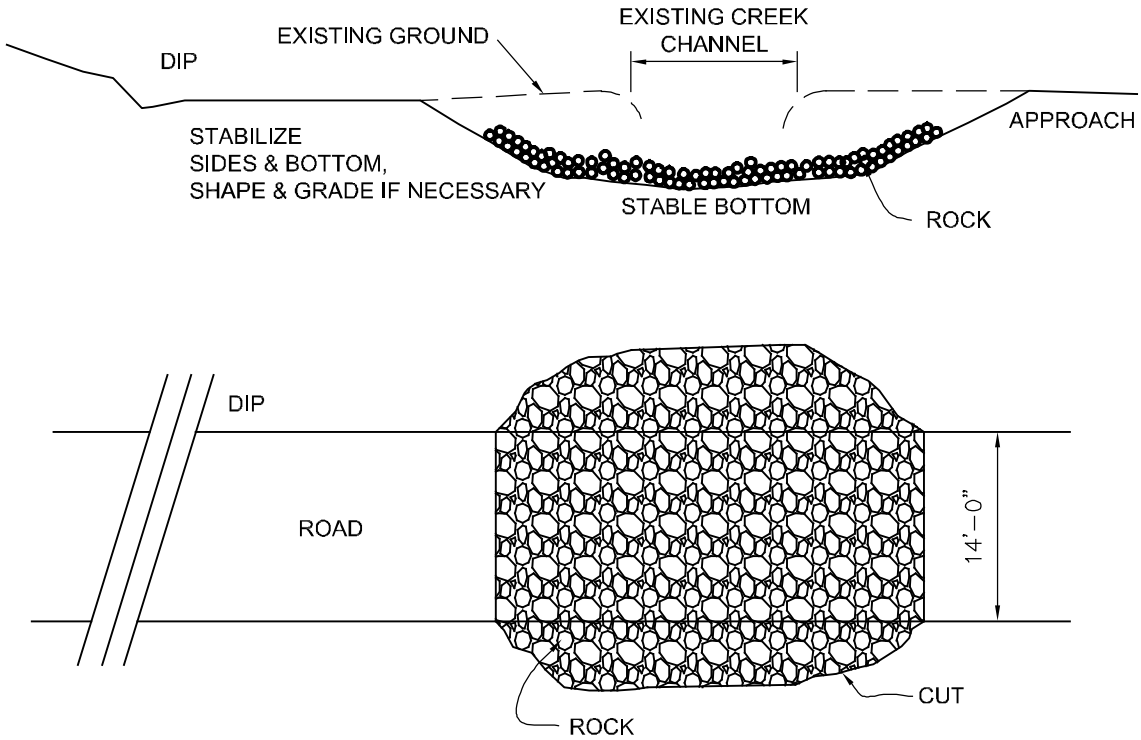

Figure 7 – Ford Stream Crossing

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APPENDIX C – AGENCY AND STAKEHOLDER MEETINGS

Introduction

Appendix C contains a table (Table C-1) listing agency and stakeholder meetings and two tables (Tables C-2 and C-3) of public outreach initiated by the Applicant (PacifiCorp, doing business as Rocky Mountain Power).

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TABLE C-1 AGENCY AND STAKEHOLDER MEETINGS FEBRUARY 2009 TO DECEMBER 2013		
Date	**Agency/Organization**	**Meeting Topic**
Bureau of Land Management and U.S. Forest Service		
February 23, 2009	▪ Bureau of Land Management (BLM) Wyoming State Office ▪ BLM Las Vegas Field Office ▪ Rocky Mountain Power ▪ TransWest Express, LLC	Introduce and establish working relationships between BLM project management and BLM field office staff; identify BLM resource databases the third-party consultant will need to prepare the environmental impact statement (EIS); and discuss preliminary alternative routes.
February 24, 2009	▪ BLM Wyoming State Office ▪ BLM Ely District Office ▪ BLM Caliente Field Office ▪ Rocky Mountain Power ▪ TransWest Express, LLC	Introduce and establish working relationships between BLM project management and BLM district and field office staff; identify BLM resource databases the third-party consultant will need to prepare the EIS; and discuss preliminary alternative routes.
February 25, 2009	▪ BLM Wyoming State Office ▪ BLM Utah State Office ▪ BLM Color Country District ▪ BLM Cedar City Field Office ▪ BLM Kanab Field Office ▪ BLM Richfield Field Office ▪ BLM St. George Field Office ▪ Dixie National Forest ▪ Rocky Mountain Power	Introduce and establish working relationships between BLM project management and BLM district and field office staff; identify BLM resource databases the third-party consultant will need to prepare the EIS; and discuss preliminary alternative routes.
March 11, 2009	▪ BLM Wyoming State Office ▪ BLM Grand Junction Field Office ▪ Rocky Mountain Power ▪ TransWest Express, LLC	Introduce and establish working relationships between BLM project management and BLM field office staff; identify BLM resource databases the third-party consultant will need to prepare the EIS; and discuss preliminary alternative routes.
March 12, 2009	▪ BLM Wyoming State Office ▪ BLM Moab Field Office ▪ Manti-La Sal National Forest ▪ Rocky Mountain Power ▪ TransWest Express, LLC	Introduce and establish working relationships among BLM project management, BLM field office staff, and national forest; identify BLM resource databases the third-party consultant will need to prepare the EIS; and discuss preliminary alternative routes.
March 13, 2009	▪ BLM Wyoming State Office ▪ BLM Price Field Office ▪ BLM Vernal Field Office ▪ Ashley National Forest ▪ Manti-La Sal National Forest ▪ Rocky Mountain Power ▪ TransWest Express, LLC	Introduce and establish working relationships between BLM project management, BLM field office staff, and U.S. Forest Service (USFS) staff; identify BLM resource databases the third-party consultant will need to prepare the EIS; and discuss preliminary alternative routes.
March 17, 2009	▪ BLM Wyoming State Office ▪ BLM Rawlins Field Office ▪ BLM Rock Springs Field Office ▪ Rocky Mountain Power ▪ TransWest Express, LLC	Introduce and establish working relationships between BLM project management and BLM field office staff; identify BLM resource databases the third-party consultant will need to prepare the EIS; and discuss preliminary alternative routes.

TABLE C-1 AGENCY AND STAKEHOLDER MEETINGS FEBRUARY 2009 TO DECEMBER 2013		
Date	**Agency/Organization**	**Meeting Topic**
March 18, 2009	▪ BLM Wyoming State Office ▪ BLM Little Snake Field Office ▪ BLM White River Field Office ▪ Rocky Mountain Power ▪ TransWest Express, LLC	Introduce and establish working relationships between BLM project management and BLM field office staff; identify BLM resource databases the third-party consultant will need to prepare the EIS; and discuss preliminary alternative routes.
March 19, 2009	▪ BLM Wyoming State Office ▪ BLM Utah State Office ▪ BLM Fillmore Field Office ▪ BLM Salt Lake Field Office ▪ USFS Intermountain Region ▪ Fishlake National Forest ▪ Uinta-Wasatch-Cache National Forest ▪ Utah Governor's Energy Advisor's Office ▪ Rocky Mountain Power ▪ TransWest Express, LLC	Introduce and establish working relationships among BLM project management, BLM field office staff, and USFS staff; identify BLM resource databases the third-party consultant will need to prepare the EIS; and discuss preliminary alternative routes.
July 30, 2009	▪ BLM Wyoming State Office ▪ BLM Las Vegas Field Office ▪ BLM St. George Field Office ▪ Rocky Mountain Power ▪ TransWest Express, LLC	Introduce and establish working relationships between BLM project management and BLM field office staff; identify BLM resource databases the third-party consultant will need to prepare the EIS; and discuss preliminary alternative routes.
August 25, 2009	▪ BLM Wyoming State Office ▪ Ashley National Forest ▪ Manti-La Sal National Forest ▪ Rocky Mountain Power ▪ TransWest Express, LLC	Introduce and establish working relationships among BLM project management and USFS staff; identify BLM resource databases the third-party consultant will need to prepare the EIS; and discuss preliminary alternative routes.
August 27, 2009	▪ BLM Wyoming State Office ▪ Dixie National Forest ▪ Fishlake National Forest	Introduce and establish working relationships among BLM project management and USFS staff; identify BLM resource databases the third-party consultant will need to prepare the EIS; and discuss preliminary alternative routes.
August 28, 2009	▪ BLM Wyoming State Office ▪ Uinta-Wasatch-Cache National Forest	Introduce and establish working relationships among BLM project management and USFS staff; identify BLM resource databases the consultant will need to prepare the EIS; and discuss preliminary alternative routes.
September 17, 2009	▪ BLM Wyoming State Office ▪ BLM Price Field Office ▪ Rocky Mountain Power ▪ TransWest Express, LLC	Discuss resource issues associated with alternative routes identified in the BLM Price Field Office.
May 31, 2011	▪ BLM Wyoming State Office ▪ BLM Price Field Office	Reintroduce and discuss the Project.
June 2, 2011	▪ BLM Wyoming State Office ▪ BLM Moab Field Office	Reintroduce and discuss the Project.

TABLE C-1 AGENCY AND STAKEHOLDER MEETINGS FEBRUARY 2009 TO DECEMBER 2013		
Date	**Agency/Organization**	**Meeting Topic**
August 30, 2011	▪ BLM Wyoming State Office ▪ BLM Colorado State Office ▪ BLM Utah State Office	Brief the BLM State Directors on the status of the Project, including the results of project scoping.
November 30, 2011	▪ BLM Wyoming State Office ▪ BLM Utah State Office ▪ Western Area Power Administration (representing the TransWest Express project) ▪ Dixie National Forest	Coordination meeting of the BLM, Western Area Power Administration, and USFS to discuss consistency of study and analysis approaches for the two projects.
April 12, 2012	▪ BLM Wyoming State Office ▪ Dixie National Forest ▪ Western Area Power Administration (representing the TransWest Express project)	Coordination meeting of the BLM, USFS staff, and Western Area Power Administration to discuss consistency of study and analysis approaches for biological and visual resources for the two projects.
May 2, 2012	▪ BLM Wyoming State Office ▪ Dixie National Forest ▪ Manti-La Sal National Forest ▪ Uinta-Wasatch-Cache National Forest	Coordination meeting of the BLM, USFS, and the third-party contractors for the Energy Gateway South (EPG) and TransWest Express (AECOM) projects to discuss consistency of analysis for inventoried roadless areas and unroaded and undeveloped areas.
May 16, 2012	▪ BLM Wyoming State Office ▪ Uinta-Wasatch-Cache National Forest ▪ Dixie National Forest	BLM and USFS management briefing to discuss the status Energy Gateway South, TransWest Express, and Sigurd to Red Butte No. 2 – 345kV transmission projects.
May 24, 2012	▪ BLM Wyoming State Office ▪ Western Area Power Administration	Coordination meeting of the BLM, Western Power Administration, and the third-party contractors for the Energy Gateway South (EPG) and TransWest Express (AECOM) projects to discuss consistency of study and analysis approaches for the two projects.
October 3, 2012	▪ BLM Wyoming State Office ▪ BLM Rawlins Field Office ▪ BLM Rock Springs Field Office ▪ BLM Colorado State Office ▪ BLM Northwest District Office ▪ BLM Utah State Office ▪ BLM Price Field Office ▪ BLM Vernal Field Office ▪ Uinta-Wasatch-Cache National Forest ▪ Dixie National Forest	Briefing on the status of the Project to the BLM State Directors and USFS management. Included discussion of the results of coordination efforts with the Agency Interdisciplinary Team and cooperating agencies on the review of impacts and route comparisons.
December 14, 2012	▪ BLM Wyoming State Office ▪ BLM Utah State Office	Discuss sage-grouse issues and routing options in the Emma Park area in Utah.
January 22, 2013	▪ BLM Wyoming State Office ▪ BLM Utah State Office ▪ Rocky Mountain Power	Discuss sage-grouse issues and routing options in the Emma Park area, Utah, with Rocky Mountain Power.

TABLE C-1 AGENCY AND STAKEHOLDER MEETINGS FEBRUARY 2009 TO DECEMBER 2013		
Date	**Agency/Organization**	**Meeting Topic**
February 8, 2013	▪ BLM Wyoming State Office ▪ USFS Interdisciplinary Team	Discuss USFS specialist reports and comments related to a USFS decision.
March 12, 2013	▪ BLM Colorado State Office ▪ BLM Northwest District Office ▪ BLM Little Snake Field Office	Discuss agency-requested route adjustments.
March 13, 2013	▪ BLM Utah State Office ▪ BLM Vernal Field Office ▪ Dixie National Forest	Discuss agency-requested route adjustments.
April 24, 2013	▪ BLM Wyoming State Office ▪ BLM Utah State Office ▪ Uinta-Wasatch-Cache National Forest ▪ Dixie National Forest ▪ Rocky Mountain Power	Discuss the Plan of Development for the Project as well as inventoried roadless areas.
May 24, 2013	▪ BLM Wyoming State Office ▪ USFS	Discuss analysis and documentation of effects on inventoried roadless areas and unroaded/undeveloped areas.
June 4, 2013	▪ BLM Wyoming State Office ▪ BLM Utah State Office ▪ BLM Color Country District ▪ BLM Fillmore Field Office ▪ BLM Moab Field Office ▪ BLM Price Field Office ▪ BLM Richfield Field Office ▪ BLM Salt Lake Field Office ▪ BLM Vernal Field Office ▪ Dixie National Forest ▪ Uinta-Wasatch-Cache National Forest	Brief BLM and USFS management on the status of the Project and discuss an agency-preferred route and potential plan amendments.
June 6, 2013	▪ BLM Wyoming State Office ▪ BLM Colorado State Office ▪ BLM Northwest District Office ▪ BLM Little Snake Field Office ▪ BLM White River Field Office	Brief BLM management on the status of the Project and discuss an agency-preferred route and potential plan amendments.
June 7, 2013	▪ BLM Wyoming State Office ▪ BLM Rawlins Field Office	Brief BLM management on the status of the Project and discuss an agency-preferred route and potential plan amendments.
June 27, 2013	▪ BLM Wyoming State Office ▪ BLM Rawlins Field Office	Discuss routing issues and an agency-preferred route in southern Wyoming.
August 22, 2013	▪ BLM Wyoming State Office ▪ USFS	Discuss analysis and documentation of effects on inventoried roadless areas and unroaded/undeveloped areas.
October 22, 2013	▪ BLM Wyoming State Office ▪ USFS	Discuss USFS comments related to USFS decision.
October 30, 2013	▪ BLM Wyoming State Office ▪ USFS	Discuss USFS comments related to USFS decision.

TABLE C-1 AGENCY AND STAKEHOLDER MEETINGS FEBRUARY 2009 TO DECEMBER 2013		
Date	**Agency/Organization**	**Meeting Topic**
December 3, 2013	▪ BLM Washington Office ▪ BLM Wyoming State Office ▪ BLM Colorado State Office ▪ BLM Utah State Office ▪ BLM National Operations Center ▪ U.S. Department of the Interior, Office of Environmental Policy and Compliance ▪ U.S. Department of the Interior, Office of the Regional Solicitor ▪ USFS Intermountain Region ▪ Dixie National Forest	Brief BLM Washington Office on the status of the Project and review the print-ready Draft EIS.
December 16, 2013	▪ BLM Wyoming State Office ▪ BLM Utah State Office ▪ BLM Vernal Field Office ▪ BLM National Transmission Support Team	Discuss resource issues associated with alternative routes in the BLM Vernal Field Office.
Other Cooperating Agencies		
May 21, 2009	▪ BLM Wyoming State Office ▪ Hill Air Force Base ▪ BLM West Desert District ▪ BLM Fillmore Field Office ▪ BLM Salt Lake Field Office ▪ Rocky Mountain Power ▪ TransWest Express, LLC	Introduce and establish working relationships among BLM project management, BLM field office staff, and Hill Air Force Base; identify resource databases the third-party consultant will need to prepare the EIS; and discuss preliminary alternative routes.
June 2, 2009	▪ BLM Wyoming State Office ▪ Millard County (Utah) ▪ Rocky Mountain Power ▪ TransWest Express, LLC	Introduce and establish working relationships between BLM project management and Millard County; identify resource databases the third-party consultant will need to prepare the EIS; and discuss preliminary alternative routes.
June 12, 2009	▪ BLM Wyoming State Office ▪ BLM Little Snake Field Office ▪ Colorado State Land Board ▪ Colorado Division of Wildlife ▪ Moffat County	Discuss routing issues associated with alternative routes located within the BLM Little Snake Field Office and Moffat County.
April 1, 2010	▪ BLM Wyoming State Office ▪ BLM Price Field Office ▪ USFS ▪ U.S. Army Corps of Engineers ▪ Utah Public Lands Policy Coordination Office ▪ Rocky Mountain Power	Discuss resource issues associated with alternative routes identified in the Nine Mile Canyon area of the BLM Price Field Office.
April 7, 2010	▪ BLM Wyoming State Office ▪ Duchesne County (Utah)	Discuss resource issues associated with alternative routes located in the Argyle Canyon area.

TABLE C-1 AGENCY AND STAKEHOLDER MEETINGS FEBRUARY 2009 TO DECEMBER 2013		
Date	**Agency/Organization**	**Meeting Topic**
July 29, 2010	▪ BLM Wyoming State Office ▪ BLM Rawlins Field Office ▪ BLM Rock Springs Field Office ▪ BLM Little Snake Field Office ▪ U.S. Fish and Wildlife Service (FWS), Wyoming Ecological Services Field Office ▪ Wyoming Governor's Office ▪ Wyoming Game and Fish Department ▪ Carbon County (Wyoming) ▪ Little Snake River Conservation District (Wyoming) ▪ Saratoga-Encampment-Rawlins Conservation District (Wyoming) ▪ Rocky Mountain Power	Discuss resource issues associated with alternative routes located in southern Wyoming.
June 1, 2011	▪ BLM Wyoming State Office ▪ Carbon County (Wyoming) ▪ Sweetwater County (Wyoming) ▪ Moffat County (Colorado)	Discuss alternative routes for the Energy Gateway South and TransWest Express projects.
September 13, 2011	Agency Interdisciplinary Team Meeting – Rawlins, Wyoming ▪ BLM Wyoming State Office ▪ BLM Rawlins Field Office ▪ BLM Rock Springs Field Office ▪ Wyoming Game and Fish Department ▪ Sweetwater County (Wyoming) ▪ Medicine Bow Conservation District (Wyoming) ▪ Saratoga-Encampment-Rawlins Conservation District ▪ Sweetwater County Conservation District	Review project management and administration protocols, review scoping activities and results, review alternative routes being carried forward, discuss potential plan amendments, review schedule, and discuss data collection and inventories.
September 14, 2011	Agency Interdisciplinary Team Meeting – Craig, Colorado ▪ BLM Wyoming State Office ▪ BLM Grand Junction Field Office ▪ BLM Little Snake Field Office ▪ BLM White River Field Office ▪ FWS, Colorado Ecological Services Field Office ▪ Colorado Parks and Wildlife ▪ Utah Division of Wildlife Resources ▪ Moffat County (Colorado) ▪ Uintah County (Utah)	Review project management and administration protocols, review scoping activities and results, review alternative routes being carried forward, discuss potential plan amendments, review schedule, and discuss data collection and inventories.

TABLE C-1 AGENCY AND STAKEHOLDER MEETINGS FEBRUARY 2009 TO DECEMBER 2013		
Date	**Agency/Organization**	**Meeting Topic**
September 16, 2011	Agency Interdisciplinary Team Meeting – Price, Utah ▪ BLM Utah State Office ▪ BLM Fillmore Field Office ▪ BLM Moab Field Office ▪ BLM Price Field Office ▪ BLM Vernal Field Office ▪ Ashley National Forest ▪ Dixie National Forest ▪ Fishlake National Forest ▪ Manti-La Sal National Forest ▪ Uinta-Wasatch-Cache National Forest ▪ FWS, Utah Ecological Services Field Office ▪ URMCC ▪ Utah Public Lands Policy Coordination Office ▪ Utah Division of Wildlife Resources ▪ Carbon County (Utah) ▪ Emery County (Utah) ▪ Sanpete County (Utah)	Review project management and administration protocols, review scoping activities and results, review alternative routes being carried forward, discuss potential plan amendments, review schedule, and discuss data collection and inventories.
October 27, 2011	▪ BLM Wyoming State Office ▪ BLM Price Field Office ▪ Emery County (Utah)	Discuss resource issues associated with alternative routes in the San Rafael Swell area of the BLM Price Field Office.

TABLE C-1 AGENCY AND STAKEHOLDER MEETINGS FEBRUARY 2009 TO DECEMBER 2013		
Date	**Agency/Organization**	**Meeting Topic**
December 13, 2011	Agency Interdisciplinary Team Conference Call ▪ BLM Wyoming State Office ▪ BLM Rawlins Field Office ▪ BLM Rock Springs Field Office ▪ BLM Colorado State Office ▪ BLM Little Snake Field Office ▪ BLM White River Field Office ▪ BLM Utah State Office ▪ BLM Fillmore Field Office ▪ BLM Moab Field Office ▪ Ashley National Forest ▪ Dixie National Forest ▪ Manti-La Sal National Forest ▪ Uinta-Wasatch-Cache National Forest ▪ Bureau of Indian Affairs, Western Region ▪ FWS, Colorado Ecological Services Field Office ▪ FWS, Utah Ecological Services Field Office ▪ Utah Reclamation Mitigation and Conservation Commission (URMCC) ▪ Colorado Division of Parks and Wildlife ▪ Utah Division of Wildlife Resources ▪ Sweetwater County (Wyoming) ▪ Carbon County (Utah) ▪ Duchesne County (Utah) ▪ Uintah County (Utah)	Introduce and discuss the impact assessment and mitigation planning process, explain how the alternative routes will be screened and compared, as well as the status of the scoping report, alternative routes, resource inventory with the Agency Interdisciplinary Team.
December 15, 2011	▪ BLM Wyoming State Office ▪ BLM Price Field Office ▪ Emery County (Utah)	Discuss resource issues associated with alternative routes in the San Rafael Swell area of the BLM Price Field Office.
May 13, 2012	▪ BLM Wyoming State Office ▪ Moffat County (Colorado)	Meeting with Moffat County Land Use Board to discuss detailed inventory review maps and identify input needed from Moffat County.

TABLE C-1 AGENCY AND STAKEHOLDER MEETINGS FEBRUARY 2009 TO DECEMBER 2013		
Date	**Agency/Organization**	**Meeting Topic**
July 17, 2012	▪ BLM Wyoming State Office ▪ BLM Price Field Office ▪ BLM Richfield Field Office ▪ BLM Vernal Field Office ▪ Ashley National Forest ▪ Dixie National Forest ▪ Manti-La Sal National Forest ▪ Uinta-Wasatch-Cache National Forest ▪ Utah Division of Wildlife Resources ▪ Carbon County (Utah) ▪ Duchesne County (Utah) ▪ Sanpete County (Utah)	Meeting with Carbon, Duchesne, and Sanpete counties, as well as the USFS to discuss routing options.
August 20, 2012	Agency Interdisciplinary Team Meeting – Price, Utah ▪ BLM Wyoming State Office ▪ BLM Utah State Office ▪ BLM Fillmore Field Office ▪ BLM Moab Field Office ▪ BLM Price Field Office ▪ BLM Richfield Field Office ▪ BLM Vernal Field Office ▪ USFS Intermountain Region ▪ Ashley National Forest ▪ Dixie National Forest ▪ Manti-La Sal National Forest ▪ Uinta-Wasatch-Cache National Forest ▪ FWS, Utah Ecological Services Field Office ▪ URMCC ▪ Bureau of Indian Affairs, Uintah and Ouray Agency ▪ Utah Division of Wildlife Resources ▪ Utah Public Lands Policy Coordination Office ▪ Carbon County (Utah) ▪ Emery County (Utah) ▪ Sanpete County (Utah) ▪ Wyoming Coalition of Governments (representing Wyoming counties)	Meet with the Agency Interdisciplinary Team to review results of the impact assessment and mitigation planning, review the approach and results of the alternative route screening and comparison, and review and discuss alternative routes to be considered in detail in the EIS.

TABLE C-1 AGENCY AND STAKEHOLDER MEETINGS FEBRUARY 2009 TO DECEMBER 2013		
Date	**Agency/Organization**	**Meeting Topic**
August 21, 2012	▪ BLM Wyoming State Office ▪ Dixie National Forest ▪ Uinta-Wasatch-Cache National Forest	Discuss resource issues associated with alternative routes on the national forest.
August 22, 2012	Agency Interdisciplinary Team Meeting – Craig, Colorado ▪ BLM Wyoming State Office ▪ BLM Grand Junction Field Office ▪ BLM Little Snake Field Office ▪ BLM White River Field Office ▪ BLM National Operations Center ▪ FWS, Colorado Ecological Services Field Office ▪ Colorado Parks and Wildlife ▪ Moffat County (Colorado) ▪ Uintah County (Utah)	Meet with the Agency Interdisciplinary Team to review results of the impact assessment and mitigation planning, review the approach and results of the alternative route screening and comparison, and review and discuss alternative routes to be considered in detail in the EIS.
August 23, 2012	Agency Interdisciplinary Team Meeting – Rawlins, Wyoming ▪ BLM Wyoming State Office ▪ BLM Rawlins Field Office ▪ BLM Rock Springs Field Office ▪ FWS, Wyoming Ecological Services Field Office ▪ Wyoming Governor's Office ▪ Wyoming Game and Fish Department ▪ Carbon County (Wyoming) ▪ Sweetwater County (Wyoming) ▪ Little Snake River Conservation District (Wyoming) ▪ Saratoga-Rawlins-Encampment Conservation District (Wyoming) ▪ Wyoming Coalition of Governments	Meet with the Agency Interdisciplinary Team to review results of the impact assessment and mitigation planning, review the approach and results of the alternative route screening and comparison, and review and discuss alternative routes to be considered in detail in the EIS.
September 6, 2012	▪ BLM Wyoming State Office ▪ URMCC	Discuss routing issues associated with alternative routes crossing properties managed by the URMCC.
September 10, 2012	▪ BLM Wyoming State Office ▪ Moffat County	Meeting with Moffat County Land Use Board and Rocky Mountain Power to discuss the Project.
November 8, 2012	▪ BLM Wyoming State Office ▪ URMCC	Meeting with the URMCC (a cooperating agency) to introduce and discuss the Project with other members of the Central Utah Project Bonneville Unit Working Group (including the Bureau of Reclamation and Central Utah Water Conservancy District).

TABLE C-1 AGENCY AND STAKEHOLDER MEETINGS FEBRUARY 2009 TO DECEMBER 2013		
Date	**Agency/Organization**	**Meeting Topic**
November 16, 2012	▪ BLM ▪ USFS ▪ FWS ▪ Utah Division of Wildlife Resources ▪ Colorado Parks and Wildlife ▪ Wasatch County (Utah) ▪ Duchesne County (Utah) ▪ Carbon County (Utah) ▪ Sweetwater County Conservation District ▪ Saratoga-Encampment-Rawlins Conservation District ▪ URMCC ▪ Uintah Basin Adaptive Resource Management Local Working Group ▪ Rocky Mountain Power	Meeting to initiate and discuss the greater sage-grouse habitat equivalent analysis (HEA) process.
December 12, 2012	▪ BLM ▪ USFS ▪ FWS ▪ Colorado Parks and Wildlife ▪ Wyoming Game and Fish Department ▪ Uintah County (Utah) ▪ Rocky Mountain Power	Meeting to summarize the HEA process and the relationship to the National Environmental Policy Act (NEPA) process; confirm use of the framework for sage-grouse impacts analysis.
December 19, 2012	▪ BLM Wyoming State Office ▪ BLM Northwest District Office ▪ BLM Little Snake Field Office ▪ National Park Service ▪ Colorado Parks and Wildlife	Discuss routing issues along U.S. Highway 40 in the vicinity of the Tuttle Ranch Conservation Easement and the Deerlodge Road entrance of Dinosaur National Monument.
January 23, 2013	▪ BLM Wyoming State Office ▪ BLM Utah State Office ▪ BLM Vernal Field Office ▪ Dixie National Forest	Discuss and review the schedule for Section 7 consultation, requirements for any field surveys in support of the consultation, and discuss the EIS and consultation schedules.
January 24, 2013	▪ BLM Wyoming State Office ▪ BLM Little Snake Field Office ▪ FWS, Colorado Ecological Services Field Office	Discuss and review the schedule for Section 7 consultation, requirements for any field surveys in support of the consultation, and discuss the EIS and consultation schedules.
January 25, 2013	▪ BLM ▪ FWS ▪ Colorado Parks and Wildlife ▪ Utah Division of Wildlife Resources	Meeting to discuss parameters to be included in the sage-grouse HEA.

TABLE C-1 AGENCY AND STAKEHOLDER MEETINGS FEBRUARY 2009 TO DECEMBER 2013		
Date	**Agency/Organization**	**Meeting Topic**
January 28, 2013	▪ BLM Wyoming State Office ▪ BLM Rawlins Field Office ▪ FWS, Wyoming Ecological Services Field Office	Discuss and review the schedule for Section 7 consultation, requirements for any field surveys in support of the consultation, and discuss the EIS and consultation schedules.
January 31, 2013	▪ BLM ▪ FWS	Meeting to review the proposed HEA habitat services metric.
February 5, 2013	Agency Interdisciplinary Team Meeting – Rawlins, Wyoming ▪ BLM Wyoming State Office ▪ BLM Rawlins Field Office ▪ Wyoming Governor's Office ▪ Carbon County (Wyoming) ▪ Sweetwater County (Wyoming) ▪ Saratoga-Rawlins-Encampment Conservation District (Wyoming)	Discuss agency comments on the first internal Draft EIS, review route adjustments to be incorporated into the second internal Draft EIS, and begin discussion of an agency-preferred alternative route.
February 6, 2013	Agency Interdisciplinary Team Meeting – Craig, Colorado ▪ BLM Wyoming State Office ▪ BLM Colorado State Office ▪ BLM Little Snake Field Office ▪ BLM White River Field Office ▪ BLM National Operations Center ▪ National Park Service ▪ Colorado Parks and Wildlife ▪ Moffat County (Colorado) ▪ Uintah County (Utah)	Discuss agency comments on the first internal Draft EIS, review route adjustments to be incorporated into the second internal Draft EIS, and begin discussion of an agency-preferred alternative route.

TABLE C-1 AGENCY AND STAKEHOLDER MEETINGS FEBRUARY 2009 TO DECEMBER 2013		
Date	**Agency/Organization**	**Meeting Topic**
February 7, 2013	Agency Interdisciplinary Team Meeting – Rawlins, Wyoming ▪ BLM Wyoming State Office ▪ BLM Utah State Office ▪ BLM Fillmore Field Office ▪ BLM Moab Field Office ▪ BLM Price Field Office ▪ BLM Vernal Field Office ▪ Bureau of Indian Affairs, Uintah and Ouray Agency ▪ Dixie National Forest ▪ Fishlake National Forest ▪ Manti-La Sal National Forest ▪ Uinta-Wasatch-Cache National Forest ▪ URMCC ▪ Utah Division of Wildlife Resources ▪ Carbon County (Utah) ▪ Duchesne County (Utah) ▪ Emery County (Utah) ▪ Wasatch County (Utah)	Discuss agency comments on the first internal Draft EIS, review route adjustments to be incorporated into the second internal Draft EIS, and begin discussion of an agency-preferred alternative route.
February 28, 2013	▪ BLM ▪ FWS ▪ USFS ▪ U.S. Geological Survey	Discuss potential effects on clay phacelia and Deseret milkvetch.
March 4, 2013	▪ BLM ▪ FWS ▪ USFS	Discuss potential effects on migratory bird habitat.
March 14, 2013	▪ BLM ▪ FWS ▪ Colorado Parks and Wildlife ▪ Utah Division of Wildlife Resources ▪ Saratoga-Encampment-Rawlins Conservation District ▪ Rocky Mountain Power	Review comments received on the draft HEA.
March 15, 2013	▪ BLM ▪ FWS ▪ USFS	Discuss considerations pertinent to assessing the feasibility of the Project through Spanish Fork Canyon.

TABLE C-1 AGENCY AND STAKEHOLDER MEETINGS FEBRUARY 2009 TO DECEMBER 2013		
Date	**Agency/Organization**	**Meeting Topic**
March 20, 2013	Old Spanish National Historic Trail Stakeholder Meeting – Green River, Utah ▪ BLM Wyoming State Office ▪ BLM Utah State Office ▪ BLM Moab Field Office ▪ BLM Price Field Office ▪ National Park Service ▪ Old Spanish Trail Association	Discuss the Old Spanish National Historic Trail resources, qualities, values, associated setting, and primary uses in response to BLM Manual 6280.
March 21, 2013	Continental Divide National Scenic Trail Stakeholder Meeting – Rawlins, Wyoming ▪ BLM Wyoming State Office ▪ BLM Rawlins Field Office ▪ USFS, Rocky Mountain Region ▪ Continental Divide Trail Coalition ▪ Continental Divide Trail Society ▪ Alliance for Historic Wyoming	Discuss the Continental Divide National Scenic Trail resources, qualities, values, associated setting, and primary uses in response to BLM Manual 6280.
March 21, 2013	Cherokee and Overland Historic Trails Stakeholder Meeting – Rawlins, Wyoming ▪ BLM Wyoming State Office ▪ BLM Rawlins Field Office ▪ National Park Service ▪ Oregon-California Trails Association ▪ Alliance for Historic Wyoming	Discuss the Cherokee and Overland Historic Trail resources, qualities, values, associated setting, and primary uses in response to BLM Manual 6280.
March 28, 2013	▪ BLM Wyoming State Office ▪ National Park Service ▪ Rocky Mountain Power ▪ TransWest Express, LLC ▪ BLM Colorado State Office ▪ Colorado Parks and Wildlife	Preliminary meeting to discuss application for right-of-way to cross Deerlodge Road entrance of Dinosaur National Monument.
April 2, 2013	▪ BLM ▪ FWS	Discuss roles, responsibilities, timeframes for developing sage-grouse mitigation, and the sage-grouse analysis framework.
April, 4, 2013	▪ BLM ▪ FWS ▪ Rocky Mountain Power	Discuss the use of the sage-grouse framework for the Project and how direct and indirect impacts would be addressed in the HEA and the EIS.
April 24, 2013	▪ BLM ▪ FWS	Discuss the greater sage-grouse HEA; review the purpose of the mitigation plan and HEA documents within the sage-grouse framework.
April 29, 2013	▪ BLM ▪ FWS ▪ USFS	Discuss clay phacelia and Uinta Basin hookless cactus.

TABLE C-1 AGENCY AND STAKEHOLDER MEETINGS FEBRUARY 2009 TO DECEMBER 2013		
Date	**Agency/Organization**	**Meeting Topic**
July 17, 2013	▪ BLM ▪ FWS ▪ USFS	Discuss the analysis for potential effects on migratory bird habitat.
September 12, 2013	▪ BLM ▪ FWS ▪ USFS	Discuss additional conservation measures needed to minimize impacts on migratory bird habitat.
November 1, 2013	▪ BLM ▪ FWS ▪ USFS	Discuss data and methodology for assessing impacts on migratory birds and the process for refining conservation measures to minimize potential impacts on migratory bird habitat.
Tribes		
April 23, 2012	Ute Tribe	Introduce and discuss the Project with the Ute Tribe Energy & Minerals Department.
May 31, 2012	Presentation to Tri-Ute association ▪ Northern Ute Tribe ▪ Southern Ute Tribe ▪ Ute Mountain Tribe	Introduce and discuss the Project with the Tri-Ute association.
Local Governments		
April 20, 2009	Carbon County (Wyoming)	Discuss potential land use issues and permitting.
April 20, 2009	Sweetwater County (Wyoming)	Discuss potential land use issues and permitting.
April 20, 2009	Nephi City (Utah)	Discuss potential land use issues and permitting.
April 21, 2009	Daggett County (Utah)	Discuss potential land use issues and permitting.
April 21, 2009	Uintah County (Utah)	Discuss potential land use issues and permitting.
April 22, 2009	Duchesne County (Utah)	Discuss potential land use issues and permitting.
April 22, 2009	Milford City (Utah)	Discuss potential land use issues and permitting.
April 23, 2009	Naples City (Utah)	Discuss potential land use issues and permitting.
April 23, 2009	Fillmore City (Utah)	Discuss potential land use issues and permitting.
April 27, 2009	Beaver County (Utah)	Discuss potential land use issues and permitting.
April 30, 2009	Washington County (Utah)	Discuss potential land use issues and permitting.
May 4, 2009	Town of Baggs (Wyoming)	Discuss potential land use issues and permitting.
May 5, 2009	Moffat County (Colorado)	Discuss potential land use issues and permitting.
May 6, 2009	Town of Rangely (Colorado)	Discuss potential land use issues and permitting.
May 12, 2009	Mount Pleasant City (Utah)	Discuss potential land use issues and permitting.

TABLE C-1 AGENCY AND STAKEHOLDER MEETINGS FEBRUARY 2009 TO DECEMBER 2013		
Date	**Agency/Organization**	**Meeting Topic**
May 13, 2009	Sanpete County (Utah)	Discuss potential land use issues and permitting.
May 14, 2009	City of Green River (Utah)	Discuss potential land use issues and permitting.
May 14, 2009	Grand County (Utah)	Discuss potential land use issues and permitting.
May 18, 2009	Emery County (Utah)	Discuss potential land use issues and permitting.
May 19, 2009	Huntington City (Utah)	Discuss potential land use issues and permitting.
May 20, 2009	Carbon County (Utah)	Discuss potential land use issues and permitting.
May 20, 2009	Helper City (Utah)	Discuss potential land use issues and permitting.
May 20, 2009	Juab County (Utah)	Discuss potential land use issues and permitting.
May 28, 2009	Iron County (Utah)	Discuss potential land use issues and permitting.
June 5, 2009	Town of Ballard (Utah)	Discuss potential land use issues and permitting.
June 8, 2009	Garfield County (Colorado)	Discuss potential land use issues and permitting.
June 8, 2009	Rio Blanco County (Colorado)	Discuss potential land use issues and permitting.
June 9, 2009	Mesa County (Colorado)	Discuss potential land use issues and permitting.
June 9, 2009	Utah County (Utah)	Discuss potential land use issues and permitting.
June 10, 2009	Roosevelt City (Utah)	Discuss potential land use issues and permitting.
June 10, 2009	Wasatch County (Utah)	Discuss potential land use issues and permitting.
June 15, 2009	Beaver City (Utah)	Discuss potential land use issues and permitting.
June 15, 2009	Sevier County (Utah)	Discuss potential land use issues and permitting.
August 9, 2009	Town of Dixon (Wyoming)	Discuss potential land use issues and permitting.

TABLE C-1 AGENCY AND STAKEHOLDER MEETINGS FEBRUARY 2009 TO DECEMBER 2013		
Date	**Agency/Organization**	**Meeting Topic**
Interested Parties		
April 11, 2012	Interested Parties Meeting: ▪ BLM Wyoming State Office ▪ BLM Utah State Office ▪ Dixie National Forest ▪ Wyoming State Historic Preservation Office ▪ Colorado State Historic Preservation Office ▪ Utah Public Lands Policy Coordination Office ▪ Huntington Eccles Scenic Byway ▪ Old Spanish Trail Association ▪ Oregon-California Trails Association	Introduce the Project; discuss the National Environmental Policy Act and Section 106 of the National Historic Preservation Act (NHPA); and discuss the purpose, use, and development of a Programmatic Agreement with interested parties that responded to the BLM's invitation.
July 25, 2013	Consulting Parties Meeting (Rawlins, Wyoming)	Review and discuss the content of the draft Programmatic Agreement.
July 26, 2013	Consulting Parties Meeting (Craig, Colorado)	Review and discuss the content of the draft Programmatic Agreement.
July 30, 2013	Consulting Parties Meeting (Price, Utah)	Review and discuss the content of the draft Programmatic Agreement.

TABLE C-2 APPLICANT-INITIATED PUBLIC OUTREACH SUMMARY (MAILINGS) JANUARY 2009 TO May 2013		
Mailing Type	**Date**	**Number of Copies Sent**
Company newsletter	June 2011	9,500
Letter to landowners - Wyoming	Up to May 2013	388
Letter to landowners - Colorado	Up to May 2013	650
Letter to landowners - Utah	Up to May 2013	5,614

TABLE C-3 APPLICANT-INITIATED PUBLIC OUTREACH SUMMARY (MEETINGS) JANUARY 2009 TO MARCH 2013		
Meeting Type/Title	**Date**	**City, State**
Briefing with Six County Association of Governments	January 7, 2009	Richfield, Utah
Briefing with Cedar City Chamber of Commerce	January 8, 2009	Cedar City, Utah
Briefing with Southeastern Utah Association of Governments	January 8, 2009	Price, Utah
Briefing with Garfield County, Colorado	January 12, 2009	Glenwood Springs, Colorado
Briefing with Moffat County, Colorado	January 12, 2009	Craig, Colorado
Briefing with Mesa County, Colorado	January 13, 2009	Grand Junction, Colorado
Briefing with Five County Association of Governments	January 21, 2009	St. George, Utah
Briefing with Uintah Basin Association of Governments	January 22, 2009	Vernal, Utah
Briefing with Six County Association of Governments	February 3, 2009	St. George, Utah
Briefing with Iron County Coordinating Council	February 4, 2009	Parowan, Utah

TABLE C-3 APPLICANT-INITIATED PUBLIC OUTREACH SUMMARY (MEETINGS) JANUARY 2009 TO MARCH 2013		
Meeting Type/Title	**Date**	**City, State**
Briefing with Southeastern Utah Association of Local Governments (Sanpete, Sevier, Piute, Millard Counties)	February 5, 2009	Richfield, Utah
Briefing with Associated Governments of Northwestern Colorado	February 12, 2009	Rifle, Colorado
Energy Gateway Update for Utah Municipal Power Agency Annual Member Meeting	March 6, 2009	Salt Lake City, Utah
Carbon County Planning Meeting	April 23, 2009	Price, Utah
Briefing to Southwest Utah Technical Task Force meeting	June 11, 2009	Utah
Briefing to Utah County Commissioners	June 23, 2009	Provo, Utah
Briefing to Ute Indian Tribe Business Council, Uintah and Ouray Indian Reservation	December 16, 2009	Fort Duchesne, Utah
Briefing at Vernal Chamber of Commerce meeting	January 11, 2011	Vernal, Utah
Briefing at Utah Valley Exchange Club meeting	January 19, 2011	Orem, Utah
Briefing at American Society of Civil Engineering meeting	February 17, 2011	Provo, Utah
Briefing to Moffat County Land Use Board	March 14, 2011	Craig, Colorado
Briefing to Rio Blanco County Commission	March 14, 2011	Meeker, Colorado
Meeting with landowners	April 5, 2011	Vernal, Utah
Meeting with landowners	April 6, 2011	Rangely, Colorado
Meeting with landowners	April 7, 2011	Baggs, Wyoming
Meeting with landowners	April 7, 2011	Craig, Colorado
Meeting with landowners	April 13, 2011	Green River, Utah
Meeting with landowners	April 14, 2011	Price, Utah
Briefing to Grand County Council	April 19, 2011	Moab, Utah
Meeting with landowners	April 20, 2011	Mt. Pleasant, Utah
Meeting with landowners	April 21 2011	Nephi, Utah
Briefing to Moffat County Land Use Board	May 16, 2011	Craig, Colorado
Meeting with Energy & Minerals Department, Ute Indian Tribe, Uintah and Ouray Indian Reservation	May 25, 2011	Fort Duchesne, Utah
Meeting with Carbon County (Wyoming), Sweetwater County (Wyoming), and Moffat County (Colorado)	June 3, 2011	Rawlins, Wyoming
Briefing to Carbon County Council of Governments	July 20, 2011	Dixon, Wyoming
Meeting with Realty Officer, Bureau of Indian Affairs	September 19, 2011	Fort Duchesne, Utah
Meeting with Wasatch County Planning Director	November 29, 2011	Heber City, Utah
Briefing during Wasatch County Public Lands Committee meeting	January 4, 2012	Heber City, Utah
Meeting with Energy & Minerals Department, Ute Indian Tribe, Uintah and Ouray Indian Reservation	April 23, 2012	Fort Duchesne, Utah
Briefing to Moffat County Planning and Zoning Board	August 4, 2012	Craig, Colorado
Briefing to Moffat County Land Use Board	September 10, 2012	Craig, Colorado
Community Working Group meeting 1	September 12, 2012	Rawlins, Wyoming
Community Working Group meeting 1	September 18, 2012	Salt Lake City, Utah
Community Working Group meeting 1	September 19, 2012	Nephi, Utah
Community Working Group meeting 1	September 20, 2012	Price, Utah
Community Working Group meeting 1	October 9, 2012	Vernal, Utah
Meeting with Uintah County Economic Development Director	November 15, 2012	Vernal, Utah
Briefing to the Nephi City Mayor and City Council	February 5, 2013	Nephi, Utah

APPENDIX D – CLIMATE AND AIR QUALITY SUPPORTING DATA

D.1 Emissions Summary Tables – Transmission Line and Series Compensation Station Construction

TABLE D-1 CRITERIA POLLUTANT EMISSIONS FOR TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE WYCO-B AND ROUTE VARIATIONS				
Pollutant	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**	**Tons Per Mile of Transmission Line**
Fugitive Dust from Earthmoving and Grading Activities				
PM_{10}	127.30	157.3	0.00	1.390
$PM_{2.5}$	12.70	15.7	0.00	0.140
Paved and Unpaved Road Dust – Conventional Steel Erection Option[1]				
PM_{10}	2,444.80	4,570.1	965.30	39.020
$PM_{2.5}$	246.00	459.9	97.10	3.930
Paved and Unpaved Road Dust – Steel Erection Using Helicopters Option[1]				
PM_{10}	2,522.80	4,404.4	895.60	38.250
$PM_{2.5}$	253.90	443.2	90.10	3.850
Nonroad Engine Emissions – Conventional Steel Erection Option[1]				
CO	26.80	54.7	6.60	0.430
NO_x	24.20	49.6	5.90	0.390
PM_{10}	1.60	3.2	0.40	0.030
$PM_{2.5}$	1.60	3.2	0.40	0.030
SO_2	0.10	0.3	0.03	0.002
VOC	1.80	3.8	0.40	0.030
Nonroad Engine Emissions – Steel Erection Using Helicopters Option[1]				
CO	25.70	43.8	5.10	0.370
NO_x	23.10	38.9	4.50	0.320
PM_{10}	1.60	2.6	0.30	0.020
$PM_{2.5}$	1.60	2.6	0.30	0.020
SO_2	0.10	0.2	0.02	0.002
VOC	1.80	3.0	0.30	0.020
Helicopter Emissions – Conventional Steel Erection Option[1]				
CO	0.20	2.2	0.40	0.010
NO_x	0.30	3.1	0.50	0.020
PM_{10}	0.01	0.1	0.02	0.001
$PM_{2.5}$	0.01	0.1	0.02	0.001
SO_2	0.04	0.4	0.10	0.003
VOC	0.20	1.8	0.30	0.010
Helicopter Emissions – Steel Erection Using Helicopters Option[1]				
CO	1.30	2.3	0.40	0.020
NO_x	2.20	3.4	0.50	0.030
PM_{10}	0.10	0.1	0.02	0.001
$PM_{2.5}$	0.10	0.1	0.02	0.001
SO_2	0.30	0.4	0.10	0.004
VOC	1.00	1.9	0.30	0.020

TABLE D-1 CRITERIA POLLUTANT EMISSIONS FOR TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE WYCO-B AND ROUTE VARIATIONS				
Pollutant	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**	**Tons Per Mile of Transmission Line**
Traffic Emissions – Conventional Steel Erection Option[1]				
CO	2.90	5.8	0.80	0.050
NO_x	5.70	11.5	1.60	0.090
PM_{10}	0.40	0.8	0.10	0.010
$PM_{2.5}$	0.30	0.6	0.10	0.010
SO_2	0.04	0.1	0.01	0.001
VOC	0.90	1.6	0.30	0.010
Traffic Emissions – Steel Erection Using Helicopters Option[1]				
CO	2.90	5.4	0.70	0.040
NO_x	5.80	10.9	1.50	0.090
PM_{10}	0.40	0.7	0.10	0.010
$PM_{2.5}$	0.30	0.6	0.10	0.005
SO_2	0.04	0.1	0.01	0.001
VOC	0.90	1.5	0.30	0.010

NOTES:
[1]Emissions would occur from construction activities including either steel erection using helicopters or conventional steel erection, not both. Emissions above include all activities, not just steel erection.
CO = Carbon monoxide
NO_x = Nitrogen oxides
$PM_{2.5}$ = Particulate matter less than 2.5 micrometers
PM_{10} = Particulate matter less than 10 micrometers
SO_2 = Sulfur dioxide
VOC = Volatile organic compounds

TABLE D-2 CRITERIA POLLUTANT EMISSIONS FOR TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE WYCO-C AND ROUTE VARIATIONS				
Pollutant	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**	**Tons Per Mile of Transmission Line**
Fugitive Dust from Earthmoving and Grading Activities				
PM_{10}	130.20	160.90	0.00	1.380
$PM_{2.5}$	13.00	16.10	0.00	0.140
Paved and Unpaved Road Dust – Conventional Steel Erection Option[1]				
PM_{10}	2,515.30	4,701.90	993.10	39.020
$PM_{2.5}$	253.10	473.10	99.90	3.930
Paved and Unpaved Road Dust – Steel Erection Using Helicopters Option[1]				
PM_{10}	2,595.50	4,531.50	921.50	38.250
$PM_{2.5}$	261.20	456.00	92.70	3.850
Nonroad Engine Emissions – Conventional Steel Erection Option[1]				
CO	27.60	56.30	6.70	0.430
NO_x	24.90	51.00	6.10	0.390
PM_{10}	1.70	3.30	0.40	0.030
$PM_{2.5}$	1.70	3.30	0.40	0.030
SO_2	0.10	0.30	0.03	0.002
VOC	1.90	3.90	0.50	0.030

TABLE D-2 CRITERIA POLLUTANT EMISSIONS FOR TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE WYCO-C AND ROUTE VARIATIONS				
Pollutant	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**	**Tons Per Mile of Transmission Line**
Nonroad Engine Emissions – Steel Erection Using Helicopters Option[1]				
CO	26.40	45.10	5.30	0.370
NO_x	23.80	40.00	4.60	0.320
PM_{10}	1.60	2.70	0.30	0.020
$PM_{2.5}$	1.60	2.70	0.30	0.020
SO_2	0.10	0.20	0.02	0.002
VOC	1.80	3.10	0.30	0.020
Helicopter Emissions – Conventional Steel Erection Option[1]				
CO	0.20	2.20	0.40	0.010
NO_x	0.30	3.20	0.50	0.020
PM_{10}	0.01	0.10	0.02	0.001
$PM_{2.5}$	0.01	0.10	0.02	0.001
SO_2	0.04	0.40	0.10	0.003
VOC	0.20	1.80	0.30	0.010
Helicopter Emissions – Steel Erection Using Helicopters Option[1]				
CO	1.30	2.40	0.40	0.020
NO_x	2.20	3.50	0.50	0.030
PM_{10}	0.10	0.10	0.02	0.001
$PM_{2.5}$	0.10	0.10	0.02	0.001
SO_2	0.30	0.50	0.10	0.004
VOC	1.00	2.00	0.30	0.020
Traffic Emissions – Conventional Steel Erection Option[1]				
CO	2.90	6.00	0.80	0.050
NO_x	5.90	11.80	1.60	0.090
PM_{10}	0.40	0.80	0.10	0.010
$PM_{2.5}$	0.30	0.60	0.10	0.010
SO_2	0.04	0.10	0.01	0.001
VOC	0.90	1.70	0.30	0.010
Traffic Emissions – Steel Erection Using Helicopters Option[1]				
CO	3.00	5.60	0.80	0.040
NO_x	5.90	11.20	1.50	0.090
PM_{10}	0.40	0.70	0.10	0.010
$PM_{2.5}$	0.30	0.60	0.10	0.005
SO_2	0.04	0.06	0.01	0.001
VOC	0.90	1.60	0.30	0.010

NOTES:
[1]Emissions would occur from construction activities including either steel erection using helicopters or conventional steel erection, not both. Emissions above include all activities, not just steel erection.
CO = Carbon monoxide
NO_x = Nitrogen oxides
$PM_{2.5}$ = Particulate matter less than 2.5 micrometers
PM_{10} = Particulate matter less than 10 micrometers
SO_2 = Sulfur dioxide
VOC = Volatile organic compounds

TABLE D-3 CRITERIA POLLUTANT EMISSIONS FOR TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE WYCO-D AND ROUTE VARIATIONS				
Pollutant	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**	**Tons Per Mile of Transmission Line**
Fugitive Dust from Earthmoving and Grading Activities				
PM_{10}	153.60	189.8	0.0	1.370
$PM_{2.5}$	15.40	19.0	0.0	0.140
Paved and Unpaved Road Dust – Conventional Steel Erection Option[1]				
PM_{10}	2.988.70	5,586.9	1,180.1	39.020
$PM_{2.5}$	300.70	562.2	118.7	3.930
Paved and Unpaved Road Dust – Steel Erection Using Helicopters Option[1]				
PM_{10}	3,084.10	5,384.4	1,094.9	38.250
$PM_{2.5}$	310.30	541.8	110.2	3.850
Nonroad Engine Emissions – Conventional Steel Erection Option[1]				
CO	32.80	66.8	8.00	0.430
NO_x	29.60	60.6	7.20	0.390
PM_{10}	2.00	3.9	0.50	0.030
$PM_{2.5}$	2.00	3.9	0.50	0.030
SO_2	0.10	0.3	0.03	0.002
VOC	2.30	4.6	0.50	0.030
Nonroad Engine Emissions – Steel Erection Using Helicopters Option[1]				
CO	31.40	53.6	6.30	0.370
NO_x	28.20	47.5	5.50	0.320
PM_{10}	1.90	3.2	0.40	0.020
$PM_{2.5}$	1.90	3.2	0.40	0.020
SO_2	0.10	0.3	0.03	0.002
VOC	2.20	3.6	0.40	0.020
Helicopter Emissions – Conventional Steel Erection Option[1]				
CO	0.30	2.7	0.40	0.010
NO_x	0.40	3.8	0.60	0.020
PM_{10}	0.01	0.1	0.02	0.001
$PM_{2.5}$	0.01	0.1	0.02	0.001
SO_2	0.10	0.5	0.10	0.003
VOC	0.20	2.2	0.40	0.010
Helicopter Emissions – Steel Erection Using Helicopters Option[1]				
CO	1.50	2.9	0.40	0.020
NO_x	2.60	4.2	0.60	0.030
PM_{10}	0.10	0.1	0.02	0.001
$PM_{2.5}$	0.10	0.1	0.02	0.001
SO_2	0.30	0.5	0.10	0.004
VOC	1.20	2.3	0.40	0.020
Traffic Emissions – Conventional Steel Erection Option[1]				
CO	3.50	7.1	1.00	0.050
NO_x	7.00	14.0	1.90	0.090
PM_{10}	0.50	0.9	0.10	0.010
$PM_{2.5}$	0.40	0.8	0.10	0.010
SO_2	0.10	0.1	0.02	0.001
VOC	1.10	2.0	0.30	0.010

TABLE D-3 CRITERIA POLLUTANT EMISSIONS FOR TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE WYCO-D AND ROUTE VARIATIONS				
Pollutant	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**	**Tons Per Mile of Transmission Line**
Traffic Emissions – Steel Erection Using Helicopters Option[1]				
CO	3.50	6.6	0.90	0.040
NO_x	7.10	13.3	1.80	0.090
PM_{10}	0.50	0.9	0.10	0.010
$PM_{2.5}$	0.40	0.7	0.10	0.005
SO_2	0.10	0.1	0.02	0.001
VOC	1.10	1.9	0.30	0.010

NOTES:
[1]Emissions would occur from construction activities including either steel erection using helicopters or conventional steel erection, not both. Emissions above include all activities, not just steel erection.
CO = Carbon monoxide
NO_x = Nitrogen oxides
$PM_{2.5}$ = Particulate matter less than 2.5 micrometers
PM_{10} = Particulate matter less than 10 micrometers
SO_2 = Sulfur dioxide
VOC = Volatile organic compounds

TABLE D-4 CRITERIA POLLUTANT EMISSIONS FOR TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE WYCO-F AND ROUTE VARIATIONS				
Pollutant	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**	**Tons Per Mile of Transmission Line**
Fugitive Dust from Earthmoving and Grading Activities				
PM_{10}	135.10	166.9	0.00	1.380
$PM_{2.5}$	13.50	16.7	0.00	0.140
Paved and Unpaved Road Dust – Conventional Steel Erection Option[1]				
PM_{10}	2,616.90	4,891.9	1,033.30	39.020
$PM_{2.5}$	263.30	492.2	104.00	3.930
Paved and Unpaved Road Dust – Steel Erection Using Helicopters Option[1]				
PM_{10}	2,700.40	4,714.5	958.70	38.250
$PM_{2.5}$	271.70	474.4	96.50	3.850
Nonroad Engine Emissions – Conventional Steel Erection Option[1]				
CO	28.70	58.5	7.00	0.430
NO_x	25.90	53.1	6.30	0.390
PM_{10}	1.70	3.4	0.40	0.030
$PM_{2.5}$	1.70	3.4	0.40	0.030
SO_2	0.10	0.3	0.03	0.002
VOC	2.00	4.0	0.50	0.030
Nonroad Engine Emissions – Steel Erection Using Helicopters Option[1]				
CO	27.50	46.9	5.50	0.370
NO_x	24.70	41.6	4.80	0.320
PM_{10}	1.70	2.8	0.30	0.020
$PM_{2.5}$	1.70	2.8	0.30	0.020
SO_2	0.10	0.2	0.02	0.002
VOC	1.90	3.2	0.40	0.020

TABLE D-4
CRITERIA POLLUTANT EMISSIONS FOR TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE WYCO-F AND ROUTE VARIATIONS

Pollutant	Year 1 (tons)	Year 2 (tons)	Year 3 (tons)	Tons Per Mile of Transmission Line
Helicopter Emissions – Conventional Steel Erection Option[1]				
CO	0.20	2.3	0.40	0.010
NO_x	0.30	3.4	0.60	0.020
PM_{10}	0.01	0.1	0.02	0.001
$PM_{2.5}$	0.01	0.1	0.02	0.001
SO_2	0.04	0.4	0.10	0.003
VOC	0.20	1.9	0.30	0.010
Helicopter Emissions – Steel Erection Using Helicopters Option[1]				
CO	1.30	2.5	0.40	0.020
NO_x	2.30	3.7	0.60	0.030
PM_{10}	0.10	0.1	0.02	0.001
$PM_{2.5}$	0.10	0.1	0.02	0.001
SO_2	0.30	0.5	0.10	0.004
VOC	1.10	2.0	0.30	0.020
Traffic Emissions – Conventional Steel Erection Option[1]				
CO	3.10	6.2	0.90	0.050
NO_x	6.10	12.3	1.70	0.090
PM_{10}	0.40	0.8	0.10	0.010
$PM_{2.5}$	0.30	0.7	0.10	0.010
SO_2	0.05	0.1	0.01	0.001
VOC	1.00	1.7	0.30	0.010
Traffic Emissions – Steel Erection Using Helicopters Option[1]				
CO	3.10	5.8	0.80	0.040
NO_x	6.20	11.6	1.60	0.090
PM_{10}	0.40	0.8	0.10	0.010
$PM_{2.5}$	0.30	0.6	0.10	0.005
SO_2	0.05	0.1	0.01	0.001
VOC	1.00	1.6	0.30	0.010

NOTES:
[1]Emissions would occur from construction activities including either steel erection using helicopters or conventional steel erection, not both. Emissions above include all activities, not just steel erection.
CO = Carbon monoxide
NO_x = Nitrogen oxides
$PM_{2.5}$ = Particulate matter less than 2.5 micrometers
PM_{10} = Particulate matter less than 10 micrometers
SO_2 = Sulfur dioxide
VOC = Volatile organic compounds

TABLE D-5 CRITERIA POLLUTANT EMISSIONS FOR TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE COUT BAX-B				
Pollutant	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**	**Tons Per Mile of Transmission Line**
Fugitive Dust from Earthmoving and Grading Activities				
PM_{10}	130.5	260.9	25.10	1.490
$PM_{2.5}$	13.0	26.1	2.50	0.150
Paved and Unpaved Road Dust – Conventional Steel Erection Option[1]				
PM_{10}	3,337.8	6,239.4	1,317.90	39.020
$PM_{2.5}$	335.9	627.8	132.60	3.930
Paved and Unpaved Road Dust – Steel Erection Using Helicopters Option[1]				
PM_{10}	3,444.3	6,013.3	1,222.80	38.250
$PM_{2.5}$	346.6	605.1	123.00	3.850
Nonroad Engine Emissions – Conventional Steel Erection Option[1]				
CO	68.7	149.5	20.20	0.850
NO_x	29.4	83.4	18.30	0.470
PM_{10}	2.7	6.6	1.20	0.040
$PM_{2.5}$	2.7	6.6	1.20	0.040
SO_2	0.1	0.4	0.10	0.002
VOC	5.4	11.3	1.40	0.060
Nonroad Engine Emissions – Steel Erection Using Helicopters Option[1]				
CO	68.4	140.2	20.20	0.820
NO_x	29.1	74.2	18.30	0.440
PM_{10}	2.6	6.1	1.20	0.040
$PM_{2.5}$	2.6	6.1	1.20	0.040
SO_2	0.1	0.3	0.10	0.002
VOC	5.4	10.7	1.40	0.060
Helicopter Emissions – Conventional Steel Erection Option[1]				
CO	0.0	2.5	1.40	0.010
NO_x	0.0	3.6	2.00	0.020
PM_{10}	0.0	0.1	0.10	0.001
$PM_{2.5}$	0.0	0.1	0.10	0.001
SO_2	0.0	0.5	0.30	0.003
VOC	0.0	2.0	1.10	0.010
Helicopter Emissions – Steel Erection Using Helicopters Option[1]				
CO	0.0	4.1	1.40	0.020
NO_x	0.0	6.5	2.00	0.030
PM_{10}	0.0	0.2	0.10	0.001
$PM_{2.5}$	0.0	0.2	0.10	0.001
SO_2	0.0	0.8	0.30	0.004
VOC	0.0	3.4	1.10	0.020
Traffic Emissions – Conventional Steel Erection Option[1]				
CO	2.9	9.2	2.50	0.050
NO_x	6.1	18.7	4.90	0.110
PM_{10}	0.4	1.3	0.30	0.010
$PM_{2.5}$	0.3	1.0	0.30	0.010
SO_2	0.1	0.1	0.04	0.001
VOC	1.1	2.8	0.80	0.02

TABLE D-5 CRITERIA POLLUTANT EMISSIONS FOR TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE COUT BAX-B				
Pollutant	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**	**Tons Per Mile of Transmission Line**
Traffic Emissions – Steel Erection Using Helicopters Option[1]				
CO	2.9	8.9	2.30	0.050
NO_x	6.1	18.3	4.60	0.100
PM_{10}	0.4	1.2	0.30	0.010
$PM_{2.5}$	0.3	1.0	0.30	0.010
SO_2	0.1	0.1	0.04	0.001
VOC	1.1	2.7	0.70	0.020

NOTES:
[1]Emissions would occur from construction activities including either steel erection using helicopters or conventional steel erection, not both. Emissions above include all activities, not just steel erection.
CO = Carbon monoxide
NO_x = Nitrogen oxides
$PM_{2.5}$ = Particulate matter less than 2.5 micrometers
PM_{10} = Particulate matter less than 10 micrometers
SO_2 = Sulfur dioxide
VOC = Volatile organic compounds

TABLE D-6 CRITERIA POLLUTANT EMISSIONS FOR TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE COUT BAX-C				
Pollutant	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**	**Tons Per Mile of Transmission Line**
Fugitive Dust from Earthmoving and Grading Activities				
PM_{10}	133.1	266.2	25.60	1.470
$PM_{2.5}$	13.3	26.6	2.60	0.150
Paved and Unpaved Road Dust – Conventional Steel Erection Option[1]				
PM_{10}	3,463.3	6,474.1	1,367.50	39.020
$PM_{2.5}$	348.5	651.5	137.60	3.930
Paved and Unpaved Road Dust – Steel Erection Using Helicopters Option[1]				
PM_{10}	3,573.8	6,239.4	1,268.80	38.250
$PM_{2.5}$	359.6	627.8	127.70	3.850
Nonroad Engine Emissions – Conventional Steel Erection Option[1]				
CO	71.3	155.1	21.00	0.850
NO_x	30.5	86.5	19.00	0.470
PM_{10}	2.8	6.9	1.30	0.040
$PM_{2.5}$	2.8	6.9	1.30	0.040
SO_2	0.1	0.4	0.10	0.002
VOC	5.6	11.8	1.40	0.060
Nonroad Engine Emissions – Steel Erection Using Helicopters Option[1]				
CO	70.9	145.4	21.00	0.820
NO_x	30.2	77.0	19.00	0.440
PM_{10}	2.7	6.3	1.30	0.040
$PM_{2.5}$	2.7	6.3	1.30	0.040
SO_2	0.1	0.4	0.10	0.002
VOC	5.6	11.1	1.40	0.060

TABLE D-6 CRITERIA POLLUTANT EMISSIONS FOR TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE COUT BAX-C				
Pollutant	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**	**Tons Per Mile of Transmission Line**
Helicopter Emissions – Conventional Steel Erection Option[1]				
CO	0.0	2.6	1.40	0.010
NO_x	0.0	3.7	2.10	0.020
PM_{10}	0.0	0.1	0.10	0.001
$PM_{2.5}$	0.0	0.1	0.10	0.001
SO_2	0.0	0.5	0.30	0.003
VOC	0.0	2.1	1.20	0.010
Helicopter Emissions – Steel Erection Using Helicopters Option[1]				
CO	0.0	4.3	1.40	0.020
NO_x	0.0	6.8	2.10	0.030
PM_{10}	0.0	0.2	0.10	0.001
$PM_{2.5}$	0.0	0.2	0.10	0.001
SO_2	0.0	0.8	0.30	0.004
VOC	0.0	3.5	1.20	0.020
Traffic Emissions – Conventional Steel Erection Option[1]				
CO	3.0	9.5	2.60	0.050
NO_x	6.4	19.4	5.00	0.110
PM_{10}	0.4	1.3	0.30	0.010
$PM_{2.5}$	0.4	1.1	0.30	0.010
SO_2	0.1	0.1	0.04	0.001
VOC	1.1	2.9	0.80	0.020
Traffic Emissions – Steel Erection Using Helicopters Option[1]				
CO	3.0	9.2	2.40	0.050
NO_x	6.4	19.0	4.70	0.100
PM_{10}	0.4	1.3	0.30	0.010
$PM_{2.5}$	0.4	1.0	0.30	0.010
SO_2	0.1	0.1	0.04	0.001
VOC	1.1	2.8	0.80	0.020

NOTES:
[1]Emissions would occur from construction activities including either steel erection using helicopters or conventional steel erection, not both. Emissions above include all activities, not just steel erection.
CO = Carbon monoxide
NO_x = Nitrogen oxides
$PM_{2.5}$ = Particulate matter less than 2.5 micrometers
PM_{10} = Particulate matter less than 10 micrometers
SO_2 = Sulfur dioxide
VOC = Volatile organic compounds

TABLE D-7 CRITERIA POLLUTANT EMISSIONS FOR TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE COUT BAX-E				
Pollutant	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**	**Tons Per Mile of Transmission Line**
Fugitive Dust from Earthmoving and Grading Activities				
PM_{10}	129.9	259.8	25.00	1.420
$PM_{2.5}$	13.0	26.0	2.50	0.140
Paved and Unpaved Road Dust – Conventional Steel Erection Option[1]				
PM_{10}	3,484.9	6,514.3	1,376.00	39.020
$PM_{2.5}$	350.7	655.5	138.50	3.930
Paved and Unpaved Road Dust – Steel Erection Using Helicopters Option[1]				
PM_{10}	3,596.0	6.278.2	1,276.60	38.250
$PM_{2.5}$	361.8	631.7	128.50	3.850
Nonroad Engine Emissions – Conventional Steel Erection Option[1]				
CO	71.7	156.1	21.10	0.850
NO_x	30.7	87.1	19.10	0.470
PM_{10}	2.8	6.9	1.30	0.040
$PM_{2.5}$	2.8	6.9	1.30	0.040
SO_2	0.1	0.4	0.10	0.002
VOC	5.6	11.8	1.40	0.060
Nonroad Engine Emissions – Steel Erection Using Helicopters Option[1]				
CO	71.4	146.3	21.10	0.820
NO_x	30.4	77.4	19.10	0.440
PM_{10}	2.7	6.4	1.30	0.040
$PM_{2.5}$	2.7	6.4	1.30	0.040
SO_2	0.1	0.4	0.10	0.002
VOC	5.6	11.1	1.40	0.060
Helicopter Emissions – Conventional Steel Erection Option[1]				
CO	0.0	2.6	1.40	0.010
NO_x	0.0	3.7	2.10	0.020
PM_{10}	0.0	0.1	0.10	0.001
$PM_{2.5}$	0.0	0.1	0.10	0.001
SO_2	0.0	0.5	0.30	0.003
VOC	0.0	2.1	1.20	0.010
Helicopter Emissions – Steel Erection Using Helicopters Option[1]				
CO	0.0	4.3	1.40	0.020
NO_x	0.0	6.8	2.10	0.030
PM_{10}	0.0	0.2	0.10	0.001
$PM_{2.5}$	0.0	0.2	0.10	0.001
SO_2	0.0	0.8	0.30	0.004
VOC	0.0	3.5	1.20	0.020
Traffic Emissions – Conventional Steel Erection Option[1]				
CO	3.0	9.6	2.60	0.050
NO_x	6.4	19.5	5.10	0.110
PM_{10}	0.5	1.3	0.40	0.010
$PM_{2.5}$	0.4	1.1	0.30	0.010
SO_2	0.1	0.1	0.04	0.001
VOC	1.1	2.9	0.80	0.020

TABLE D-7 CRITERIA POLLUTANT EMISSIONS FOR TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE COUT BAX-E				
Pollutant	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**	**Tons Per Mile of Transmission Line**
Traffic Emissions – Steel Erection Using Helicopters Option[1]				
CO	3.0	9.3	2.40	0.050
NO_x	6.4	19.1	4.80	0.100
PM_{10}	0.5	1.3	0.30	0.010
$PM_{2.5}$	0.4	1.1	0.30	0.010
SO_2	0.1	0.1	0.04	0.001
VOC	1.1	2.9	0.80	0.020

NOTES:
[1]Emissions would occur from construction activities including either steel erection using helicopters or conventional steel erection, not both. Emissions above include all activities, not just steel erection.
CO = Carbon monoxide
NO_x = Nitrogen oxides
$PM_{2.5}$ = Particulate matter less than 2.5 micrometers
PM_{10} = Particulate matter less than 10 micrometers
SO_2 = Sulfur dioxide
VOC = Volatile organic compounds

TABLE D-8 CRITERIA POLLUTANT EMISSIONS FOR TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE COUT-A AND ROUTE VARIATION				
Pollutant	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**	**Tons Per Mile of Transmission Line**
Fugitive Dust from Earthmoving and Grading Activities				
PM_{10}	102.40	204.8	19.70	1.590
$PM_{2.5}$	10.20	20.5	2.00	0.160
Paved and Unpaved Road Dust – Conventional Steel Erection Option[1]				
PM_{10}	2,462.70	4,603.6	972.40	39.020
$PM_{2.5}$	247.80	463.2	97.80	3.930
Paved and Unpaved Road Dust – Steel Erection Using Helicopters Option[1]				
PM_{10}	2,541.30	4,436.7	902.20	38.250
$PM_{2.5}$	255.70	446.4	90.80	3.850
Nonroad Engine Emissions – Conventional Steel Erection Option[1]				
CO	50.70	110.3	14.90	0.850
NO_x	21.70	61.5	13.50	0.470
PM_{10}	2.00	4.9	0.90	0.040
$PM_{2.5}$	2.00	4.9	0.90	0.040
SO_2	0.10	0.3	0.10	0.002
VOC	4.00	8.4	1.00	0.060
Nonroad Engine Emissions – Steel Erection Using Helicopters Option[1]				
CO	50.40	103.4	14.90	0.820
NO_x	21.50	54.7	13.50	0.440
PM_{10}	1.90	4.5	0.90	0.040
$PM_{2.5}$	1.90	4.5	0.90	0.040
SO_2	0.10	0.3	0.10	0.002
VOC	4.00	7.9	1.00	0.060

TABLE D-8 CRITERIA POLLUTANT EMISSIONS FOR TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE COUT-A AND ROUTE VARIATION				
Pollutant	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**	**Tons Per Mile of Transmission Line**
Helicopter Emissions – Conventional Steel Erection Option[1]				
CO	0.00	1.8	1.00	0.010
NO_x	0.00	2.6	1.50	0.020
PM_{10}	0.00	0.1	0.04	0.001
$PM_{2.5}$	0.00	0.1	0.04	0.001
SO_2	0.00	0.3	0.20	0.003
VOC	0.00	1.5	0.80	0.010
Helicopter Emissions – Steel Erection Using Helicopters Option[1]				
CO	0.00	3.1	1.00	0.020
NO_x	0.00	4.8	1.50	0.030
PM_{10}	0.00	0.1	0.04	0.001
$PM_{2.5}$	0.00	0.1	0.04	0.001
SO_2	0.00	0.6	0.20	0.004
VOC	0.00	2.5	0.80	0.020
Traffic Emissions – Conventional Steel Erection Option[1]				
CO	2.10	6.8	1.80	0.050
NO_x	4.50	13.8	3.60	0.110
PM_{10}	0.30	0.9	0.20	0.010
$PM_{2.5}$	0.30	0.8	0.20	0.010
SO_2	0.04	0.1	0.03	0.001
VOC	0.80	2.1	0.60	0.020
Traffic Emissions – Steel Erection Using Helicopters Option[1]				
CO	2.10	6.6	1.70	0.050
NO_x	4.50	13.5	3.40	0.100
PM_{10}	0.30	0.9	0.20	0.010
$PM_{2.5}$	0.30	0.7	0.20	0.010
SO_2	0.04	0.1	0.03	0.001
VOC	0.80	2.0	0.50	0.020

NOTES:
[1]Emissions would occur from construction activities including either steel erection using helicopters or conventional steel erection, not both. Emissions above include all activities, not just steel erection.
CO = Carbon monoxide
NO_x = Nitrogen oxides
$PM_{2.5}$ = Particulate matter less than 2.5 micrometers
PM_{10} = Particulate matter less than 10 micrometers
SO_2 = Sulfur dioxide
VOC = Volatile organic compounds

TABLE D-9 CRITERIA POLLUTANT EMISSIONS FOR TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE COUT-B AND ROUTE VARIATIONS				
Pollutant	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**	**Tons Per Mile of Transmission Line**
Fugitive Dust from Earthmoving and Grading Activities				
PM_{10}	106.40	212.7	20.50	1.570
$PM_{2.5}$	10.60	21.3	2.00	0.160
Paved and Unpaved Road Dust – Conventional Steel Erection Option[1]				
PM_{10}	2,582.30	4,827.1	1,019.60	39.020
$PM_{2.5}$	259.80	485.7	102.60	3.930
Paved and Unpaved Road Dust – Steel Erection Using Helicopters Option[1]				
PM_{10}	2,664.60	4,652.1	946.00	38.250
$PM_{2.5}$	268.10	468.1	95.20	3.850
Nonroad Engine Emissions – Conventional Steel Erection Option[1]				
CO	53.20	115.6	15.70	0.850
NO_x	22.80	64.5	14.20	0.470
PM_{10}	2.10	5.1	0.90	0.040
$PM_{2.5}$	2.10	5.1	0.90	0.040
SO_2	0.10	0.3	0.10	0.002
VOC	4.20	8.8	1.10	0.060
Nonroad Engine Emissions – Steel Erection Using Helicopters Option[1]				
CO	52.90	108.4	15.70	0.820
NO_x	22.50	57.4	14.20	0.440
PM_{10}	2.00	4.7	0.90	0.040
$PM_{2.5}$	2.00	4.7	0.90	0.040
SO_2	0.10	0.3	0.10	0.002
VOC	4.20	8.2	1.10	0.060
Helicopter Emissions – Conventional Steel Erection Option[1]				
CO	0.00	1.9	1.10	0.010
NO_x	0.00	2.8	1.50	0.020
PM_{10}	0.00	0.1	0.04	0.001
$PM_{2.5}$	0.00	0.1	0.04	0.001
SO_2	0.00	0.4	0.20	0.003
VOC	0.00	1.5	0.90	0.010
Helicopter Emissions – Steel Erection Using Helicopters Option[1]				
CO	0.00	3.2	1.10	0.020
NO_x	0.00	5.1	1.50	0.030
PM_{10}	0.00	0.1	0.04	0.001
$PM_{2.5}$	0.00	0.1	0.04	0.001
SO_2	0.00	0.6	0.20	0.004
VOC	0.00	2.6	0.90	0.020
Traffic Emissions – Conventional Steel Erection Option[1]				
CO	2.20	7.1	1.90	0.050
NO_x	4.70	14.5	3.80	0.110
PM_{10}	0.30	1.0	0.30	0.010
$PM_{2.5}$	0.30	0.8	0.20	0.010
SO_2	0.05	0.1	0.03	0.001
VOC	0.80	2.2	0.60	0.020

TABLE D-9 CRITERIA POLLUTANT EMISSIONS FOR TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE COUT-B AND ROUTE VARIATIONS				
Pollutant	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**	**Tons Per Mile of Transmission Line**
Traffic Emissions – Steel Erection Using Helicopters Option[1]				
CO	2.20	6.9	1.80	0.050
NO_x	4.70	14.1	3.50	0.100
PM_{10}	0.30	1.0	0.20	0.010
$PM_{2.5}$	0.30	0.8	0.20	0.010
SO_2	0.05	0.1	0.03	0.001
VOC	0.80	2.1	0.60	0.020

NOTES:
[1]Emissions would occur from construction activities including either steel erection using helicopters or conventional steel erection, not both. Emissions above include all activities, not just steel erection.
CO = Carbon monoxide
NO_x = Nitrogen oxides
$PM_{2.5}$ = Particulate matter less than 2.5 micrometers
PM_{10} = Particulate matter less than 10 micrometers
SO_2 = Sulfur dioxide
VOC = Volatile organic compounds

TABLE D-10 CRITERIA POLLUTANT EMISSIONS FOR TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE COUT-C AND ROUTE VARIATIONS				
Pollutant	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**	**Tons Per Mile of Transmission Line**
Fugitive Dust from Earthmoving and Grading Activities				
PM_{10}	108.30	216.7	20.80	1.650
$PM_{2.5}$	10.80	21.7	2.10	0.160
Paved and Unpaved Road Dust – Conventional Steel Erection Option[1]				
PM_{10}	2,508.10	4,688.5	990.30	39.020
$PM_{2.5}$	252.40	471.8	99.70	3.930
Paved and Unpaved Road Dust – Steel Erection Using Helicopters Option[1]				
PM_{10}	2,588.10	4,518.6	918.80	38.250
$PM_{2.5}$	260.40	454.7	92.50	3.850
Nonroad Engine Emissions – Conventional Steel Erection Option[1]				
CO	51.60	112.3	15.20	0.850
NO_x	22.10	62.7	13.80	0.470
PM_{10}	2.00	5.0	0.90	0.040
$PM_{2.5}$	2.00	5.0	0.90	0.040
SO_2	0.10	0.3	0.10	0.002
VOC	4.10	8.5	1.00	0.060
Nonroad Engine Emissions – Steel Erection Using Helicopters Option[1]				
CO	51.40	105.3	15.20	0.820
NO_x	21.90	55.7	13.80	0.440
PM_{10}	2.00	4.6	0.90	0.040
$PM_{2.5}$	2.00	4.6	0.90	0.040
SO_2	0.10	0.3	0.10	0.002
VOC	4.00	8.0	1.00	0.060

TABLE D-10 CRITERIA POLLUTANT EMISSIONS FOR TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE COUT-C AND ROUTE VARIATIONS				
Pollutant	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**	**Tons Per Mile of Transmission Line**
Helicopter Emissions – Conventional Steel Erection Option[1]				
CO	0.00	1.9	1.00	0.010
NO_x	0.00	2.7	1.50	0.020
PM_{10}	0.00	0.1	0.04	0.001
$PM_{2.5}$	0.00	0.1	0.04	0.001
SO_2	0.00	0.3	0.20	0.003
VOC	0.00	1.5	0.80	0.010
Helicopter Emissions – Steel Erection Using Helicopters Option[1]				
CO	0.00	3.1	1.00	0.020
NO_x	0.00	4.9	1.50	0.030
PM_{10}	0.00	0.1	0.04	0.001
$PM_{2.5}$	0.00	0.1	0.04	0.001
SO_2	0.00	0.6	0.20	0.004
VOC	0.00	2.5	0.80	0.020
Traffic Emissions – Conventional Steel Erection Option[1]				
CO	2.20	6.9	1.90	0.050
NO_x	4.60	14.1	3.70	0.110
PM_{10}	0.30	1.0	0.30	0.010
$PM_{2.5}$	0.30	0.8	0.20	0.010
SO_2	0.04	0.1	0.03	0.001
VOC	0.80	2.1	0.60	0.020
Traffic Emissions – Steel Erection Using Helicopters Option[1]				
CO	2.20	6.7	1.70	0.050
NO_x	4.60	13.7	3.40	0.100
PM_{10}	0.30	0.9	0.20	0.010
$PM_{2.5}$	0.30	0.8	0.20	0.010
SO_2	0.04	0.1	0.03	0.001
VOC	0.80	2.1	0.60	0.020

NOTES:
[1]Emissions would occur from construction activities including either steel erection using helicopters or conventional steel erection, not both. Emissions above include all activities, not just steel erection.
CO = Carbon monoxide
NO_x = Nitrogen oxides
$PM_{2.5}$ = Particulate matter less than 2.5 micrometers
PM_{10} = Particulate matter less than 10 micrometers
SO_2 = Sulfur dioxide
VOC = Volatile organic compounds

TABLE D-11 CRITERIA POLLUTANT EMISSIONS FOR TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE COUT-H				
Pollutant	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**	**Tons Per Mile of Transmission Line**
Fugitive Dust from Earthmoving and Grading Activities				
PM_{10}	99.20	198.4	19.10	1.580
$PM_{2.5}$	9.90	19.8	1.90	0.160
Paved and Unpaved Road Dust – Conventional Steel Erection Option[1]				
PM_{10}	2,398.20	4,482.9	946.90	39.020
$PM_{2.5}$	241.30	451.1	95.30	3.930
Paved and Unpaved Road Dust – Steel Erection Using Helicopters Option[1]				
PM_{10}	2,474.70	4,320.4	878.50	38.250
$PM_{2.5}$	249.00	434.7	88.40	3.850
Nonroad Engine Emissions – Conventional Steel Erection Option[1]				
CO	49.40	107.4	14.50	0.850
NO_x	21.10	59.9	13.20	0.470
PM_{10}	1.90	4.8	0.90	0.040
$PM_{2.5}$	1.90	4.8	0.90	0.040
SO_2	0.10	0.3	0.10	0.002
VOC	3.90	8.1	1.00	0.060
Nonroad Engine Emissions – Steel Erection Using Helicopters Option[1]				
CO	49.10	100.7	14.50	0.820
NO_x	20.90	53.3	13.20	0.440
PM_{10}	1.90	4.4	0.90	0.040
$PM_{2.5}$	1.90	4.4	0.90	0.040
SO_2	0.10	0.2	0.10	0.002
VOC	3.90	7.7	1.00	0.060
Helicopter Emissions – Conventional Steel Erection Option[1]				
CO	0.00	1.8	1.00	0.010
NO_x	0.00	2.6	1.40	0.020
PM_{10}	0.00	0.1	0.04	0.001
$PM_{2.5}$	0.00	0.1	0.04	0.001
SO_2	0.00	0.3	0.20	0.003
VOC	0.00	1.4	0.80	0.010
Helicopter Emissions – Steel Erection Using Helicopters Option[1]				
CO	0.00	3.0	1.00	0.020
NO_x	0.00	4.7	1.40	0.030
PM_{10}	0.00	0.1	0.04	0.001
$PM_{2.5}$	0.00	0.1	0.04	0.001
SO_2	0.00	0.6	0.20	0.004
VOC	0.00	2.4	0.80	0.020
Traffic Emissions – Conventional Steel Erection Option[1]				
CO	2.10	6.6	1.80	0.050
NO_x	4.40	13.4	3.50	0.110
PM_{10}	0.30	0.9	0.20	0.010
$PM_{2.5}$	0.20	0.7	0.20	0.010
SO_2	0.04	0.1	0.03	0.001
VOC	0.80	2.0	0.60	0.020

TABLE D-11 CRITERIA POLLUTANT EMISSIONS FOR TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE COUT-H				
Pollutant	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**	**Tons Per Mile of Transmission Line**
Traffic Emissions – Steel Erection Using Helicopters Option[1]				
CO	2.10	6.4	1.70	0.050
NO_x	4.40	13.1	3.30	0.100
PM_{10}	0.30	0.9	0.20	0.010
$PM_{2.5}$	0.20	0.7	0.20	0.010
SO_2	0.04	0.1	0.03	0.001
VOC	0.80	2.0	0.50	0.020

NOTES:
[1]Emissions would occur from construction activities including either steel erection using helicopters or conventional steel erection, not both. Emissions above include all activities, not just steel erection.
CO = Carbon monoxide
NO_x = Nitrogen oxides
$PM_{2.5}$ = Particulate matter less than 2.5 micrometers
PM_{10} = Particulate matter less than 10 micrometers
SO_2 = Sulfur dioxide
VOC = Volatile organic compounds

TABLE D-12 CRITERIA POLLUTANT EMISSIONS FOR TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE COUT-I				
Pollutant	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**	**Tons Per Mile of Transmission Line**
Fugitive Dust from Earthmoving and Grading Activities				
PM_{10}	117.8	235.6	22.70	1.570
$PM_{2.5}$	11.8	23.6	2.30	0.160
Paved and Unpaved Road Dust – Conventional Steel Erection Option[1]				
PM_{10}	2,871.6	5,367.9	1,133.80	39.020
$PM_{2.5}$	289.0	540.1	114.10	3.930
Paved and Unpaved Road Dust – Steel Erection Using Helicopters Option[1]				
PM_{10}	2,963.2	5,173.3	1,052.00	38.250
$PM_{2.5}$	298.2	520.6	105.90	3.850
Nonroad Engine Emissions – Conventional Steel Erection Option[1]				
CO	59.1	128.6	17.40	0.850
NO_x	25.3	71.7	15.80	0.470
PM_{10}	2.3	5.7	1.00	0.040
$PM_{2.5}$	2.3	5.7	1.00	0.040
SO_2	0.1	0.3	0.10	0.002
VOC	4.6	9.8	1.20	0.060
Nonroad Engine Emissions – Steel Erection Using Helicopters Option[1]				
CO	58.8	120.6	17.40	0.820
NO_x	25.0	63.8	15.80	0.440
PM_{10}	2.3	5.2	1.00	0.040
$PM_{2.5}$	2.3	5.2	1.00	0.040
SO_2	0.1	0.3	0.10	0.002
VOC	4.6	9.2	1.20	0.060

TABLE D-12 CRITERIA POLLUTANT EMISSIONS FOR TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE COUT-I				
Pollutant	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**	**Tons Per Mile of Transmission Line**
Helicopter Emissions – Conventional Steel Erection Option[1]				
CO	0.0	2.6	1.20	0.010
NO_x	0.0	3.7	1.70	0.020
PM_{10}	0.0	0.1	0.05	0.001
$PM_{2.5}$	0.0	0.1	0.05	0.001
SO_2	0.0	0.5	0.20	0.003
VOC	0.0	2.1	1.00	0.010
Helicopter Emissions – Steel Erection Using Helicopters Option[1]				
CO	0.0	3.6	1.20	0.020
NO_x	0.0	5.6	1.70	0.030
PM_{10}	0.0	0.2	0.05	0.001
$PM_{2.5}$	0.0	0.2	0.05	0.001
SO_2	0.0	0.7	0.20	0.004
VOC	0.0	2.9	1.00	0.020
Traffic Emissions – Conventional Steel Erection Option[1]				
CO	2.5	7.9	2.10	0.050
NO_x	5.3	16.1	4.20	0.110
PM_{10}	0.4	1.1	0.30	0.010
$PM_{2.5}$	0.3	0.9	0.20	0.010
SO_2	0.1	0.1	0.03	0.001
VOC	0.9	2.4	0.70	0.020
Traffic Emissions – Steel Erection Using Helicopters Option[1]				
CO	2.5	7.7	2.00	0.050
NO_x	5.3	15.7	3.90	0.100
PM_{10}	0.4	1.1	0.30	0.010
$PM_{2.5}$	0.3	0.9	0.20	0.010
SO_2	0.1	0.1	0.03	0.001
VOC	0.9	2.4	0.60	0.020

NOTES:
[1]Emissions would occur from construction activities including either steel erection using helicopters or conventional steel erection, not both. Emissions above include all activities, not just steel erection.
CO = Carbon monoxide
NO_x = Nitrogen oxides
$PM_{2.5}$ = Particulate matter less than 2.5 micrometers
PM_{10} = Particulate matter less than 10 micrometers
SO_2 = Sulfur dioxide
VOC = Volatile organic compounds

TABLE D-13 GREENHOUSE GAS EMISSIONS (CARBON DIOXIDE EQUIVALENT) FOR TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE WYCO-B AND ROUTE VARIATIONS				
Area of Emissions	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**	**Tons Per Mile of Transmission Line**
Conventional Steel Erection Option				
Nonroad Engine	4,695.6	9,728.8	1,151.4	76.17
Helicopter	131.2	1,279.6	213.3	7.94
Traffic	2,215.6	4,119.4	637.1	34.09
Steel Erection Using Helicopters Option				
Nonroad Engine	4,480.1	7,622.1	872.3	63.45
Helicopter	816.3	1,390.1	213.3	11.83
Traffic	2,245.2	3,913.4	607.0	33.08
NOTE: Emissions would occur from construction activities including either steel erection using helicopters or conventional steel erection, not both. Emissions above include all activities, not just steel erection.				

TABLE D-14 GREENHOUSE GAS EMISSIONS (CARBON DIOXIDE EQUIVALENT) FOR TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE WYCO-C AND ROUTE VARIATIONS				
Area of Emissions	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**	**Tons Per Mile of Transmission Line**
Conventional Steel Erection Option				
Nonroad Engine	4,831.1	10,009.5	1,184.6	76.17
Helicopter	135.0	1,316.5	219.4	7.94
Traffic	2,279.5	4,238.2	655.5	34.09
Steel Erection Using Helicopters Option				
Nonroad Engine	4,609.3	7,842.0	897.5	63.45
Helicopter	839.8	1,430.2	219.4	11.83
Traffic	2,310.0	4,026.3	624.5	33.08
NOTE: Emissions would occur from construction activities including either steel erection using helicopters or conventional steel erection, not both. Emissions above include all activities, not just steel erection.				

TABLE D-15 GREENHOUSE GAS EMISSIONS (CARBON DIOXIDE EQUIVALENT) FOR TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE WYCO-D AND ROUTE VARIATION				
Area of Emissions	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**	**Tons Per Mile of Transmission Line**
Conventional Steel Erection Option				
Nonroad Engine	5,740.4	11,893.4	1,407.5	76.17
Helicopter	160.4	1,564.3	260.7	7.94
Traffic	2,708.6	5,035.9	778.9	34.09
Steel Erection Using Helicopters Option				
Nonroad Engine	5,476.9	9,317.9	1,066.4	63.45
Helicopter	997.9	1,699.3	260.7	11.83
Traffic	2,744.8	4,784.2	742.1	33.08
NOTE: Emissions would occur from construction activities including either steel erection using helicopters or conventional steel erection, not both. Emissions above include all activities, not just steel erection.				

TABLE D-16 GREENHOUSE GAS EMISSIONS (CARBON DIOXIDE EQUIVALENT) FOR TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE WYCO-F AND ROUTE VARIATIONS				
Area of Emissions	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**	**Tons Per Mile of Transmission Line**
Conventional Steel Erection Option				
Nonroad Engine	5,026.3	10,413.9	1,232.4	76.17
Helicopter	140.5	1,369.7	228.3	7.94
Traffic	2,371.6	4,409.4	682.0	34.09
Steel Erection Using Helicopters Option				
Nonroad Engine	4,795.6	8,158.8	933.8	63.45
Helicopter	873.8	1,487.9	228.3	11.83
Traffic	2,403.3	4,189.0	649.8	33.08
NOTE: Emissions would occur from construction activities including either steel erection using helicopters or conventional steel erection, not both. Emissions above include all activities, not just steel erection.				

TABLE D-17 GREENHOUSE GAS EMISSIONS (CARBON DIOXIDE EQUIVALENT) FOR TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE COUT BAX-B				
Area of Emissions	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**	**Tons Per Mile of Transmission Line**
Conventional Steel Erection Option				
Nonroad Engine	5,691.4	16,759.3	3,572.8	93.21
Helicopter	0.0	1,451.5	808.9	8.10
Traffic	2,607.7	7,126.0	1,913.2	41.72
Steel Erection Using Helicopters Option				
Nonroad Engine	5,627.4	14,562.0	2,666.7	81.86
Helicopter	0.0	2,558.8	808.9	12.06
Traffic	2,607.7	6,985.3	1,815.4	40.86
NOTE: Emissions would occur from construction activities including either steel erection using helicopters or conventional steel erection, not both. Emissions above include all activities, not just steel erection.				

TABLE D-18 GREENHOUSE GAS EMISSIONS (CARBON DIOXIDE EQUIVALENT) FOR TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE COUT BAX-C				
Area of Emissions	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**	**Tons Per Mile of Transmission Line**
Conventional Steel Erection Option				
Nonroad Engine	5,905.4	17,389.6	3,707.2	93.21
Helicopter	0.0	1,506.1	839.3	8.10
Traffic	2,705.8	7,394.0	1,985.2	41.72
Steel Erection Using Helicopters Option				
Nonroad Engine	5,839.0	15,109.7	2,767.0	81.86
Helicopter	0.0	2,655.0	839.3	12.06
Traffic	2,705.8	7,248.0	1,883.7	40.86
NOTE: Emissions would occur from construction activities including either steel erection using helicopters or conventional steel erection, not both. Emissions above include all activities, not just steel erection.				

TABLE D-19 GREENHOUSE GAS EMISSIONS (CARBON DIOXIDE EQUIVALENT) FOR TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE COUT BAX-E				
Area of Emissions	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**	**Tons Per Mile of Transmission Line**
Conventional Steel Erection Option				
Nonroad Engine	5,942.1	17,497.7	3,730.2	93.21
Helicopter	0.0	1,515.5	844.5	8.10
Traffic	2,722.6	7,439.9	1,997.5	41.72
Steel Erection Using Helicopters Option				
Nonroad Engine	5,875.3	15,203.5	2,784.2	81.86
Helicopter	0.0	2,671.5	844.5	12.06
Traffic	2,722.6	7,293.1	1,895.4	40.86
NOTE: Emissions would occur from construction activities including either steel erection using helicopters or conventional steel erection, not both. Emissions above include all activities, not just steel erection.				

TABLE D-20 GREENHOUSE GAS EMISSIONS (CARBON DIOXIDE EQUIVALENT) FOR TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE COUT-A AND ROUTE VARIATION				
Area of Emissions	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**	**Tons/Mile of Transmission Line**
Conventional Steel Erection Option				
Nonroad Engine	4,199.2	12,365.4	2,636.1	93.21
Helicopter	0.0	1,071.0	596.8	8.10
Traffic	1,924.0	5,257.7	1,411.6	41.72
Steel Erection Using Helicopters Option				
Nonroad Engine	4,152.0	10,744.2	1,967.5	81.86
Helicopter	0.0	1,887.9	596.8	12.06
Traffic	1,924.0	5,153.9	1,339.5	40.86
NOTE: Emissions would occur from construction activities including either steel erection using helicopters or conventional steel erection, not both. Emissions above include all activities, not just steel erection.				

TABLE D-21 GREENHOUSE GAS EMISSIONS (CARBON DIOXIDE EQUIVALENT) FOR TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE COUT-B AND ROUTE VARIATIONS				
Area of Emissions	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**	**Tons Per Mile of Transmission Line**
Conventional Steel Erection Option				
Nonroad Engine	4,403.1	12,965.7	2,764.1	93.21
Helicopter	0.0	1,123.0	625.8	8.10
Traffic	2,017.4	5,512.9	1,480.1	41.72
Steel Erection Using Helicopters Option				
Nonroad Engine	4,353.6	11,265.7	2,063.0	81.86
Helicopter	0.0	1,979.6	625.8	12.06
Traffic	2,017.4	5,404.1	1,404.5	40.86
NOTE: Emissions would occur from construction activities including either steel erection using helicopters or conventional steel erection, not both. Emissions above include all activities, not just steel erection.				

TABLE D-22 GREENHOUSE GAS EMISSIONS (CARBON DIOXIDE EQUIVALENT) FOR TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE COUT-C AND ROUTE VARIATIONS				
Area of Emissions	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**	**Tons Per Mile of Transmission Line**
Conventional Steel Erection Option				
Nonroad Engine	4,276.7	12,593.5	2,684.7	93.21
Helicopter	0.0	1,090.7	607.8	8.10
Traffic	1,959.5	5,354.7	1,437.6	41.72
Steel Erection Using Helicopters Option				
Nonroad Engine	4,228.6	10,942.4	2,003.8	81.86
Helicopter	0.0	1,922.8	607.8	12.06
Traffic	1,959.5	5,249.0	1,364.2	40.86
NOTE: Emissions would occur from construction activities including either steel erection using helicopters or conventional steel erection, not both. Emissions above include all activities, not just steel erection.				

TABLE D-23 GREENHOUSE GAS EMISSIONS (CARBON DIOXIDE EQUIVALENT) FOR TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE COUT-H				
Area of Emissions	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**	**Tons Per Mile of Transmission Line**
Conventional Steel Erection Option				
Nonroad Engine	4,089.2	12,041.3	2,567.0	93.21
Helicopter	0.0	1,042.9	581.2	8.10
Traffic	1,873.6	5,119.9	1,374.6	41.72
Steel Erection Using Helicopters Option				
Nonroad Engine	4,043.2	10,462.5	1,916.0	81.86
Helicopter	0.0	1,838.5	581.2	12.06
Traffic	1,873.6	5,018.8	1,304.3	40.86
NOTE: Emissions would occur from construction activities including either steel erection using helicopters or conventional steel erection, not both. Emissions above include all activities, not just steel erection.				

TABLE D-24 GREENHOUSE GAS EMISSIONS (CARBON DIOXIDE EQUIVALENT) FOR TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE COUT-I				
Area of Emissions	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**	**Tons Per Mile of Transmission Line**
Conventional Steel Erection Option				
Nonroad Engine	4,896.4	14,418.3	3,073.7	93.21
Helicopter	0.0	1,518.1	695.9	8.10
Traffic	2,243.5	6,130.6	1,646.0	41.72
Steel Erection Using Helicopters Option				
Nonroad Engine	4,841.3	12,527.9	2,294.2	81.86
Helicopter	0.0	2,201.4	695.9	12.06
Traffic	2,243.5	6,009.6	1,561.8	40.86
NOTE: Emissions would occur from construction activities including either steel erection using helicopters or conventional steel erection, not both. Emissions above include all activities, not just steel erection.				

TABLE D-25 CRITERIA POLLUTANT EMISSIONS FOR SERIES COMPENSATION STATIONS (EACH SERIES COMPENSATION STATION)			
Pollutant	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**
Fugitive Dust from Earthmoving and Grading Activities			
PM_{10}	1.900	4.000	0.0000
$PM_{2.5}$	0.200	0.400	0.0000
Paved and Unpaved Road Dust			
PM_{10}	1.400	4.300	3.4000
$PM_{2.5}$	0.100	0.400	0.4000
Nonroad Engine Emissions			
CO	5.600	9.900	6.6000
NO_x	5.000	5.400	6.3000
PM_{10}	0.300	0.40	0.4000
$PM_{2.5}$	0.300	0.40	0.4000
SO_2	0.010	0.010	0.0100
VOC	0.400	0.900	0.5000
Traffic Emissions			
CO	0.030	0.040	0.0300
NO_x	0.070	0.090	0.0600
PM_{10}	0.010	0.010	0.0040
$PM_{2.5}$	0.004	0.010	0.0030
SO_2	0.001	0.001	0.0004
VOC	0.010	0.020	0.0100

NOTES:
CO = Carbon monoxide
NO_x = Nitrogen oxides
$PM_{2.5}$ = Particulate matter less than 2.5 micrometers
PM_{10} = Particulate matter less than 10 micrometers
SO_2 = Sulfur dioxide
VOC = Volatile organic compounds

TABLE D-26 GREENHOUSE GAS EMISSIONS (CARBON DIOXIDE EQUIVALNT) FOR SERIES COMPENSATION STATIONS (EACH SERIES COMPENSATION STATION)			
Area of Emissions	**Year 1 (tons)**	**Year 2 (tons)**	**Year 3 (tons)**
Nonroad Engine	948.8	887.7	1,179.0
Traffic	35.4	53.6	24.5

D.2 Modeling Results Summary Tables – Transmission Line and Series Compensation Station Construction

TABLE D-27
MODELING RESULTS – TRANSMISSION LINE CONSTRUCTION
FOR ALTERNATIVES WYCO-B, WYCO-C, WYCO-D, AND WYCO-F AND ROUTE VARIATIONS

Pollutant	Averaging Period	Maximum AERSCREEN Concentration (µg/m^3)	Background Concentration (µg/m^3)	Project Impact plus Background (µg/m^3)	Limiting Standard (µg/m^3)	Comments
NO_2	1-hour	1,307.2	55.7	1,362.9	188.7	May exceed the numerical value of the standards
PM_{10}	24-hour	62.5	58.4	120.9	150.0	Below all ambient air quality standards
$PM_{2.5}$	24-hour	8.2	13.2	21.4	35.0	Below all ambient air quality standards
CO	1-hour	5,758.0	1,379.3	7,137.3	40,000.0	Below all ambient air quality standards
	8-hour	5,758.0	1,092.0	6,850.0	10,000.0	Below all ambient air quality standards
SO_2	1-hour	3.2	13.2	16.3	196.4	Below all ambient air quality standards
	3-hour	3.2	10.3	13.4	700.0	Below all ambient air quality standards

NOTES:
A factor of 80 percent was applied to estimated nitrogen oxides concentrations for conversion to nitrogen dioxide based on the Environmental Protection Agency's March 1, 2011, memorandum: *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-Hour NO_2 National Ambient Air Quality Standard*
CO = Carbon monoxide
NO_2 = Nitrogen dioxide
$PM_{2.5}$ = Particulate matter less than 2.5 micrometers
PM_{10} = Particulate matter less than 10 micrometers
SO_2 = Sulfur dioxide

TABLE D-28
MODELING RESULTS – TRANSMISSION LINE CONSTRUCTION
FOR ALTERNATIVES COUT BAX-B, COUT BAX-C, AND COUT BAX-E

Pollutant	Averaging Period	Maximum AERSCREEN Concentration (µg/m^3)	Background Concentration (µg/m^3)	Project Impact plus Background (µg/m^3)	Limiting Standard (µg/m^3)	Comments
NO_2	1-hour	1,307.2	73.7	1,380.9	188.7	May exceed the numerical value of the standards
PM_{10}	24-hour	62.5	78.8	141.4	150.0	Below all ambient air quality standards
$PM_{2.5}$	24-hour	8.2	19.9	28.1	35.0	Below all ambient air quality standards
CO	1-hour	5,758.0	1,954.0	7,712.0	40,000.0	Below all ambient air quality standards
	8-hour	5,758.0	1,264.4	7,022.4	10,000.0	Below all ambient air quality standards

TABLE D-28
MODELING RESULTS – TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVES COUT BAX-B, COUT BAX-C, AND COUT BAX-E

Pollutant	Averaging Period	Maximum AERSCREEN Concentration ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Project Impact plus Background ($\mu g/m^3$)	Limiting Standard ($\mu g/m^3$)	Comments
SO_2	1-hour	3.2	7.9	11.1	196.4	Below all ambient air quality standards
	3-hour	3.2	7.9	11.1	700.0	Below all ambient air quality standards

NOTES:
A factor of 80 percent was applied to estimated nitrogen oxides concentrations for conversion to nitrogen dioxide based on the Environmental Protection Agency's March 1, 2011, memorandum: *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-Hour NO_2 National Ambient Air Quality Standard*
CO = Carbon monoxide
NO_2 = Nitrogen dioxide
$PM_{2.5}$ = Particulate matter less than 2.5 micrometers
PM_{10} = Particulate matter less than 10 micrometers
SO_2 = Sulfur dioxide

TABLE D-29
MODELING RESULTS – TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE COUT-A AND ROUTE VARIATION AND ALTERNATIVE COUT-B AND ROUTE VARIATIONS (EXCEPT UTAH COUNTY PM_{10})

Pollutant	Averaging Period	Maximum AERSCREEN Concentration ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Project Impact plus Background ($\mu g/m^3$)	Limiting Standard ($\mu g/m^3$)	Comments
NO_2	1-hour	1,307.2	93.0	1,400.2	188.7	May exceed the numerical value of the standards
PM_{10}	24-hour	62.5	78.8	141.4	150.0	Below all ambient air quality standards
$PM_{2.5}$	24-hour	8.2	19.8	28.0	35.0	Below all ambient air quality standards
CO	1-hour	5,758.0	4,367.8	10,125.8	40,000.0	Below all ambient air quality standards
	8-hour	5,758.0	1,724.1	7,482.1	10,000.0	Below all ambient air quality standards
SO_2	1-hour	3.2	7.9	11.1	196.4	Below all ambient air quality standards
	3-hour	3.2	7.9	11.1	700.0	Below all ambient air quality standards

NOTES:
A factor of 80 percent was applied to estimated nitrogen oxides concentrations for conversion to nitrogen dioxide based on the Environmental Protection Agency's March 1, 2011, memorandum: *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-Hour NO_2 National Ambient Air Quality Standard*
CO = Carbon monoxide
NO_2 = Nitrogen dioxide
$PM_{2.5}$ = Particulate matter less than 2.5 micrometers
PM_{10} = Particulate matter less than 10 micrometers
SO_2 = Sulfur dioxide

TABLE D-30
MODELING RESULTS – TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE COUT-A AND ROUTE VARIATION (UTAH COUNTY), ALTERNATIVE COUT-B AND ROUTE VARIATIONS (UTAH COUNTY), AND ALTERNATIVE COUT-C AND ROUTE VARIATIONS (UTAH COUNTY)

Pollutant	Averaging Period	Maximum AERSCREEN Concentration ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Project Impact plus Background ($\mu g/m^3$)	Limiting Standard ($\mu g/m^3$)	Comments
PM_{10}	24-hour	62.5	49.5	112.0	150.0	Below all ambient air quality standards

NOTE: PM_{10} = Particulate matter less than 10 micrometers

TABLE D-31
MODELING RESULTS – TRANSMISSION LINE CONSTRUCTION FOR ALTERNATIVE COUT-C AND ROUTE VARIATIONS AND ALTERNATIVES COUT-H AND COUT-I (EXCEPT UTAH COUNTY PM_{10})

Pollutant	Averaging Period	Maximum AERSCREEN Concentration ($\mu g/m^3$)	Background Concentration ($\mu g/m^3$)	Project Impact plus Background ($\mu g/m^3$)	Limiting Standard ($\mu g/m^3$)	Comments
NO_2	1-hour	1,307.2	67.0	1,374.2	188.7	May exceed the numerical value of the standards
PM_{10}	24-hour	62.5	78.8	141.4	150.0	Below all ambient air quality standards
$PM_{2.5}$	24-hour	8.2	14.5	22.7	35.0	Below all ambient air quality standards
CO	1-hour	5,758.0	4,367.8	10,125.8	40,000.0	Below all ambient air quality standards
	8-hour	5,758.0	1,724.1	7,482.1	10,000.0	Below all ambient air quality standards
SO_2	1-hour	3.2	7.9	11.1	196.4	Below all ambient air quality standards
	3-hour	3.2	7.9	11.1	700.0	Below all ambient air quality standards

NOTES:
A factor of 80 percent was applied to estimated nitrogen oxides concentrations for conversion to nitrogen dioxide based on the Environmental Protection Agency's March 1, 2011 memorandum: *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-Hour NO_2 National Ambient Air Quality Standard*
CO = Carbon monoxide
NO_2 = Nitrogen dioxide
$PM_{2.5}$ = Particulate matter less than 2.5 micrometers
PM_{10} = Particulate matter less than 10 micrometers
SO_2 = Sulfur dioxide

TABLE D-32 MODELING RESULTS – SERIES COMPENSATION STATION CONSTRUCTION EACH SERIES COMPENSATION STATION						
Pollutant	**Averaging Period**	**Maximum AERSCREEN Concentration ($\mu g/m^3$)**	**Background Concentration ($\mu g/m^3$)**	**Project Impact plus Background ($\mu g/m^3$)**	**Limiting Standard ($\mu g/m^3$)**	**Comments**
NO_2	1-hour	4,950.4	67.0	5,017.4	188.7	May exceed the numerical value of the standards
PM_{10}	24-hour	20.5	78.8	99.3	150.0	Below all ambient air quality standards
$PM_{2.5}$	24-hour	7.1	14.5	21.6	35.0	Below all ambient air quality standards
CO	1-hour	4,524.0	4,367.8	8,891.8	40,000.0	Below all ambient air quality standards
	8-hour	4,524.0	1,724.1	6,248.1	10,000.0	Below all ambient air quality standards
SO_2	1-hour	11.4	7.9	19.3	196.4	Below all ambient air quality standards
	3-hour	11.4	7.9	19.3	700.0 (Colorado) 1,300 (Utah)	Below all ambient air quality standards

NOTES:
A factor of 80 percent was applied to estimated nitrogen oxides concentrations for conversion to nitrogen dioxide based on the Environmental Protection Agency's March 1, 2011, memorandum: *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-Hour NO_2 National Ambient Air Quality Standard*
CO = Carbon monoxide
NO_2 = Nitrogen dioxide
$PM_{2.5}$ = Particulate matter less than 2.5 micrometers
PM_{10} = Particulate matter less than 10 micrometers
SO_2 = Sulfur dioxide

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APPENDIX E – BIOLOGICAL RESOURCES SUPPORTING DATA

Information presented in this appendix was compiled to assist in completion of biological resource inventories and impacts analysis included in Chapters 3 and 4.

E.1 Land Cover Categories in the Project Area

Land cover in the Project area was identified using data from the National Land Cover Gap Analysis Project (GAP) dataset (U.S. Geological Survey [USGS] 2010). The National Land Cover GAP dataset is compiled from both the Northwest GAP (University of Idaho 2010) and the Southwest GAP datasets (Lowry et al. 2005).

A total of 86 GAP land cover categories were identified in the Project area (Table E-1). Descriptions of the GAP land cover categories in the Project area were obtained from NatureServe's Ecological System classification descriptions (NatureServe 2012) or the GAP Level Three Land Cover Category Descriptions (University of Idaho 2012). Descriptions of each land cover category are included below Table E-1. Descriptions of altered and disturbed land cover and land use classes (e.g., agriculture, developed, etc.) were adopted from the National Land Cover Dataset 2001 legend (Homer et al. 2004). National Wetlands Inventory (NWI) data (U.S. Fish and Wildlife Service [FWS] 2012a) was used concurrently with GAP data to help identify freshwater wetlands in the wetlands primary vegetation community type. Noxious weed data from Bureau of Land Management (BLM) Field Offices and U.S. Forest Service (USFS) Ranger Districts were also used concurrently with the GAP data to supplement identification of the invasive primary vegetation community type.

For the purposes of this Environmental Impact Statement (EIS), the 86 GAP land cover categories were consolidated and reclassified into 16 primary vegetation communities, also referred to as primary habitat types (Table E-1). This reclassification was done based on similarities of vegetative species composition, structure, and general topographic positioning of certain land cover categories.

TABLE E-1
LAND COVER CATEGORIES IN THE PROJECT AREA

Primary Vegetation Communities (Reclassification)	Land Cover Categories (Gap Analysis Project or Other)
Agriculture	Cultivated cropland
	Pasture/hay
Alpine	North American alpine ice field
	Rocky Mountain alpine bedrock and scree
	Rocky Mountain alpine dwarf-shrubland
	Rocky Mountain alpine fell-field
	Rocky Mountain alpine-montane wet meadow
	Rocky Mountain dry tundra
Aspen	Inter-Mountain Basins aspen-mixed conifer forest and woodland
	Rocky Mountain aspen forest and woodland

TABLE E-1 LAND COVER CATEGORIES IN THE PROJECT AREA	
Primary Vegetation Communities (Reclassification)	**Land Cover Categories (Gap Analysis Project or Other)**
Barren/Sparsely Vegetated (less than 10 percent cover)	Colorado Plateau mixed bedrock canyon and tableland
	Inter-Mountain Basins active and stabilized dune
	Inter-Mountain Basins cliff and canyon
	Inter-Mountain Basins playa
	Inter-Mountain Basins shale badland
	Rocky Mountain cliff, canyon and massive bedrock
	Western Great Plains cliff and outcrop
Big Sagebrush	Inter-Mountain Basins big sagebrush shrubland
	Inter-Mountain Basins big sagebrush steppe
	Inter-Mountain Basins montane sagebrush steppe
Developed/Disturbed	Developed, high intensity
	Developed, low intensity
	Developed, medium intensity
	Developed, open space
	Disturbed, non-specific
	Disturbed/successional – recently chained pinyon-juniper
	Quarries, mines, gravel pits and oil wells
	Recently burned
	Recently logged areas
Grassland	Inter-Mountain Basins semi-desert grassland
	Northern Rocky Mountain lower montane, foothill and valley grassland
	Northwestern Great Plains mixed grass prairie
	Rocky Mountain subalpine-montane mesic meadow
	Southern Rocky Mountain montane-subalpine grassland
	Western Great Plains sand prairie
Invasive	Introduced upland vegetation – annual grassland
	Introduced upland vegetation – perennial grassland and forbland
	Introduced upland vegetation – treed
Montane Forest	Middle Rocky Mountain montane Douglas-fir forest and woodland
	Northern Rocky Mountain dry-mesic montane mixed conifer forest
	Northern Rocky Mountain mesic montane mixed conifer forest
	Rocky Mountain lodgepole pine forest
	Rocky Mountain subalpine dry-mesic spruce-fir forest and woodland
	Rocky Mountain subalpine mesic spruce-fir forest and woodland
	Rocky Mountain subalpine-montane limber-bristlecone pine woodland
	Southern Rocky Mountain dry-mesic montane mixed conifer forest and woodland
	Southern Rocky Mountain mesic montane mixed conifer forest and woodland
Mountain Shrub	Harvested forest-shrub regeneration
	Inter-Mountain Basins curl-leaf mountain-mahogany woodland and shrubland
	Northern Rocky Mountain montane-foothill deciduous shrubland
	Northern Rocky Mountain subalpine deciduous shrubland
	Rocky Mountain gambel oak-mixed montane shrubland
	Rocky Mountain lower montane-foothill shrubland

TABLE E-1 LAND COVER CATEGORIES IN THE PROJECT AREA	
Primary Vegetation Communities (Reclassification)	**Land Cover Categories (Gap Analysis Project or Other)**
Pinyon-Juniper	Colorado Plateau pinyon-juniper shrubland
	Colorado Plateau pinyon-juniper woodland
	Great Basin pinyon-juniper woodland
	Inter-Mountain Basins juniper savanna
	Rocky Mountain foothill limber pine-juniper woodland
	Southern Rocky Mountain pinyon-juniper woodland
Ponderosa Pine	Northern Rocky Mountain foothill conifer wooded steppe
	Southern Rocky Mountain ponderosa pine woodland
Riparian	Great Basin foothill and lower montane riparian woodland and shrubland
	Introduced riparian and wetland vegetation
	Northwestern Great Plains riparian
	Rocky Mountain bigtooth maple ravine woodland
	Rocky Mountain lower montane riparian woodland and shrubland
	Rocky Mountain subalpine-montane riparian shrubland
	Rocky Mountain subalpine-montane riparian woodland
	Western Great Plains floodplain
	Western Great Plains riparian woodland and shrubland
	National Wetlands Inventory data
Shrub/Shrub Steppe	Colorado Plateau blackbrush-mormon-tea shrubland
	Colorado Plateau mixed low sagebrush shrubland
	Great Basin xeric mixed sagebrush shrubland
	Inter-Mountain Basins greasewood flat
	Inter-Mountain Basins mat saltbush shrubland
	Inter-Mountain Basins mixed salt desert scrub
	Inter-Mountain Basins semi-desert shrub steppe
	Southern Colorado Plateau sand shrubland
	Wyoming basins dwarf sagebrush shrubland and steppe
Water	Open water (fresh)
Wetland	Great Plains prairie pothole
	Inter-Mountain Basins interdunal swale wetland
	North American arid west emergent marsh
	Rocky Mountain subalpine-montane fen
	Western Great Plains closed depression wetland
	Western Great Plains open freshwater depression wetland
	Western Great Plains saline depression wetland
	National Wetlands Inventory data

E.1.1 Agriculture

Cultivated Cropland

Cultivated croplands are areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and cotton, and also perennial woody crops such as orchards and vineyards. Crop vegetation accounts for greater than 20 percent of total vegetation. This class also includes all land being actively tilled (University of Idaho 2012).

Pasture/Hay

Pasture/hay areas include grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20 percent of total vegetation (University of Idaho 2012).

E.1.2 Alpine

North American Alpine Ice Field

This widespread ecological system is composed of unvegetated landscapes of annual/perennial ice and snow and exposed rock and rubble at the highest elevations, where snowfall exceeds melting. The primary ecological processes include snow/ice retention and/or decadal movement (active moraines and till), wind desiccation, and permafrost. The snowpack/ice field never melts or if so, then for only a few weeks. The alpine substrate/ice field ecological system is part of the alpine mosaic consisting of alpine tundra dry meadow, wet meadow, fell-fields, and dwarf-shrubland (University of Idaho 2012).

Rocky Mountain Alpine Bedrock and Scree

This ecological system is restricted to the highest elevations of the Rocky Mountains, from Alberta and British Columbia south into New Mexico, west into the highest mountain ranges of the Great Basin. It is composed of barren and sparsely vegetated alpine substrates, typically including both bedrock outcrop and scree slopes, with nonvascular- (lichen) dominated communities. Exposure to desiccating winds, rocky and sometimes unstable substrates, and a short growing season limit plant growth. There can be sparse cover of forbs, grasses, lichens and low shrubs (NatureServe 2012).

Rocky Mountain Alpine Dwarf-Shrubland

This widespread ecological system occurs above upper timberline throughout the Rocky Mountain cordillera, including alpine areas of ranges in Utah and Nevada, and north into Canada. Elevations are above 11,000 feet (3,360 meters) in the Colorado Rockies but drop to less than 6,900 feet (2,100 meters) in northwestern Montana and in the mountains of Alberta. This system occurs in areas of level or concave glacial topography, with late-lying snow and subirrigation from surrounding slopes. Soils have become relatively stabilized in these sites, are moist but well-drained, strongly acidic, and often with substantial peat layers. Vegetation in these areas is controlled by snow retention, wind desiccation, permafrost, and a short growing season. This ecological system is characterized by a semi-continuous layer of ericaceous dwarf-shrubs or dwarf willows that form a heath type ground cover less than 1.64 feet (0.5 meter) in height. Dense tuffs of graminoids and scattered forbs occur. *Dryas octopetala* or *Dryas integrifolia* communities are not included here, except for one very moist association, because they occur on more windswept and drier sites than the heath communities. In these communities *Cassiope mertensiana, Salix arctica, Salix reticulata, Salix vestita*, or *Phyllodoce empetriformis* can be dominant shrubs. *Vaccinium* spp., *Ledum glandulosum, Phyllodoce glanduliflora*, and *Kalmia microphylla* may also be shrub associates. The herbaceous layer is a mixture of forbs and graminoids, especially sedges, including, *Erigeron* spp., *Luetkea pectinata, Antennaria lanata, Oreostemma alpigenum (= Aster alpigenus), Pedicularis* spp., *Castilleja* spp., *Deschampsia caespitosa, Caltha leptosepala, Erythronium* spp., *Juncus parryi, Luzula piperi, Carex spectabilis, Carex nigricans*, and *Polygonum bistortoides*. Fell-fields often intermingle with the alpine dwarf-shrubland (NatureServe 2012).

Rocky Mountain Alpine Fell-Field

This ecological system is found discontinuously at alpine elevations throughout the Rocky Mountains, west into the mountainous areas of the Great Basin, and north into the Canadian Rockies. Small areas are

represented in the west side of the Okanagan Ecoregion in the eastern Cascades. These are wind-scoured fell-fields that are free of snow in the winter, such as ridgetops and exposed saddles, exposing the plants to severe environmental stress. Soils on these windy unproductive sites are shallow, stony, low in organic matter, and poorly developed; wind deflation often results in a gravelly pavement. Most fell-field plants are cushioned or matted, frequently succulent, flat to the ground in rosettes and often densely haired and thickly cutinized. Plant cover is 15 to 50 percent, while exposed rocks make up the rest. Fell-fields are usually in or adjacent to alpine tundra dry meadows. Common species include *Arenaria capillaris, Geum rossii, Kobresia myosuroides, Minuartia obtusiloba, Myosotis asiatica, Paronychia pulvinata, Phlox pulvinata, Sibbaldia procumbens, Silene acaulis, Trifolium dasyphyllum*, and *Trifolium parryi* (NatureServe 2012).

Rocky Mountain Alpine-Montane Wet Meadow

These are high-elevation communities found throughout the Rocky Mountains and Intermountain regions, dominated by herbaceous species found on wetter sites with very low-velocity surface and subsurface flows. They range in elevation from montane to alpine 3,300 to 11,800 feet (1,000 to 3,600 meters). These types occur as large meadows in montane or subalpine valleys, as narrow strips bordering ponds, lakes, and streams, and along toeslope seeps. They are typically found on flat areas or gentle slopes, but may also occur on sub-irrigated sites with slopes up to 10 percent. In alpine regions, sites typically are small depressions located below late-melting snow patches or on snowbeds. Soils of this system may be mineral or organic. In either case, soils show typical hydric soil characteristics, including high organic content and/or low chroma and redoximorphic features. This system often occurs as a mosaic of several plant associations, often dominated by graminoids, including *Calamagrostis stricta, Caltha leptosepala, Cardamine cordifolia, Carex illota, Carex microptera, Carex nigricans, Carex scopulorum, Carex utriculata, Carex vernacula, Deschampsia caespitosa, Eleocharis quinqueflora, Juncus drummondii, Phippsia algida, Rorippa alpina, Senecio triangularis, Trifolium parryi*, and *Trollius laxus*. Often alpine dwarf-shrublands, especially those dominated by Salix, are immediately adjacent to the wet meadows. Wet meadows are tightly associated with snowmelt and typically not subjected to high disturbance events such as flooding (NatureServe 2012).

Rocky Mountain Dry Tundra

Alpine turf occurs above upper treeline throughout the Rocky Mountains, including alpine areas in Utah and Nevada. It is found on gentle to moderate slopes, flat ridges, and margins of alpine valleys, where the soil has become relatively stable. These wind-swept sites retain little snow cover and are relatively harsh, dry habitats. The plant cover is a short, often dense, diverse mixture of sod-forming grasses and sedges, and mat-forming herbs (cushion plants). Common plants include blackroot sedge, dry-spike sedge, Scirpus-like sedge, arctic bluegrass, Ross' avens, Pacific bog sedge, cushion phlox, Parry's clover and Uinta clover. Because of the very short growing season, summer flowers are often abundant (University of Idaho 2012).

E.1.3 Aspen

Inter-Mountain Basins Aspen-Mixed Conifer Forest and Woodland

This ecological system occurs on montane slopes and plateaus in Utah, western Colorado, northern Arizona, eastern Nevada, southern Idaho, western Wyoming, and in north-central Montana in the Big Snowy Mountains. It also occurs in localized settings in the Klamath Mountains of California, as well as in the Sierra Nevada and adjacent Great Basin mountains (Inyo, White, Warner, and Modoc Plateau). Elevations range from 5,600 to 9,200 feet (1,700 to 2,800 meters). Occurrences are typically on gentle to steep slopes on any aspect but are often found on clay-rich soils in intermontane valleys. Soils are derived from alluvium, colluvium and residuum from a variety of parent materials but most typically occur on

sedimentary rocks. The tree canopy is composed of a mix of deciduous and coniferous species, codominated by *Populus tremuloides* and conifers, including *Pseudotsuga menziesii, Abies concolor, Abies lasiocarpa, Abies magnifica, Picea engelmannii, Picea glauca X engelmannii, Picea pungens, Pinus contorta, Pinus flexilis, Pinus jeffreyi, Pinus contorta* var. *murrayana*, and *Pinus ponderosa*. As the occurrences age, *Populus tremuloides* is slowly reduced until the conifer species become dominant. Common shrubs include *Amelanchier alnifolia, Prunus virginiana, Acer grandidentatum, Symphoricarpos oreophilus, Juniperus communis, Paxistima myrsinites, Rosa woodsii, Spiraea betulifolia, Symphoricarpos albus*, or *Mahonia repens*. Herbaceous species include *Bromus carinatus, Calamagrostis rubescens, Carex geyeri, Elymus glaucus, Poa* spp., and *Achnatherum, Hesperostipa, Nassella*, and/or *Piptochaetium* spp. (= *Stipa* spp.), *Achillea millefolium, Arnica cordifolia*, *Asteraceae* spp., *Erigeron* spp., *Galium boreale, Geranium viscosissimum, Lathyrus* spp., *Lupinus argenteus, Mertensia arizonica, Mertensia lanceolata, Maianthemum stellatum, Osmorhiza berteroi (= Osmorhiza chilensis)*, and *Thalictrum fendleri*. Most occurrences at present represent a late-seral stage of aspen changing to a pure conifer occurrence. Nearly a hundred years of fire suppression and livestock grazing have converted much of the pure aspen occurrences to the present-day aspen-conifer forest and woodland ecological system. This is the typical meadow edge aspen-conifer setting in the Sierra Nevada where frequently, due to fire suppression, the conifers are replacing aspens (NatureServe 2012).

Rocky Mountain Aspen Forest and Woodland

This widespread ecological system is more common in the southern and central Rocky Mountains but occurs in the montane and subalpine zones throughout much of the western United States and north into Canada. An eastern extension occurs along the Rocky Mountains foothill front and in mountain "islands" in Montana (Big Snowy and Highwood mountains), and the Black Hills of South Dakota. In California, this system is only found on the east side of the Sierra Nevada adjacent to the Great Basin. Large stands are found in the Inyo and White mountains, while small stands occur on the Modoc Plateau. In western Alberta, it occurs only in the Upper Foothills subregion and north of three transitions to Western North American Boreal Mesic Birch-Aspen Forest. Elevations generally range from 5,000 to 10,000 feet (1,525 to 3,050 meters), but occurrences can be found at lower elevations in some regions, especially in the Canadian Rockies. Distribution of this ecological system is primarily limited by adequate soil moisture required to meet its high evapotranspiration demand. Secondarily, it is limited by the length of the growing season or low temperatures. These are upland forests and woodlands dominated by *Populus tremuloides* without a significant conifer component (less than 25 percent relative tree cover). The understory structure may be complex with multiple shrub and herbaceous layers, or simple with just an herbaceous layer. The herbaceous layer may be dense or sparse, dominated by graminoids or forbs. In California, *Symphyotrichum spathulatum (= Aster occidentalis)* is a common forb. Associated shrub species include *Symphoricarpos* spp., *Rubus parviflorus, Amelanchier alnifolia*, and *Arctostaphylos uva-ursi*. Occurrences of this system originate and are maintained by stand-replacing disturbances such as avalanches, crown fire, insect outbreak, disease and windthrow, or clearcutting by man or beaver, in the matrix of conifer forests. It differs from Northwestern Great Plains Aspen Forest and Parkland, which is limited to plains environments (NatureServe 2012).

E.1.4 Barren and Sparsely Vegetated

Colorado Plateau Mixed Bedrock Canyon and Tableland

The distribution of this ecological system is centered on the Colorado Plateau where it is comprised of barren and sparsely vegetated landscapes (generally less than 10 percent plant cover) of steep cliff faces, narrow canyons, and open tablelands of predominantly sedimentary rocks, such as sandstone, shale, and limestone. Some eroding shale layers similar to Inter-Mountain Basins Shale Badland may be interbedded between the harder rocks. The vegetation is characterized by very open tree canopy or scattered trees and

shrubs with a sparse herbaceous layer. Common species includes *Pinus edulis, Pinus ponderosa, Juniperus* spp., *Cercocarpus intricatus*, and other short-shrub and herbaceous species, utilizing moisture from cracks and pockets where soil accumulates (NatureServe 2012).

Inter-Mountain Basins Active and Stabilized Dune

This ecological system occurs in the Intermountain western United States on basins, valleys and plains. Often it is composed of a mosaic of migrating, bare dunes; anchored dunes with sparse to moderately dense vegetation (less than 10 to 30 percent canopy cover); and stabilized dunes. The system is defined by the presence of migrating dunes or, where the dunes are entirely anchored or stabilized, evidence that the substrate is eolian and not residual, that the vegetation is early-seral or mid-seral, and that the substrate is likely to become actively migrating again with disturbance or increased aridity. In the Colorado Plateau, there are many small active and partially vegetated dunes along some of the larger washes and playas (where sand is blown out of wash and forms dunes) and some larger dunes such as Coral Pink Dunes in southwestern Utah. Substrates are usually eolian sand, but small dunes composed of silt and clay downwind from playas in the Wyoming Basins (which usually support greasewood vegetation) also are included here. Species occupying these environments are often adapted to shifting, coarse-textured substrates (usually quartz sand) and form patchy or open grasslands, shrublands or steppe, and occasionally woodlands. Vegetation varies and may be composed of *Achnatherum hymenoides, Artemisia filifolia, Artemisia tridentata* ssp. *tridentata, Atriplex canescens, Ephedra* spp., *Chrysothamnus viscidiflorus, Coleogyne ramosissima, Ericameria nauseosa, Hesperostipa comata, Leymus flavescens, Muhlenbergia pungens, Psoralidium lanceolatum, Purshia tridentata, Redfieldia flexuosa, Sporobolus airoides, Sarcobatus vermiculatus, Tetradymia tetrameres*, or *Tiquilia* spp. Herbaceous species such as *Achnatherum hymenoides, Redfieldia flexuosa*, and *Psoralidium lanceolatum* are characteristic of early-seral vegetation through much of this system's range. Shrubs are commonly dominant on mid- to late-seral stands, and *Ericameria nauseosa* can be found at any stage (NatureServe 2012).

Inter-Mountain Basins Cliff and Canyon

This ecological system ranges from Wyoming and Utah west to the Pacific states. It is found from foothill to subalpine elevations and includes barren and sparsely vegetated landscapes (generally less than 10 percent plant cover) of steep cliff faces, narrow canyons, and smaller rock outcrops of various igneous, sedimentary, and metamorphic bedrock types. Also included is vegetation of unstable scree and talus slopes that typically occurs below cliff faces. Widely scattered trees and shrubs may include *Abies concolor, Pinus edulis, Pinus flexilis, Pinus monophylla, Juniperus* spp., *Artemisia tridentata, Purshia tridentata, Cercocarpus ledifolius, Ephedra* spp., *Holodiscus discolor*, and other species often common in adjacent plant communities (NatureServe 2012).

Inter-Mountain Basins Playa

This ecological system is composed of barren and sparsely vegetated playas (generally less than 10 percent plant cover) found in the Intermountain western United States Salt crusts are common throughout, with small saltgrass beds in depressions and sparse shrubs around the margins. These systems are intermittently flooded. The water is prevented from percolating through the soil by an impermeable soil subhorizon and is left to evaporate. Soil salinity varies greatly with soil moisture and greatly affects species composition. Characteristic species may include *Allenrolfea occidentalis, Sarcobatus vermiculatus, Grayia spinosa, Puccinellia lemmonii, Leymus cinereus, Distichlis spicata*, and/or *Atriplex* spp (NatureServe 2012).

Inter-Mountain Basins Shale Badland

This widespread ecological system of the Intermountain western United States is composed of barren and sparsely vegetated substrates (greater than 10 percent plant cover) typically derived from marine shales but also includes substrates derived from siltstones and mudstones (clay). In southern Wyoming, the shales are not marine in origin, but often have bentonite derived from volcanic ash deposition that occurred during several eruptions of the Yellowstone volcanic fields. Landforms are typically rounded hills and plains that form a rolling topography. The harsh soil properties and high rate of erosion and deposition are driving environmental variables supporting sparse dwarf-shrubs, e.g., *Atriplex corrugata, Atriplex gardneri, Artemisia pedatifida*, and herbaceous vegetation (NatureServe 2012).

Rocky Mountain Cliff, Canyon and Massive Bedrock

This ecological system of barren and sparsely vegetated landscapes (generally greater than 10 percent plant cover) is found from foothill to subalpine elevations on steep cliff faces, narrow canyons, and smaller rock outcrops of various igneous (intrusives), sedimentary, and metamorphic bedrock types. It is located throughout the Rocky Mountains and northeastern Cascade Ranges in North America. Also included are unstable scree and talus slopes that typically occur below cliff faces. In general these are the dry sparsely vegetated places on a landscape. The biota on them reflects what is surrounding them, unless it is an extreme parent material. There may be small patches of dense vegetation, but it typically includes scattered trees and/or shrubs. Characteristic trees includes species from the surrounding landscape, such as *Pseudotsuga menziesii, Pinus ponderosa, Pinus flexilis, Populus tremuloides, Abies concolor, Abies lasiocarpa*, or *Pinus edulis* and *Juniperus* spp. at lower elevations. There may be scattered shrubs present, such as species of *Holodiscus, Ribes, Physocarpus, Rosa, Juniperus*, and *Jamesia americana, Mahonia repens, Rhus trilobata*, or *Amelanchier alnifolia*. Soil development is limited, as is herbaceous cover (NatureServe 2012).

Western Great Plains Cliff and Outcrop

This system includes cliffs and outcrops throughout the Western Great Plains Division. Substrate can range from sandstone and limestone, which can often form bands in the examples of this system. Vegetation is restricted to shelves, cracks and crevices in the rock. However, this system differs from Western Great Plains Badlands in that often the soil is slightly developed and less erodible, and some grass and shrub species can occur at greater than 10 percent. Common species in this system include short shrubs such as *Rhus trilobata* and *Artemisia longifolia* and mixed grass species such as *Bouteloua curtipendula* and *Bouteloua gracilis* and *Calamovilfa longifolia*. Drought and wind erosion are the most common natural dynamics affecting this system (NatureServe 2012).

E.1.5 Big Sagebrush

Inter-Mountain Basins Big Sagebrush Shrubland

This ecological system occurs throughout much of the western United States, typically in broad basins between mountain ranges, plains and foothills between 4,900 and 7,500 feet (1,500 and 2,300 meters) elevation. Soils are typically deep, well-drained and non-saline. These shrublands are dominated by *Artemisia tridentata ssp. tridentata* (not as common in Wyoming or Montana but possibly on stabilized part of Killpecker Dunes in Wyoming) and/or *Artemisia tridentata* ssp. *wyomingensis* (predominant in Wyoming and Montana). Scattered *Juniperus* spp., *Sarcobatus vermiculatus*, and *Atriplex* spp. may be present in some stands. *Ericameria nauseosa, Chrysothamnus viscidiflorus, Purshia tridentata* (not commonly in Montana or Wyoming), or *Symphoricarpos oreophilus* may codominate disturbed stands (e.g., in burned stands, these may become more predominant). Perennial herbaceous components typically contribute less than 25 percent vegetative cover. Common graminoid species can include *Achnatherum*

hymenoides, Bouteloua gracilis, Elymus lanceolatus, Festuca idahoensis (not in Montana or Wyoming), *Hesperostipa comata, Leymus cinereus, Pleuraphis jamesii* (not present in northeastern portions of the range), *Pascopyrum smithii, Poa secunda*, or *Pseudoroegneria spicata* (not in Wyoming). Some semi-natural communities are included that often originate on abandoned agricultural land or on other disturbed sites. In these locations, *Bromus tectorum* or other annual bromes and invasive weeds can be abundant. Most *Artemisia tridentata* ssp. *wyomingensis* communities in Wyoming are placed in Inter-Mountain Basins Big Sagebrush Steppe; the shrubland system is more restricted in environmental setting than the steppe. Dunes in the Red Desert have areas of large basin big sage with very dense canopies. In Wyoming, this system is likely to only contain *Artemisia tridentata* ssp. *tridentata* (NatureServe 2012).

Inter-Mountain Basins Big Sagebrush Steppe

This widespread matrix-forming ecological system occurs throughout much of the Columbia Plateau and northern Great Basin, east into the Wyoming Basins, central Montana, and north and east onto the western fringe of the Great Plains in Montana and South Dakota. It is found at slightly higher elevations farther south. In central Montana, this system differs slightly, with more summer rain than winter precipitation, more precipitation annually, and it occurs on glaciated landscapes. Soils are typically deep and non-saline, often with a microphytic crust. This shrub-steppe is dominated by perennial grasses and forbs (greater than 25 percent cover) with *Artemisia tridentata* ssp. *tridentata* (this is not at all important in Wyoming occurrences), *Artemisia tridentata* ssp. *xericensis, Artemisia tridentata* ssp. *wyomingensis, Artemisia tripartita* ssp. *tripartita* (Snake River valley in Wyoming), *Artemisia cana* ssp. *cana*, and/or *Purshia tridentata* dominating or codominating the open to moderately dense (10 to 40 percent cover) shrub layer. *Atriplex confertifolia, Chrysothamnus viscidiflorus, Ericameria nauseosa, Sarcobatus vermiculatus, Tetradymia* spp., or *Artemisia frigida* may be common especially in disturbed stands. In Montana and Wyoming, stands are more mesic, with more biomass of grass, have less shrub diversity than stands farther west, and 50 to 90 percent of the occurrences are dominated by *Artemisia tridentata* ssp. *wyomingensis* with *Pascopyrum smithii*. In addition, *Bromus japonicus* and *Bromus tectorum* are indicators of disturbance, and *Bromus tectorum* is typically not as abundant as in the Intermountain West, possibly due to a colder climate. Associated graminoids can include *Achnatherum hymenoides, Calamagrostis montanensis, Elymus lanceolatus* ssp. *lanceolatus, Koeleria macrantha, Poa secunda, Pascopyrum smithii, Hesperostipa comata, Nassella viridula, Bouteloua gracilis*, and *Pseudoroegneria spicata*. Important rhizomatous species include *Carex filifolia* and *Carex duriuscula*, which are very common and important in the eastern distribution of this system in both Wyoming and Montana. *Festuca idahoensis* is uncommon in this system, although it does occur in areas of higher elevations/precipitation; *Festuca campestris* is also uncommon. In Wyoming, both *Nassella viridula* and *Pseudoroegneria spicata* rarely occur, with the latter typically found in eastern Wyoming on ridgetops and rocky slopes outside of this system. In Montana, there is an absence of *Festuca* spp., except *Vulpia octoflora*. Common forbs are *Phlox hoodii, Arenaria* spp., *Opuntia* spp., *Sphaeralcea coccinea, Dalea purpurea, Liatris punctata*, and *Astragalus* spp. Areas with deeper soils more commonly support *Artemisia tridentata* ssp. *tridentata* but have largely been converted for other land uses. The natural fire regime of this ecological system likely maintains a patchy distribution of shrubs, so the general aspect of the vegetation is grassland. Shrubs may increase following heavy grazing and/or with fire suppression, particularly in moist portions of the northern Columbia Plateau where it forms a landscape mosaic pattern with shallow-soil scabland shrublands. Where fire frequency has allowed for shifts to a native grassland condition, maintained without significant shrub invasion over a 50- to 70-year interval, the area would be considered Columbia Basin Foothill and Canyon Dry Grassland (NatureServe 2012).

Inter-Mountain Basins Montane Sagebrush Steppe

This ecological system includes sagebrush communities occurring at foothills (in Wyoming) to montane and subalpine elevations across the western United States from 3,300 feet (1,000 meters) in eastern

Oregon and Washington to over 9,800 feet (3,000 meters) in the southern Rockies. In Montana, it occurs on mountain "islands" in the north-central portion of the state and possibly along the Boulder River south of Absarokee and at higher elevations. In British Columbia, it occurs between 1,450 and 5,400 feet (450 and 1,650 meters) in the southern Fraser Plateau and the Thompson and Okanagan basins. Climate is cool, semi-arid to subhumid. This system primarily occurs on deep-soiled to stony flats, ridges, nearly flat ridgetops, and mountain slopes. In general, this system shows an affinity for mild topography, fine soils, some source of subsurface moisture or more mesic sites, zones of higher precipitation and areas of snow accumulation. Across its range of distribution, this is a compositionally diverse system. It is composed primarily of *Artemisia tridentata* ssp. *vaseyana, Artemisia cana* ssp. *viscidula*, and related taxa such as *Artemisia tridentata* ssp. *spiciformis (= Artemisia spiciformis)*. *Purshia tridentata* may codominate or even dominate some stands. *Artemisia arbuscula* ssp. *arbuscula*-dominated shrublands commonly occur in this system on rocky or windblown sites. Other common shrubs include *Symphoricarpos* spp., *Amelanchier* spp., *Ericameria nauseosa, Peraphyllum ramosissimum, Ribes cereum*, and *Chrysothamnus viscidiflorus*. *Artemisia tridentata* ssp. *wyomingensis* may be present to codominant if the stand is clearly montane as indicated by montane indicator species such as *Festuca idahoensis, Leucopoa kingii*, or *Danthonia intermedia*. Most stands have an abundant perennial herbaceous layer (over 25 percent cover, in many cases over 50 percent cover), but this system also includes *Artemisia tridentata* ssp. *vaseyana* shrublands. Common graminoids include *Danthonia intermedia, Festuca arizonica, Festuca idahoensis, Hesperostipa comata, Poa fendleriana, Elymus trachycaulus, Bromus carinatus, Poa secunda, Leucopoa kingii, Deschampsia caespitosa, Calamagrostis rubescens*, and *Pseudoroegneria spicata*. Species of *Achnatherum* are common, including *Achnatherum nelsonii* ssp. *dorei, Achnatherum nelsonii* ssp. *nelsonii, Achnatherum hymenoides*, and others. In many areas, wildfires can maintain an open herbaceous-rich steppe condition, although at most sites, shrub cover can be unusually high for a steppe system (greater than 40 percent), with the moisture providing equally high grass and forb cover (NatureServe 2012).

E.1.6 Developed/Disturbed

Developed, High Intensity

This land cover category includes highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses and commercial/industrial. Impervious surfaces account for 80 to100 percent of the total cover (University of Idaho 2012).

Developed, Low Intensity

This land cover category includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20 to 49 percent of total cover. These areas most commonly include single-family housing units (University of Idaho 2012).

Developed, Medium Intensity

This land cover category includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50 to 79 percent of the total cover. These areas most commonly include single-family housing units (University of Idaho 2012).

Developed, Open Space

This land cover category includes areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20 percent of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and

vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes (University of Idaho 2012).

Disturbed, Non-specific

This land cover category includes areas that are barren or have relatively low vegetation cover that is associated with some form of generic human alteration or management regime. These areas are typically associated with heavy amounts of grazing (University of Idaho 2012).

Disturbed/Successional – Recently Chained Pinyon-Juniper

This land cover category includes areas that have recently been chained to remove Pinyon-Juniper and are clearly evident in the imagery (images acquired between 1999 and 2001) (University of Idaho 2012).

Quarries, Mines, Gravel Pits and Oil Wells

This land cover category includes areas of extractive mining activities with significant surface expression (University of Idaho 2012).

Recently Burned

This land cover category includes areas that have burned in the recent past that are clearly evident in the imagery (images acquired between 1999 and 2001) (University of Idaho 2012).

Recently Logged Areas

This land cover category includes areas that have recently been clear-cut or thinned by 50 percent or more and are clearly evident in the imagery (images acquired between 1999 and 2001) (University of Idaho 2012).

E.1.7 Grassland

Inter-Mountain Basins Semi-Desert Grassland

This widespread ecological system includes the driest grasslands throughout the Intermountain western United States. It occurs on xeric sites over an elevation range of approximately 4,750 to 7,610 feet (1,450 to 2,320 meters) on a variety of landforms, including swales, playas, mesas, alluvial flats, and plains. This system may constitute the matrix over large areas of Intermountain basins, and also may occur as large patches in mosaics with shrubland systems dominated by *Artemisia tridentata* ssp. *tridentata, Artemisia tridentata* ssp. *wyomingensis, Atriplex* spp., *Coleogyne* spp., *Ephedra* spp., *Gutierrezia sarothrae*, or *Krascheninnikovia lanata*. Grasslands in areas of higher precipitation, at higher elevation, typically belong to other systems. Substrates are often well-drained sandy or loam soils derived from sedimentary parent materials but are quite variable and may include fine-textured soils derived from igneous and metamorphic rocks. The dominant perennial bunch grasses and shrubs in this system are all drought-resistant plants. Dominant or codominant species are *Achnatherum hymenoides, Aristida* spp., *Bouteloua gracilis, Hesperostipa comata, Muhlenbergia* spp., or *Pleuraphis jamesii*. Scattered shrubs and dwarf-shrubs often are present, especially *Artemisia tridentata* ssp. *tridentata, Artemisia tridentata* ssp. *wyomingensis, Atriplex* spp., *Coleogyne* spp., *Ephedra* spp., *Gutierrezia sarothrae*, and *Krascheninnikovia lanata*. Grasslands in the basins of south-central and southwestern Wyoming, dominated by *Pseudoroegneria spicata* and *Poa secunda* and containing cushion-form forbs and other species typical of dry basins, are included in this system (NatureServe 2012).

Northern Rocky Mountain Lower Montane, Foothill and Valley Grassland

This ecological system of the northern Rocky Mountains is found at lower montane to foothill elevations in the mountains and large valleys of northeastern Wyoming and western Montana, west through Idaho into the Blue Mountains of Oregon, and north into the Okanagan and Fraser plateaus of British Columbia and the Canadian Rockies. They also occur to the east in the central Montana mountain "islands," foothills, as well as the Rocky Mountain Front and Big and Little Belt ranges. These grasslands are floristically similar to Inter-Mountain Basins Big Sagebrush Steppe, Columbia Basin Foothill and Canyon Dry Grassland , and Columbia Basin Palouse Prairie , but are defined by shorter summers, colder winters, and young soils derived from recent glacial and alluvial material. These northern lower montane and valley grasslands represent a shift in the precipitation regime from summer monsoons and cold snowy winters found in the southern Rockies to predominantly dry summers and winter precipitation. In the eastern portion of its range in Montana, winter precipitation is replaced by a huge spring peak in precipitation. They are found at elevations from 980 to 5,400 feet (300 to 1,650 meters), ranging from small meadows to large open parks surrounded by conifers in the lower montane, to extensive foothill and valley grasslands below the lower treeline. Many of these valleys may have been primarily sage-steppe with patches of grassland in the past, but because of land-use history post-settlement (herbicide, grazing, fire suppression, pasturing, etc.), they have been converted to grassland-dominated areas. Soils are relatively deep, fine-textured, often with coarse fragments, and non-saline, often with a microphytic crust. The most important species are cool-season perennial bunch grasses and forbs (greater than 25 percent cover), sometimes with a sparse (less than 10 percent cover) shrub layer. *Pseudoroegneria spicata, Festuca campestris, Festuca idahoensis*, or *Hesperostipa comata* commonly dominate sites on all aspects of level to moderate slopes and on certain steep slopes with a variety of other grasses, such as *Achnatherum hymenoides, Achnatherum richardsonii, Hesperostipa curtiseta, Koeleria macrantha, Leymus cinereus, Elymus trachycaulus, Bromus inermis* ssp. *pumpellianus (= Bromus pumpellianus), Achnatherum occidentale (= Stipa occidentalis), Pascopyrum smithii*, and other graminoids such as *Carex filifolia* and *Danthonia intermedia*. Other grassland species include *Opuntia fragilis, Artemisia frigida, Carex petasata, Antennaria* spp., and *Selaginella densa*. Important exotic grasses include *Phleum pratense, Bromus inermis*, and *Poa pratensis*. Shrub species may be scattered, including *Amelanchier alnifolia, Rosa* spp., *Symphoricarpos* spp., *Juniperus communis, Artemisia tridentata*, and in Wyoming *Artemisia tripartita* ssp. *rupicola*. Common associated forbs include *Geum triflorum, Galium boreale, Campanula rotundifolia, Antennaria microphylla, Geranium viscosissimum*, and *Potentilla gracilis*. A soil crust of lichen covers almost all open soil between clumps of grasses; *Cladonia* and *Peltigera* are the most common lichens. Unvegetated mineral soil is commonly found between clumps of grass and the lichen cover. The fire regime of this ecological system maintains a grassland due to rapid fire return that retards shrub invasion or landscape isolation and fragmentation that limits seed dispersal of native shrub species. Fire frequency is presumed to be less than 20 years. These are extensive grasslands, not grass-dominated patches in the sagebrush shrub steppe ecological system. *Festuca campestris* is easily eliminated by grazing and does not occur in all areas of this system (NatureServe 2012).

Northwestern Great Plains Mixed Grass Prairie

This system extends from northern Nebraska into southern Canada and westward through the Dakotas to the Rocky Mountain Front in Montana and probably Wyoming, on both glaciated and non-glaciated substrates. Soil texture (which ultimately effects water available to plants) is the defining environmental descriptor; soils are primarily fine and medium-textured and do not include sands, sandy soils, or sandy loams. This system occurs on a wide variety of landforms (e.g., mesatops, stream terraces) and in proximity to a diversity of other systems. Most usually it is found in association with Western Great Plains Sand Prairie that occupies the coarser-textured substrates. In various locales the topography where this system occurs is broken by many glacial pothole lakes, and this system may be proximate to Great Plains Prairie Pothole. On the eastern Montana plains, mixedgrass prairie is by far the predominant

system. Here it occurs continuously for hundreds of square kilometers, interrupted only by riparian areas or sand prairies, which are associated with gentle rises, eroded ridges or mesas derived from sandstone. Historically, this system covered approximately 38 million hectare in Nebraska, North and South Dakota, and Canada; now it covers approximately 270,000 square kilometers in this region. The growing season and rainfall are intermediate to drier units to the southwest and mesic tallgrass regions to the east. Graminoids typically comprising the greatest canopy cover include *Pascopyrum smithii, Nassella viridula*, and *Festuca* spp. In Montana these include *Festuca campestris* and *Festuca idahoensis*. Other commonly dominant species in Montana are *Bouteloua gracilis, Hesperostipa comata*, and *Carex filifolia*, while *Festuca campestris* and *Festuca idahoensis* may be more abundant in the north and foothill/montane grassland transition areas. Remnants of *Hesperostipa curtiseta*-dominated vegetation are found in northernmost Montana and North Dakota associated with the most productive sites (largely plowed to cereal grains); the species, usually in association with *Pascopyrum smithii*, is much more abundant in Canada. Sites with a strong component of *Nassella viridula* indicate a more favorable moisture balance and perhaps a favorable grazing regime as well because this is one of the most palatable of the mid-grasses. *Hesperostipa comata* is also an important component and becomes increasingly so as improper grazing regimes favor it at the expense of (usually) *Pascopyrum smithii*; progressively more destructive grazing can result in the loss of *Pascopyrum smithii* from the system followed by drastic reduction in *Hesperostipa comata* and ultimately the dominance of *Bouteloua gracilis* (or *Poa secunda* and other short graminoids) and/or a lawn of *Selaginella densa*. *Koeleria macrantha*, at least in Montana and southern Canada, is the most pervasive grass; if it has high cover, past intensive grazing is the presumed reason. Shrub species such as *Symphoricarpos* spp. and *Artemisia frigida* and *Artemisia cana* also occur. Fire and grazing constitute the primary dynamics affecting this system. Drought can also impact this system, in general favoring the shortgrass component at the expense of the mid-grasses. With intensive grazing, cool-season exotics such as *Poa pratensis, Bromus inermis*, and *Bromus japonicus* can increase in dominance; both of the rhizomatous grasses have been shown to markedly depress species diversity. Shrub species such as *Juniperus virginiana* can also increase in dominance with fire suppression. This system is one of the most disturbed grassland systems in Nebraska, North and South Dakota, and Canada (NatureServe 2012).

Rocky Mountain Subalpine-Montane Mesic Meadow

This Rocky Mountain ecological system is restricted to sites from lower montane to subalpine where finely textured soils, snow deposition, or windswept dry conditions limit tree establishment. Many occurrences are small patch in spatial character, and are often found in mosaics with woodlands, more dense shrublands, or just below alpine communities. It is typically found above 6,500 feet (2,000 meters) in elevation in the southern part of its range and above 1,950 feet (600 meters) in the northern part. These upland communities occur on gentle to moderate-gradient slopes and relatively moist habitats. The soils are typically seasonally moist to saturated in the spring, but if so will dry out later in the growing season. These sites are not as wet as those found in Rocky Mountain Alpine-Montane Wet Meadow. Vegetation is typically forb-rich, with forbs often contributing more to overall herbaceous cover than graminoids. Some stands are comprised of dense grasslands, these often being taxa with relatively broad and soft blades, but where the moist habitat promotes a rich forb component. Important taxa include *Erigeron* spp., Asteraceae spp., *Mertensia* spp., *Penstemon* spp., *Campanula* spp., *Lupinus* spp., *Solidago* spp., *Ligusticum* spp., *Thalictrum occidentale, Valeriana sitchensis, Rudbeckia occidentalis, Balsamorhiza sagittata*, and *Wyethia* spp. Important grasses include *Deschampsia caespitosa, Koeleria macrantha*, perennial *Bromus* spp., and a number of *Carex* species. *Dasiphora fruticosa* ssp. *floribunda* and *Symphoricarpos* spp. are occasional but not abundant. Burrowing mammals can increase the forb diversity (NatureServe 2012).

Southern Rocky Mountain Montane-Subalpine Grassland

This Rocky Mountain ecological system typically occurs between 7,200 and 9,850 feet (2,200 and 3,000 meters) elevation on flat to rolling plains and parks or on lower sideslopes that are dry, but it may extend up to 11,000 feet (3,350 meters) on warm aspects. Soils resemble prairie soils in that the A-horizon is dark brown, relatively high in organic matter, slightly acidic, and usually well-drained. An occurrence usually consists of a mosaic of two or three plant associations with one of the following dominant bunch grasses: *Danthonia intermedia, Danthonia parryi, Festuca idahoensis, Festuca arizonica, Festuca thurberi, Muhlenbergia filiculmis*, or *Pseudoroegneria spicata*. The subdominants include *Muhlenbergia montana, Bouteloua gracilis*, and *Poa secunda*. These large-patch grasslands are intermixed with matrix stands of spruce-fir, lodgepole pine, ponderosa pine, and aspen forests. In limited circumstances (e.g., South Park in Colorado), they form the "matrix" of high-elevation plateaus. Small-patch representations of this system do occur at high elevations of the Trans-Pecos where they present as occurrences of *Festuca arizonica-Blepharoneuron tricholepis* Herbaceous Vegetation. These occurrences often occupy sites adjacent to Madrean Oriental Chaparral (NatureServe 2012).

Western Great Plains Sand Prairie

The sand prairies constitute a very unique system in the western Great Plains. These sand prairies are often considered part of the tallgrass or mixedgrass regions in the western Great Plains but can contain elements from Western Great Plains Shortgrass Prairie, Central Mixedgrass Prairie, and Northwestern Great Plains Mixedgrass Prairie. The largest expanse of sand prairies (approximately 5 million hectares) can be found in the Sandhills of north-central Nebraska and southwestern South Dakota. These areas are relatively intact. The primary use of this system has been grazing (not cultivation), and areas such as the Nebraska Sandhills can experience less degeneration than other prairie systems. Although greater than 90 percent of the Sandhills region is privately owned, the known fragility of the soils and the cautions used by ranchers to avoid poor grazing practices have allowed for fewer significant changes in the vegetation of the Sandhills compared to other grassland systems. The unifying and controlling feature for this system is that coarse-textured soils predominate and the dominant grasses are well-adapted to this condition. Soils in the sand prairies can be relatively undeveloped and are highly permeable. Soil texture and drainage along with a species' rooting morphology, photosynthetic physiology, and mechanisms to avoid transpiration loss are highly important in determining the composition of the sand prairies. In the northwestern portion of its range, stand size corresponds to the area of exposed caprock sandstone, and small patches predominate, but large patches are also found embedded in the encompassing Northwestern Great Plains Mixedgrass Prairie. Another important feature is their susceptibility to wind erosion. Blowouts and sand draws are some of the unique wind-driven disturbances in the sand prairies, particularly the Nebraska Sandhills. In most of eastern Montana, substrates supporting this system have weathered in place from sandstone caprock; thus the solum is relatively thin, and the wind-sculpted features present further east, particularly in Nebraska, do not develop. Graminoid species dominate the sand prairies, although relative dominance can change due to impacts of wind disturbance. *Andropogon hallii* and *Calamovilfa longifolia* are the most common species, but other grass and forb species such as *Hesperostipa comata, Carex inops* ssp. *heliophila*, and *Panicum virgatum* may be present. Apparently only *Calamovilfa longifolia* functions as a dominant throughout the range of the system. In the western extent, *Hesperostipa comata* becomes more dominant, and *Andropogon hallii* is less abundant but still present. Communities of *Artemisia cana* ssp. *cana* are included here in central and eastern Montana. Patches of *Quercus havardii* can also occur in this system in the southern Great Plains. Fire and grazing constitute the other major dynamic processes that can influence this system (NatureServe 2012).

E.1.8 Invasive

Introduced Upland Vegetation – Annual Grassland

This land cover category includes areas that are dominated by introduced annual and/or biennial forb species such as: *Halogeton glomeratum*, *Kochia scoparia*, *Salsola* spp., or annual grass species such as: *Avena* spp., *Bromus* spp., *Schismus* spp. (University of Idaho 2012).

Introduced Upland Vegetation – Perennial Grassland and Forbland

This land cover category includes areas that are dominated by introduced perennial forb or grassland species such as: *Cirsium arvense*, *C. vulgare*, *Centaurea* spp., *Euphorbia esula*, *Isatis tinctora*, *Lepidium* ssp., *Melilotus albus*, M. *officinalis*, *Onopordum acanthium*, *Agropyron cristatum*, *Bromus inermis*, *Eragrostis lehmannianna*, *Pennisetum* spp., *Poa bulbosa*, *P. pratensis*, *Thinopyrum intermedium* (University of Idaho 2012).

Introduced Upland Vegetation – Treed

This land cover category includes vegetation dominated (typically greater than 60 percent canopy cover) by introduced species. These are spontaneous, self-perpetuating, and not (immediately) the result of planting, cultivation, or human maintenance. Land occupied by introduced vegetation is generally permanently altered (converted) unless restoration efforts are undertaken. Specifically, land cover is significantly altered/disturbed by introduced tree species (University of Idaho 2012).

Noxious Weeds

In addition to the GAP land cover categories used to define invasive habitat in the Project area, noxious weed distribution information was obtained from BLM field offices and USFS ranger districts and was used in conjunction with the GAP data to supplement identification of the invasive primary habitat type to determine the presence of noxious weeds in the Project area.

E.1.9 Montane Forest

Middle Rocky Mountain Montane Douglas-fir Forest and Woodland

This ecological system occurs throughout the middle Rocky Mountains of central and southern Idaho (Lemhi, Beaverhead and Lost River ranges), south and east into the greater Yellowstone region, and south and east into the Wind River, Gros Ventre and Bighorn ranges of Wyoming. It extends north into Montana on the east side of the Continental Divide, north to about the McDonald Pass area, and also into the Rocky Mountain Front region of Montana. This is a *Pseudotsuga menziesii*-dominated system without the maritime floristic composition; these are forests and woodlands occurring in the central Rockies where the southern monsoon influence is less and maritime climate regime is not important. This system includes extensive *Pseudotsuga menziesii* forests, occasionally with *Pinus flexilis* on calcareous substrates, and *Pinus contorta* at higher elevations. True firs, such as *Abies concolor, Abies grandis*, and *Abies lasiocarpa*, are absent in these occurrences, but *Picea engelmannii* can occur in some stands. Understory components include shrubs such as *Physocarpus malvaceus, Juniperus communis, Symphoricarpos oreophilus*, and *Mahonia repens*, and graminoids such as *Calamagrostis rubescens, Carex rossii*, and *Leucopoa kingii*. The fire regime is of mixed severity with moderate frequency. This system often occurs at the lower treeline immediately above valley grasslands, or sagebrush steppe and shrublands. Sometimes there may be a "bath-tub ring" of *Pinus ponderosa* at lower elevations or *Pinus flexilis* between the valley non-forested and the solid *Pseudotsuga menziesii* forest. In the Wyoming Basins, this system occurs as isolated stands of *Pseudotsuga menziesii*, with *Artemisia tridentata, Pseudoroegneria spicata, Leucopoa kingii*, and *Carex rossii* (NatureServe 2012).

Northern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest

This ecological system is composed of highly variable montane coniferous forests found in the interior Pacific Northwest, from southernmost interior British Columbia, eastern Washington, eastern Oregon, northern Idaho, western and north-central Montana, and south along the east slope of the Cascades in Washington and Oregon. In central Montana it occurs on mountain islands (the Snowy Mountains). This system is associated with a submesic climate regime with annual precipitation ranging from 20 to 40 inches (50 to 100 centimeters), with a maximum in winter or late spring. Winter snowpacks typically melt off in early spring at lower elevations. Elevations range from 1,500 to 6,300 feet (460 to 1,920 meters). Most occurrences of this system are dominated by a mix of *Pseudotsuga menziesii* and *Pinus ponderosa* (but there can be one without the other) and other typically seral species, including *Pinus contorta, Pinus monticola* (not in central Montana), and *Larix occidentalis* (not in central Montana). *Picea engelmannii* (or *Picea glauca* or their hybrid) becomes increasingly common towards the eastern edge of the range. The nature of this forest system is a matrix of large patches dominated or codominated by one or combinations of the above species; *Abies grandis* (a fire-sensitive, shade-tolerant species not occurring in central Montana) has increased on many sites once dominated by *Pseudotsuga menziesii* and *Pinus ponderosa*, which were formerly maintained by low-severity wildfire. Presettlement fire regimes may have been characterized by frequent, low-intensity ground fires that maintained relatively open stands of a mix of fire-resistant species. Under present conditions the fire regime is mixed severity and more variable, with stand-replacing fires more common, and the forests are more homogeneous. With vigorous fire suppression, longer fire-return intervals are now the rule, and multi-layered stands of *Pseudotsuga menziesii, Pinus ponderosa*, and/or *Abies grandis* provide fuel "ladders," making these forests more susceptible to high-intensity, stand-replacing fires. They are very productive forests that have been priorities for timber production. They rarely form either upper or lower timberline forests. Understories are dominated by graminoids, such as *Pseudoroegneria spicata, Calamagrostis rubescens, Carex geyeri*, and *Carex rossii* that may be associated with a variety of shrubs, such as *Acer glabrum, Juniperus communis, Physocarpus malvaceus, Symphoricarpos albus, Spiraea betulifolia*, or *Vaccinium membranaceum* on mesic sites. *Abies concolor* and *Abies grandis* x *concolor* hybrids in central Idaho (the Salmon Mountains) are included here but have very restricted range in this area. *Abies concolor* and *Abies grandis* in the Blue Mountains of Oregon are probably hybrids of the two and mostly *Abies grandis* (NatureServe 2012).

Northern Rocky Mountain Mesic Montane Mixed Conifer Forest

This ecological system occurs in the northern Rockies of western Montana west into northeastern Washington and southern British Columbia. These are vegetation types dominated by *Tsuga heterophylla* and *Thuja plicata* in most cases, found in areas influenced by incursions of mild, wet, Pacific maritime air masses. Much of the annual precipitation occurs as rain, but where snow does occur, it can generally be melted by rain during warm winter storms. Occurrences generally are found on all slopes and aspects but grow best on sites with high soil moisture, such as toeslopes and bottomlands. At the periphery of its distribution, this system is confined to moist canyons and cooler, moister aspects. Generally these are moist, non-flooded or upland sites that are not saturated yearlong. Along with *Tsuga heterophylla* and *Thuja plicata, Pseudotsuga menziesii* commonly shares the canopy, and *Pinus monticola, Pinus contorta, Abies grandis, Taxus brevifolia*, and *Larix occidentalis* are major associates. Mesic *Abies grandis* associations are included in this system, and *Abies grandis* is often the dominant in these situations; *Tsuga heterophylla* and *Thuja plicata* can both be absent. *Cornus nuttallii* may be present in some situations. *Picea engelmannii, Abies lasiocarpa*, and *Pinus ponderosa* may be present but only on the coldest or warmest and driest sites. *Linnaea borealis, Paxistima myrsinites, Alnus incana, Acer glabrum, Spiraea betulifolia, Symphoricarpos hesperius (= Symphoricarpos mollis* ssp. *hesperius), Cornus canadensis, Rubus parviflorus, Menziesia ferruginea*, and *Vaccinium membranaceum* are common shrub species. The composition of the herbaceous layer reflects local climate and degree of canopy closure; it is

typically highly diverse in all but closed-canopy conditions. Important forbs and ferns include *Actaea rubra, Anemone piperi, Aralia nudicaulis, Asarum caudatum, Clintonia uniflora, Coptis occidentalis, Thalictrum occidentale, Tiarella trifoliata, Trientalis borealis, Trillium ovatum, Viola glabella, Gymnocarpium dryopteris, Polystichum munitum*, and *Adiantum pedatum*. Typically, stand-replacement, fire-return intervals are from 150 to 500 years, with moderate-severity fire intervals from 50 to 100 years (NatureServe 2012).

Rocky Mountain Lodgepole Pine Forest

This ecological system is widespread in upper montane to subalpine elevations of the Rocky Mountains, Intermountain West region, north into the Canadian Rockies and east into mountain "islands" of north-central Montana. These are subalpine forests where the dominance of *Pinus contorta* is related to fire history and topo-edaphic conditions. Following stand-replacing fires, *Pinus contorta* will rapidly colonize and develop into dense, even-aged stands. Most forests in this ecological system occur as early- to mid-successional forests that developed following fires. This system includes *Pinus contorta*-dominated stands that, while typically persistent for greater than 100-year time frames, may succeed to spruce-fir; in the southern and central Rocky Mountains it is seral to Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland. More northern occurrences are seral to Rocky Mountain Subalpine Mesic-Wet Spruce-Fir Forest and Woodland. Soils supporting these forests are typically well-drained, gravelly, coarse-textured, acidic, and rarely formed from calcareous parent materials. These forests are dominated by *Pinus contorta* with shrub, grass, or barren understories. Sometimes there are intermingled mixed conifer/*Populus tremuloides* stands, with the latter occurring with inclusions of deeper, typically fine-textured soils. The shrub stratum may be conspicuous to absent; common species include *Arctostaphylos uva-ursi, Ceanothus velutinus, Linnaea borealis, Mahonia repens, Menziesia ferruginea* (in northern occurrences), *Purshia tridentata, Rhododendron albiflorum* (in northern occurrences), *Spiraea betulifolia, Spiraea douglasii, Shepherdia canadensis, Vaccinium caespitosum, Vaccinium scoparium, Vaccinium membranaceum, Symphoricarpos albus*, and *Ribes* spp. In southern interior British Columbia, this system is usually an open lodgepole pine forest found extensively between 1,640 and 5,250 feet (500 and 1,600 meters) elevation in the Columbia Range. In the Interior Cedar Hemlock and Interior Douglas-fir zones, *Tsuga heterophylla* or *Pseudotsuga menziesii* may be present. In Alberta, species composition indicates the transition to more boreal floristics, including such species as *Empetrum nigrum, Ledum groenlandicum, Leymus innovatus*, and more abundant lichens or mosses such as *Cladina* spp., *Hylocomium splendens*, and *Pleurozium schreberi* (NatureServe 2012).

Rocky Mountain Subalpine Dry-Mesic Spruce-Fir Forest and Woodland

Engelmann spruce and subalpine fir forests comprise a substantial part of the subalpine forests of the Cascades and Rocky Mountains from southern British Columbia east into Alberta, and south into New Mexico and the Intermountain region. They also occur on mountain "islands" of north-central Montana. They are the matrix forests of the subalpine zone, with elevations ranging from 4,100 feet (1,275 meters) in its northern distribution to 11,000 feet (3,355 meters) in the south. They often represent the highest elevation forests in an area. Sites in this system are cold year-round, and precipitation is predominantly in the form of snow, which may persist until late summer. Snowpacks are deep and late-lying, and summers are cool. Frost is possible almost all summer and may be common in restricted topographic basins and benches. Despite their wide distribution, the tree canopy characteristics are remarkably similar, with *Picea engelmannii* and *Abies lasiocarpa* dominating either mixed or alone. *Pseudotsuga menziesii* may persist in occurrences of this system for long periods without regeneration. *Pinus contorta* is common in many occurrences, and patches of pure *Pinus contorta* are not uncommon, as well as mixed conifer/*Populus tremuloides* stands. In some areas, such as Wyoming, *Picea engelmannii*-dominated forests are on limestone or dolomite, while nearby codominated spruce-fir forests are on granitic or volcanic rocks. Upper elevation examples may have more woodland physiognomy, and *Pinus albicaulis*

can be a seral component. What have been called "ribbon forests" or "tree islands" by some authors are included here; they can be found at upper treeline in many areas of the Rockies, including the central and northern ranges in Colorado and the Medicine Bow and Bighorn ranges of Wyoming. These are more typically islands or ribbons of trees, sometimes with a krummholz form, with open-meadow areas in a mosaic. These patterns are controlled by snow deposition and wind-blown ice. Xeric species may include *Juniperus communis, Linnaea borealis, Mahonia repens*, or *Vaccinium scoparium*. In the Bighorn Mountains, *Artemisia tridentata* is a common shrub. More northern occurrences often have taller, more mesic shrub and herbaceous species, such as *Empetrum nigrum, Rhododendron albiflorum*, and *Vaccinium membranaceum*. Disturbance includes occasional blowdown, insect outbreaks and stand-replacing fire. Mean return interval for stand-replacing fire is 222 years as estimated in southeastern British Columbia (NatureServe 2012).

Rocky Mountain Subalpine Mesic Spruce-Fir Forest and Woodland

Engelmann spruce and subalpine fir forests comprise a substantial part of the subalpine forests of the Cascades and Rocky Mountains from southern British Columbia east into Alberta, south into New Mexico and the Intermountain region. They are the matrix forests of the subalpine zone, with elevations ranging from 4,100 feet (1,275 meters) in its northern distribution to 11,000 feet (3,355 meters) in the south. They often represent the highest elevation forests in an area. Sites in this system are cold year-round, and precipitation is predominantly in the form of snow, which may persist until late summer. Snowpacks are deep and late-lying, and summers are cool. Frost is possible almost all summer and may be common in restricted topographic basins and benches. Despite their wide distribution, the tree canopy characteristics are remarkably similar, with *Picea engelmannii* and *Abies lasiocarpa* dominating either mixed or alone. *Pseudotsuga menziesii* may persist in occurrences of this system for long periods without regeneration. *Pinus contorta* is common in many occurrences, and patches of pure *Pinus contorta* are not uncommon, as well as mixed conifer/*Populus tremuloides* stands. In some areas, such as Wyoming, *Picea engelmannii*-dominated forests are on limestone or dolomite, while nearby codominated spruce-fir forests are on granitic or volcanic rocks. Xeric species may include *Juniperus communis, Linnaea borealis, Mahonia repens*, or *Vaccinium scoparium*. More northern occurrences often have taller, more mesic shrub and herbaceous species, such as *Empetrum nigrum, Rhododendron albiflorum*, and *Vaccinium membranaceum*. Disturbance includes occasional blow-down, insect outbreaks and stand-replacing fire (University of Idaho 2012).

Rocky Mountain Subalpine-Montane Limber-Bristlecone Pine Woodland

This ecological system occurs throughout the Rocky Mountains, south of Montana, on dry, rocky ridges and slopes near upper treeline above the matrix spruce-fir forest. It extends down to the lower montane in the northeastern Great Basin Mountains where dominated by *Pinus flexilis*. Sites are harsh, exposed to desiccating winds, with rocky substrates and a short growing season that limit plant growth. Higher-elevation occurrences are found well into the subalpine-alpine transition on wind-blasted, mostly west-facing slopes and exposed ridges. Calcareous substrates are important for *Pinus flexilis*-dominated communities in the northern Rocky Mountains and possibly elsewhere. The open tree canopy is often patchy and is strongly dominated by *Pinus flexilis* or *Pinus aristata* with the latter restricted to southern Colorado, northern New Mexico and the San Francisco Mountains in Arizona. In the Wyoming Rockies and northern Great Basin, *Pinus albicaulis* is found in some occurrences, but is a minor component. Other trees such as *Juniperus* spp., *Pinus contorta, Pinus ponderosa*, or *Pseudotsuga menziesii* are occasionally present. *Arctostaphylos uva-ursi, Cercocarpus ledifolius, Juniperus communis, Mahonia repens, Purshia tridentata, Ribes montigenum*, or *Vaccinium* spp. may form an open shrub layer in some stands. The herbaceous layer, if present, is generally sparse and composed of xeric graminoids, such as *Calamagrostis purpurascens, Festuca arizonica, Festuca idahoensis, Festuca thurberi*, or *Pseudoroegneria spicata*, or more alpine plants (NatureServe 2012).

Southern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest and Woodland

This is a highly variable ecological system of the montane zone of the Rocky Mountains. It occurs throughout the southern Rockies, north and west into Utah, Nevada, Wyoming and Idaho. These are mixed-conifer forests occurring on all aspects at elevations ranging from 3,900 to 10,825 feet (1,200 to 3,300 meters). Rainfall averages less than 29.5 inches (75 centimeters) per year (16 to 24 inches [40 to 60 centimeters), with summer "monsoons" during the growing season contributing substantial moisture. The composition and structure of the overstory are dependent upon the temperature and moisture relationships of the site and the successional status of the occurrence. *Pseudotsuga menziesii* and *Abies concolor* are most frequent, but *Pinus ponderosa* may be present to codominant. *Pinus flexilis* is common in Nevada. *Pseudotsuga menziesii* forests occupy drier sites, and *Pinus ponderosa* is a common codominant. *Abies concolor*-dominated forests occupy cooler sites, such as upper slopes at higher elevations, canyon sideslopes, ridgetops, and north- and east-facing slopes that burn somewhat infrequently. *Picea pungens* is most often found in cool, moist locations, often occurring as smaller patches in a matrix of other associations. As many as seven conifers can be found growing in the same occurrence, and there are a number of cold-deciduous shrub and graminoid species common, including *Arctostaphylos uva-ursi, Mahonia repens, Paxistima myrsinites, Symphoricarpos oreophilus, Jamesia americana, Quercus gambelii*, and *Festuca arizonica*. This system was undoubtedly characterized by a mixed-severity fire regime in its "natural condition," characterized by a high degree of variability in lethality and return interval (NatureServe 2012).

Southern Rocky Mountain Mesic Montane Mixed Conifer Forest and Woodland

These are mixed conifer forests of the Rocky Mountains west into the ranges of the Great Basin, occurring predominantly in cool ravines and on north-facing slopes. Elevations range from 3,900 to 10,825 feet (1,200 to 3,300 meters). Occurrences of this system are found on cooler and more mesic sites than Southern Rocky Mountain Dry-Mesic Montane Mixed Conifer Forest and Woodland. Such sites include lower and middle slopes of ravines, along stream terraces, moist, concave topographic positions and north- and east-facing slopes that burn somewhat infrequently. *Pseudotsuga menziesii* and *Abies concolor* are most common canopy dominants, but *Picea engelmannii, Picea pungens*, or *Pinus ponderosa* may be present. This system includes mixed conifer (*Populus tremuloides)* stands. A number of cold-deciduous shrub species can occur, including *Acer glabrum, Acer grandidentatum, Alnus incana, Betula occidentalis, Cornus sericea, Jamesia americana, Physocarpus malvaceus, Robinia neomexicana, Vaccinium membranaceum*, and *Vaccinium myrtillus*. Herbaceous species include *Bromus ciliatus, Carex geyeri, Carex rossii, Carex siccata, Muhlenbergia virescens, Pseudoroegneria spicata, Erigeron eximius, Fragaria virginiana, Luzula parviflora, Osmorhiza berteroi, Packera cardamine, Thalictrum occidentale*, and *Thalictrum fendleri*. Naturally occurring fires are of variable return intervals and mostly light, erratic, and infrequent due to the cool, moist conditions.

E.1.10 Mountain Shrub

Harvested Forest-Shrub Regeneration

Areas dominated by shrubs; less than 5 meters tall with shrub canopy typically greater than 20 percent of total vegetation. This class includes true shrubs, young trees in early successional stage or trees stunted from environmental conditions following a tree harvesting event (University of Idaho 2012).

Inter-Mountain Basins Curl-leaf Mountain-Mahogany Woodland and Shrubland

This ecological system occurs in hills and mountain ranges of the Intermountain West basins from the eastern foothills of the Sierra Nevada northeast to the foothills of the Bighorn Mountains. It typically

occurs from 1,950 feet (600 meters) to over 8,600 feet (2,650 meters) in elevation on rocky outcrops or escarpments and forms small- to large-patch stands in forested areas. Most stands occur as shrublands on ridges and steep rimrock slopes, but they may be composed of small trees in steppe areas. Scattered junipers or pines may also occur. This system includes both woodlands and shrublands dominated by *Cercocarpus ledifolius*. *Artemisia tridentata* ssp. *vaseyana, Purshia tridentata*, with species of *Arctostaphylos, Ribes*, or *Symphoricarpos* are often present. Undergrowth is often very sparse and dominated by bunch grasses, usually *Pseudoroegneria spicata* and *Festuca idahoensis*. *Cercocarpus ledifolius* is a slow-growing, drought-tolerant species that generally does not resprout after burning and needs the protection from fire that rocky sites provide (NatureServe 2012).

Northern Rocky Mountain Montane-Foothill Deciduous Shrubland

This shrubland ecological system is found in the lower montane and foothill regions around the Columbia Basin, and north and east into the northern Rockies, including Alberta and British Columbia. These shrublands typically occur below treeline, in the matrix of surrounding low-elevation grasslands and sagebrush shrublands. They also occur in the ponderosa pine and Douglas-fir zones, but rarely up into the subalpine zone (on dry sites). The shrublands are usually found on steep slopes of canyons and in areas with some soil development, either loess deposits or volcanic clays; they occur on all aspects. Fire, flooding and erosion all impact these shrublands, but they typically will persist on sites for long periods. These communities develop near talus slopes as garlands, at the heads of dry drainages, and toeslopes in the moist shrub-steppe and steppe zones. *Physocarpus malvaceus, Prunus emarginata, Prunus virginiana, Rosa* spp., *Rhus glabra, Acer glabrum, Amelanchier alnifolia, Symphoricarpos albus, Symphoricarpos oreophilus*, and *Holodiscus discolor* are the most common dominant shrubs, occurring alone or any combination. In the Alberta's Upper and Lower Foothills subregions, common shrubs include *Arctostaphylos uva-ursi, Juniperus communis, Symphoricarpos* spp., *Amelanchier alnifolia*, and *Rosa* spp. *Rubus parviflorus* and *Ceanothus velutinus* are other important shrubs in this system, being more common in montane occurrences than in subalpine situations. Occurrences in central and eastern Wyoming can include *Artemisia tridentata* ssp. *vaseyana* and *Cercocarpus montanus*, but neither of these is dominant, and where they occur, the stands are truly mixes of shrubs, often with *Amelanchier alnifolia, Prunus virginiana*, and others being the predominant taxa. In moist areas, *Crataegus douglasii* can be common. *Shepherdia canadensis* and *Spiraea betulifolia* can be abundant in some cases but also occur in Northern Rocky Mountain Subalpine Deciduous Shrubland. *Festuca idahoensis, Festuca campestris, Calamagrostis rubescens, Carex geyeri, Koeleria macrantha, Pseudoroegneria spicata*, and *Poa secunda* are the most important grasses. *Achnatherum thurberianum* and *Leymus cinereus* can be locally important. *Poa pratensis* and *Phleum pratense* are common introduced grasses. *Geum triflorum, Potentilla gracilis, Lomatium triternatum, Balsamorhiza sagittata*, and species of *Eriogonum, Phlox*, and *Erigeron* are important forbs (NatureServe 2012).

Northern Rocky Mountain Subalpine Deciduous Shrubland

This shrubland ecological system is found in the zone of continuous forest in the upper montane and lower subalpine zones of the northern Rocky Mountains. Soils tend to be moist to wet. Stands are typically initiated by fires and will persist on sites for long periods because of repeated burns and changes in the presence of volatile oils in the soil that impedes tree regeneration. *Menziesia ferruginea, Rhamnus alnifolia, Ribes lacustre, Rubus parviflorus, Alnus viridis, Rhododendron albiflorum, Sorbus scopulina, Sorbus sitchensis, Vaccinium myrtillus, Vaccinium scoparium*, and *Vaccinium membranaceum* are the most common dominant shrubs, occurring alone or in any combination. Other shrubs can include *Shepherdia canadensis* and *Ceanothus velutinus*, but these also commonly occur in Northern Rocky Mountain Montane-Foothill Deciduous Shrubland. *Rubus parviflorus* and *Ceanothus velutinus* are occasionally present, being more common in montane shrublands than in this subalpine system. Important

forbs include *Xerophyllum tenax, Chamerion angustifolium*, and *Pteridium aquilinum*, reflecting the mesic nature of many of these shrublands (NatureServe 2012).

Rocky Mountain Gambel Oak-Mixed Montane Shrubland

This ecological system occurs in the mountains, plateaus and foothills of the southern Rocky Mountains and Colorado Plateau, including the Uinta and Wasatch ranges and the Mogollon Rim. These shrublands are most commonly found along dry foothills, lower mountain slopes, and at the edge of the western Great Plains from approximately 6,500 to 9500 feet (2,000 to 2,900 meters) in elevation, and are often situated above pinyon-juniper woodlands. Substrates are variable and include soil types ranging from calcareous, heavy, fine-grained loams to sandy loams, gravelly loams, clay loams, deep alluvial sand, or coarse gravel. The vegetation is typically dominated by *Quercus gambelii* alone or codominant with *Amelanchier alnifolia, Amelanchier utahensis, Artemisia tridentata, Cercocarpus montanus, Prunus virginiana, Purshia stansburiana, Purshia tridentata, Robinia neomexicana, Symphoricarpos oreophilus*, or *Symphoricarpos rotundifolius*. There may be inclusions of other mesic montane shrublands with *Quercus gambelii* absent or as a relatively minor component. This ecological system intergrades with the lower montane-foothills shrubland system and shares many of the same site characteristics. Density and cover of *Quercus gambelii* and *Amelanchier* spp. often increase after fire (NatureServe 2012).

Rocky Mountain Lower Montane-Foothill Shrubland

This ecological system is found in the foothills, canyon slopes and lower mountains of the Rocky Mountains and on outcrops and canyon slopes in the western Great Plains. It ranges from southern New Mexico, extending north into Wyoming, and west into the Intermountain West region. These shrublands occur between 4,900 and 9,500 feet (1,500 and 2,900 meters) elevation and are usually associated with exposed sites, rocky substrates, and dry conditions, which limit tree growth. It is common where *Quercus gambelii* is absent, such as the northern Colorado Front Range and in drier foothills and prairie hills. This system is generally drier than Rocky Mountain Gambel Oak-Mixed Montane Shrubland but may include mesic montane shrublands where *Quercus gambelii* does not occur. *Cercocarpus montanus* dominates pure stands in parts of Wyoming and Colorado. Scattered trees or inclusions of grassland patches or steppe may be present, but the vegetation is typically dominated by a variety of shrubs, including *Amelanchier utahensis, Cercocarpus montanus, Purshia tridentata, Rhus trilobata, Ribes cereum, Symphoricarpos oreophilus*, or *Yucca glauca*. Grasses are represented as species of *Muhlenbergia, Bouteloua, Hesperostipa*, and *Pseudoroegneria spicata*. Fires play an important role in this system as the dominant shrubs usually have a severe die-back, although some plants will stump sprout. *Cercocarpus montanus* requires a disturbance such as fire to reproduce, either by seed sprout or root-crown sprouting. Fire suppression may have allowed an invasion of trees into some of these shrublands, but in many cases sites are too xeric for tree growth. In Wyoming, stands where *Cercocarpus montanus* is a component of mixed shrublands are placed in Northern Rocky Mountain Montane-Foothill Deciduous Shrubland (NatureServe 2012).

E.1.11 Pinyon-Juniper

Colorado Plateau Pinyon-Juniper Shrubland

This ecological system is characteristic of the rocky mesatops and slopes on the Colorado Plateau and western slope of Colorado, but these stunted tree shrublands may extend further upslope along the low-elevation margins of taller pinyon-juniper woodlands. Sites are drier than Colorado Plateau Pinyon-Juniper Woodland. Substrates are shallow/rocky and shaly soils at lower elevations 3,900 to 6,500 feet (1,200 to 2,000 meters). Sparse examples of the system grade into Colorado Plateau Mixed Bedrock Canyon and Tableland. The vegetation is dominated by dwarfed (usually less than 9.5 feet [3 meters] tall) *Pinus edulis* and/or *Juniperus osteosperma* trees forming extensive tall shrublands in the region along

low-elevation margins of pinyon-juniper woodlands. Other shrubs, if present, may include *Artemisia nova, Artemisia tridentata* ssp. *wyomingensis, Chrysothamnus viscidiflorus*, or *Coleogyne ramosissima*. Herbaceous layers are sparse to moderately dense and typically composed of xeric graminoids.

Colorado Plateau Pinyon-Juniper Woodland

This ecological system occurs in dry mountains and foothills of the Colorado Plateau region including the Western Slope of Colorado to the Wasatch Range, south to the Mogollon Rim, and east into the northwestern corner of New Mexico. It is typically found at lower elevations ranging from 4,900 to 8,000 feet (1,500 to 2,440 meters). These woodlands occur on warm, dry sites on mountain slopes, mesas, plateaus, and ridges. Severe climatic events occurring during the growing season, such as frosts and drought, are thought to limit the distribution of pinyon-juniper woodlands to relatively narrow altitudinal belts on mountainsides. Soils supporting this system vary in texture, ranging from stony, cobbly, gravelly sandy loams to clay loam or clay. *Pinus edulis* and/or *Juniperus osteosperma* dominate the tree canopy. In the southern portion of the Colorado Plateau in northern Arizona and northwestern New Mexico, *Juniperus monosperma* and hybrids of *Juniperus* spp. may dominate or codominate the tree canopy. *Juniperus scopulorum* may codominate or replace *Juniperus osteosperma* at higher elevations. Understory layers are variable and may be dominated by shrubs, graminoids, or be absent. Associated species include *Arctostaphylos patula, Artemisia tridentata, Cercocarpus intricatus, Cercocarpus montanus, Coleogyne ramosissima, Purshia stansburiana, Purshia tridentata, Quercus gambelii, Bouteloua gracilis, Pleuraphis jamesii, Pseudoroegneria spicata, Poa secunda*, or *Poa fendleriana*. This system occurs at higher elevations than Great Basin Pinyon-Juniper Woodland and Colorado Plateau shrubland systems where sympatric (NatureServe 2012).

Great Basin Pinyon-Juniper Woodland

This ecological system occurs on dry mountain ranges of the Great Basin region and eastern foothills of the Sierra Nevada south in scattered locations throughout southern California. It is typically found at lower elevations ranging from 5,200 to 8,500 feet (1,600 to 2,600 meters). These woodlands occur on warm, dry sites on mountain slopes, mesas, plateaus and ridges. Severe climatic events occurring during the growing season, such as frosts and drought, are thought to limit the distribution of pinyon-juniper woodlands to relatively narrow altitudinal belts on mountainsides. Woodlands dominated by a mix of *Pinus monophylla* and *Juniperus osteosperma*, pure or nearly pure occurrences of *Pinus monophylla*, or woodlands dominated solely by *Juniperus osteosperma* comprise this system, but in some regions of southern California, *Juniperus osteosperma* is replaced by *Juniperus californica*. *Cercocarpus ledifolius* is a common associate. On the east slope of the Sierras in California, *Pinus jeffreyi* and *Juniperus occidentalis* var. *australis* may be components of these woodlands. Understory layers are variable. Associated species include shrubs such as *Arctostaphylos patula, Artemisia arbuscula, Artemisia nova, Artemisia tridentata, Cercocarpus ledifolius, Cercocarpus intricatus, Coleogyne ramosissima, Yucca brevifolia, Quercus gambelii, Quercus turbinella, Quercus john-tuckeri, Juniperus californica, Quercus chrysolepis*, and bunch grasses *Hesperostipa comata, Festuca idahoensis, Pseudoroegneria spicata, Leymus cinereus (= Elymus cinereus)*, and *Poa fendleriana*. This system occurs at lower elevations than Colorado Plateau Pinyon-Juniper Woodland where sympatric (NatureServe 2012).

Inter-Mountain Basins Juniper Savanna

This widespread ecological system occupies dry foothills and sandsheets of western Colorado, northwestern New Mexico, northern Arizona, Utah, and west into the Great Basin of Nevada and southern Idaho. It is typically found at lower elevations ranging from 4,920 to 7,500 feet (1,500 to 2,300 meters). This system is generally found at lower elevations and more xeric sites than Great Basin Pinyon-Juniper Woodland or Colorado Plateau Pinyon-Juniper Woodland. These occurrences are found on lower

mountain slopes, hills, plateaus, basins and flats often where juniper is expanding into semi-desert grasslands and steppe. The vegetation is typically open savanna, although there may be inclusions of denser juniper woodlands. This savanna is typically dominated by *Juniperus osteosperma* trees with high cover of perennial bunch grasses and forbs, with *Bouteloua gracilis, Hesperostipa comata*, and *Pleuraphis jamesii* being most common. In the southern Colorado Plateau, *Juniperus monosperma* or juniper hybrids may dominate the tree layer. Pinyon trees are typically not present because sites are outside the ecological or geographic range of *Pinus edulis* and *Pinus monophylla*. It has been suggested that all *Juniperus osteosperma* stands in Wyoming be placed in Colorado Plateau Pinyon-Juniper Woodland. This savanna system does not occur in Wyoming (NatureServe 2012).

Rocky Mountain Foothill Limber Pine-Juniper Woodland

This ecological system occurs in foothill and lower montane zones in the Rocky Mountains from northern Montana south to central Colorado and on escarpments across Wyoming extending out into the western Great Plains. Elevation ranges from 3,280 to 7,870 feet (1,000 to 2,400 meters). It occurs generally below continuous forests of *Pseudotsuga menziesii* or *Pinus ponderosa* and can occur in large stands well in the zone of continuous forests in the northeastern Rocky Mountains. It is restricted to shallow soils and fractured bedrock derived from a variety of parent material, including limestone, sandstone, dolomite, granite and colluvium. Soils have a high rock component (typically over 50 percent cover) and are coarse- to fine-textured, often gravelly and calcareous. Slopes are typically moderately steep to steep. At higher elevations, it is limited to the most xeric aspects on rock outcrops, and at lower elevations to the relatively mesic north aspects. Fire is infrequent and spotty because rocky substrates prevent a continuous vegetation canopy needed to spread. Vegetation is characterized by an open-tree canopy or patchy woodland that is dominated by either *Pinus flexilis, Juniperus osteosperma*, or *Juniperus scopulorum*. *Pinus edulis* is not present. A sparse to moderately dense short-shrub layer, if present, may include a variety of shrubs, such as *Arctostaphylos uva-ursi, Artemisia nova, Artemisia tridentata, Cercocarpus ledifolius, Cercocarpus montanus, Dasiphora fruticosa* ssp. *floribunda, Ericameria nauseosa, Juniperus horizontalis, Purshia tridentata, Rhus trilobata, Rosa woodsii, Shepherdia canadensis* (important in Montana stands), *Symphoricarpos albus*, or *Symphoricarpos oreophilus*. Herbaceous layers are generally sparse, but range to moderately dense, and are typically dominated by perennial graminoids such as *Bouteloua gracilis, Festuca idahoensis, Festuca campestris, Danthonia intermedia, Leucopoa kingii, Hesperostipa comata, Koeleria macrantha, Piptatherum micranthum, Poa secunda*, or *Pseudoroegneria spicata*. In this ecological system, there may be small patches of grassland or shrubland composed of some of the above species. In Wyoming, some limber pine stands are found up to 8,000 feet (2,440 meters) elevation and are still included in this system (NatureServe 2012).

Southern Rocky Mountain Pinyon-Juniper Woodland

This southern Rocky Mountain ecological system occurs on dry mountains and foothills in southern Colorado east of the Continental Divide, in mountains and plateaus of north-central New Mexico, and extends out onto limestone breaks in the southeastern Great Plains. These woodlands occur on warm, dry sites on mountain slopes, mesas, plateaus, and ridges. Severe climatic events occurring during the growing season, such as frosts and drought, are thought to limit the distribution of pinyon-juniper woodlands to relatively narrow altitudinal belts on mountainsides. Soils supporting this system vary in texture ranging from stony, cobbly, gravelly sandy loams to clay loam or clay. *Pinus edulis* and/or *Juniperus monosperma* dominate the tree canopy. *Juniperus scopulorum* may codominate or replace *Juniperus monosperma* at higher elevations. Stands with *Juniperus osteosperma* are representative the Colorado Plateau and are not included in this system. In southern transitional areas between Madrean Pinyon-Juniper Woodland and Southern Rocky Mountain Pinyon-Juniper Woodland in central New Mexico, *Juniperus deppeana* becomes common. Understory layers are variable and may be dominated by shrubs, graminoids, or be absent. Associated species are more typical of southern Rocky Mountains than

the Colorado Plateau and include *Artemisia bigelovii, Cercocarpus montanus, Quercus gambelii, Achnatherum scribneri, Bouteloua gracilis, Festuca arizonica*, or *Pleuraphis jamesii* (NatureServe 2012).

E.1.12 Ponderosa Pine

Northern Rocky Mountain Foothill Conifer Wooded Steppe

This inland Pacific Northwest ecological system occurs in the foothills of the northern Rocky Mountains in the Columbia Plateau region and west along the foothills of the Modoc Plateau and eastern Cascades into southern interior British Columbia. It also occurs east across Idaho into the eastern foothills of the Montana Rockies. The system may also occur on the lower treeline slopes of the Wyoming Rockies. These wooded steppes occur at the lower treeline/ecotone between grasslands or shrublands and forests and woodlands, typically on warm, dry, exposed sites too droughty to support a closed tree canopy. This is not a fire-maintained system. The "savanna" character results from a climate-edaphic interaction that results in widely scattered trees over shrubs or grasses, and even in the absence of fire, a "woodland" or "forest" structure will not be obtained. Elevations range from less than 1,640 feet (500 meters) in British Columbia to 5,200 feet (1,600 meters) in the central Idaho Mountains. Occurrences are found on all slopes and aspects; however, moderately steep to very steep slopes or ridgetops are most common. This system can occur in association with cliff and canyon systems. It generally occurs on glacial till, glacio-fluvial sand and gravel, dune, basaltic rubble, colluvium, to deep loess or volcanic ash-derived soils, with characteristic features of good aeration and drainage, coarse textures, circumneutral to slightly acidic pH, an abundance of mineral material, rockiness, and periods of drought during the growing season. These can also occur on areas of sand dunes, scablands, and pumice where the edaphic conditions limit tree abundance. *Pinus ponderosa* (vars. *ponderosa* and *scopulorum*) and *Pseudotsuga menziesii* are the predominant conifers (not always together); *Pinus flexilis* may be present or common in the tree canopy. In interior British Columbia, *Pseudotsuga menziesii* is the characteristic canopy dominant. In transition areas with big sagebrush steppe systems, *Purshia tridentata, Artemisia tridentata* ssp. *wyomingensis, Artemisia tridentata* ssp. *tridentata*, and *Artemisia tripartita* may be common in fire-protected sites such as rocky areas. Deciduous shrubs, such as *Physocarpus malvaceus, Symphoricarpos albus*, or *Spiraea betulifolia*, can be abundant in more northerly sites or more moist climates. Important grass species include *Pseudoroegneria spicata, Poa secunda, Hesperostipa* spp., *Achnatherum* spp., and *Elymus elymoides* (NatureServe 2012).

Southern Rocky Mountain Ponderosa Pine Woodland

This very widespread ecological system is most common throughout the cordillera of the Rocky Mountains, from the Greater Yellowstone region south. It is also found in the Colorado Plateau region, west into scattered locations of the Great Basin. Its easternmost extent in Wyoming is in the Bighorn Mountains. These woodlands occur at the lower treeline/ecotone between grassland or shrubland and more mesic coniferous forests typically in warm, dry, exposed sites. Elevations range from less than 6,230 feet (1,900 meters) in northern Wyoming to 9,180 feet (2,800 meters) in the New Mexico Mountains. Occurrences are found on all slopes and aspects; however, moderately steep to very steep slopes or ridgetops are most common. This ecological system generally occurs on soils derived from igneous, metamorphic, and sedimentary material, with characteristic features of good aeration and drainage, coarse textures, circumneutral to slightly acidic pH, an abundance of mineral material, rockiness, and periods of drought during the growing season. Northern Rocky Mountain Ponderosa Pine Woodland and Savanna in the eastern Cascades, Okanogan, and northern Rockies regions receives winter and spring rains, and thus has a greater spring "green-up" than the drier woodlands in the central Rockies. *Pinus ponderosa* (primarily var. *scopulorum* and var. *ponderosa* (= var. *brachyptera*)) is the predominant conifer; *Pseudotsuga menziesii, Pinus edulis, Pinus contorta, Populus tremuloides*, and *Juniperus* spp. may be present in the tree canopy. The understory is usually shrubby, with *Artemisia nova, Artemisia*

tridentata, Arctostaphylos patula, Arctostaphylos uva-ursi, Cercocarpus montanus, Purshia stansburiana, Purshia tridentata, Quercus gambelii, Symphoricarpos spp., *Prunus virginiana, Amelanchier alnifolia* (less so in Montana), and *Rosa* spp. common species. *Pseudoroegneria spicata, Pascopyrum smithii*, and species of *Hesperostipa, Achnatherum, Festuca, Muhlenbergia*, and *Bouteloua* are some of the common grasses. Mixed fire regimes and ground fires of variable return intervals maintain these woodlands, depending on climate, degree of soil development, and understory density (NatureServe 2012).

E.1.13 Riparian

Great Basin Foothill and Lower Montane Riparian Woodland and Shrubland

This system occurs in mountain ranges of the Great Basin and along the eastern slope of the Sierra Nevada in a broad elevation range from about 4,000 feet (1,220 meters) to over 7,000 feet (2,135 meters). This system often occurs as a mosaic of multiple communities that are tree-dominated with a diverse shrub component. The variety of plant associations connected to this system reflects elevation, stream gradient, floodplain width, and flooding events. Dominant trees may include *Abies concolor, Alnus incana, Betula occidentalis, Populus angustifolia, Populus balsamifera* ssp. *trichocarpa, Populus fremontii, Salix laevigata, Salix gooddingii*, and *Pseudotsuga menziesii*. Dominant shrubs include *Artemisia cana, Cornus sericea, Salix exigua, Salix lasiolepis, Salix lemmonii*, or *Salix lutea*. Herbaceous layers are often dominated by species of *Carex* and *Juncus*, and perennial grasses and mesic forbs such *Deschampsia caespitosa, Elymus trachycaulus, Glyceria striata, Iris missouriensis, Maianthemum stellatum*, or *Thalictrum fendleri*. Introduced forage species such as *Agrostis stolonifera, Poa pratensis, Phleum pratense*, and the weedy annual *Bromus tectorum* are often present in disturbed stands. These are disturbance-driven systems that require flooding, scour and deposition for germination and maintenance. Livestock grazing is a major influence in altering structure, composition, and function of the community (NatureServe 2012).

Introduced Riparian and Wetland Vegetation

Vegetation dominated (typically greater than 60 percent canopy cover) by introduced species. These are spontaneous, self-perpetuating, and not (immediately) the result of planting, cultivation, or human maintenance. Land occupied by introduced vegetation is generally permanently altered (converted) unless restoration efforts are undertaken. Specifically, land cover is significantly altered/disturbed by introduced riparian and wetland vegetation (University of Idaho 2012).

Northwestern Great Plains Riparian

This system is found in the riparian areas of medium and small rivers and streams throughout the northwestern Great Plains. It is likely most common in the Northern Great Plains Steppe. This system occurs in the Upper Missouri and tributaries starting at the Niobrara, White, Cheyenne, Belle Fourche, Moreau, Grand, Heart, Little Missouri, Yellowstone, Powder, Tongue, Bighorn, Wind, Milk, Musselshell, Marias, and Teton rivers; and in Canada, the Southern Saskatchewan, Red Deer and Old Man rivers to where they extend into Rocky Mountain Lower Montane-Foothill Riparian Woodland and Shrubland or Northern Rocky Mountain Lower Montane Riparian Woodland and Shrubland. These are found on alluvial soils in highly variable landscape settings, from deep cut ravines to wide, braided streambeds. Hydrologically, these tend to be more flashy with less developed floodplain than on larger rivers, and typically dry down completely for some portion of the year. Dominant vegetation shares much with generally drier portions of larger floodplain systems downstream, but overall abundance of vegetation is generally lower. Communities in this system range from riparian forests and shrublands to gravel/sand flats. Dominant species include *Populus deltoides, Populus balsamifera* ssp. *trichocarpa, Salix* ssp., *Artemisia cana* ssp. *cana*, and *Pascopyrum smithii*. These areas are often subjected to heavy grazing

and/or agriculture and can be heavily degraded. Another factor is that groundwater depletion and lack of fire have created additional species changes (NatureServe 2012).

Rocky Mountain Bigtooth Maple Ravine Woodland

This ecological system occurs in cool ravines, on toeslopes and slump benches associated with riparian areas in the northern and central Wasatch Range and Tavaputs Plateau extending into southern Idaho, as well as in scattered localities in southwestern Utah, central Arizona and New Mexico and the Trans-Pecos of Texas. Substrates are typically rocky colluvial or alluvial soils with favorable soil moisture. These woodlands are dominated by *Acer grandidentatum* but may include mixed stands codominated by *Quercus gambelii* or with scattered conifers. Some stands may include *Acer negundo* or *Populus tremuloides* as minor components. It also occurs on steeper, north-facing slopes at higher elevations, often adjacent to Rocky Mountain Gambel Oak-Mixed Montane Shrubland or Rocky Mountain Aspen Forest and Woodland (NatureServe 2012).

Rocky Mountain Lower Montane Riparian Woodland and Shrubland

This ecological system of the northern Rocky Mountains and the east slopes of the Cascades consists of deciduous, coniferous, and mixed conifer-deciduous forests that occur on streambanks and river floodplains of the lower montane and foothill zones. Riparian forest stands are maintained by annual flooding and hydric soils throughout the growing season. Riparian forests are often accompanied by riparian shrublands or open areas dominated by wet meadows. *Populus balsamifera* is the key indicator species. Several other tree species can be mixed in the canopy, including *Populus tremuloides, Betula papyrifera, Betula occidentalis, Picea mariana*, and *Picea glauca*. *Abies grandis, Thuja plicata*, and *Tsuga heterophylla* are commonly dominant canopy species in western Montana and northern Idaho occurrences, in lower montane riparian zones. Shrub understory components include *Cornus sericea, Acer glabrum, Alnus incana, Betula papyrifera, Oplopanax horridus*, and *Symphoricarpos albus*. Ferns and forbs of mesic sites are commonly present in many occurrences, including such species as *Athyrium filix-femina, Gymnocarpium dryopteris*, and *Senecio triangularis* (NatureServe 2012).

Rocky Mountain Subalpine-Montane Riparian Shrubland

This system is found throughout the Rocky Mountain cordillera from New Mexico north into Montana and northwestern Alberta, and also occurs in mountainous areas of the Intermountain West region and Colorado Plateau. These are montane to subalpine riparian shrublands occurring as narrow bands of shrubs lining streambanks and alluvial terraces in narrow to wide, low-gradient valley bottoms and floodplains with sinuous stream channels. Generally, the system is found at higher elevations, but can be found anywhere from 4,920 to 11,400 feet (1,500 to 3,475 meters), and may occur at even lower elevations in the Canadian Rockies. Occurrences can also be found around seeps, fens, and isolated springs on hillslopes away from valley bottoms. Many of the plant associations found in this system are associated with beaver activity. This system often occurs as a mosaic of multiple communities that are shrub- and herb-dominated and includes above-treeline, willow-dominated, snowmelt-fed basins that feed into streams. The dominant shrubs reflect the large elevational gradient and include *Alnus incana, Betula glandulosa, Betula occidentalis, Cornus sericea, Salix bebbiana, Salix boothii, Salix brachycarpa, Salix drummondiana, Salix eriocephala, Salix geyeriana, Salix monticola, Salix planifolia*, and *Salix wolfii*. Generally the upland vegetation surrounding these riparian systems are of either conifer or aspen forests (NatureServe 2012).

Rocky Mountain Subalpine-Montane Riparian Woodland

This riparian woodland system is comprised of seasonally flooded forests and woodlands found at montane to subalpine elevations of the Rocky Mountain cordillera, from southern New Mexico north into

Montana, and west into the Intermountain region and the Colorado Plateau. It occurs throughout the interior of British Columbia and the eastern slopes of the Cascade Mountains. This system contains the conifer and aspen woodlands that line montane streams. These are communities tolerant of periodic flooding and high water tables. Snowmelt moisture in this system may create shallow water tables or seeps for a portion of the growing season. Stands typically occur at elevations between 4,920 and 10,830 feet (1,500 and 3,300 meters), farther north elevation ranges between 2,950 and 6,560 feet (900 and 2,000 meters). This is confined to specific riparian environments occurring on floodplains or terraces of rivers and streams, in V-shaped, narrow valleys and canyons (where there is cold-air drainage). Less frequently, occurrences are found in moderate-wide valley bottoms on large floodplains along broad, meandering rivers, and on pond or lake margins. Dominant tree species vary across the latitudinal range, although it usually includes *Abies lasiocarpa* and/or *Picea engelmannii*; other important species include *Pseudotsuga menziesii, Picea pungens, Picea engelmannii X glauca, Populus tremuloides*, and *Juniperus scopulorum*. Other trees possibly present but not usually dominant include *Alnus incana, Abies concolor, Abies grandis, Pinus contorta, Populus angustifolia, Populus balsamifera* ssp. *trichocarpa*, and *Juniperus osteosperma* (NatureServe 2012).

Western Great Plains Floodplain

This ecological system is found in the floodplains of medium and large rivers of the western Great Plains. It occurs on the lower reaches of the North and South Platte, Platte, Arkansas, and Canadian rivers. Alluvial soils and periodic, intermediate flooding (every 5 to 25 years) typify this system. These are the perennial big rivers of the region with hydrologic dynamics largely driven by snowmelt in the mountains, instead of local precipitation events. Dominant communities in this system range from floodplain forests to wet meadows to gravel/sand flats; however, they are linked by underlying soils and the flooding regime. Dominant species include *Populus deltoides* and *Salix* spp. Grass cover underneath the trees is an important part of this system and is a mix of tallgrass species, including *Panicum virgatum* and *Andropogon gerardii*. Sometimes, *Tamarix* spp. and less desirable or exotic grasses and forbs can invade degraded areas in the floodplains, especially in the western portion of the province. These areas are often subjected to heavy grazing and/or agriculture and can be heavily degraded. Groundwater depletion and lack of fire have created additional alterations in species composition. In most cases, the majority of the wet meadow and prairie communities may be extremely degraded or extirpated from examples of this system (NatureServe 2012).

Western Great Plains Riparian Woodland and Shrubland

These are the stream and creek-side woodlands and shrublands found in the western Great Plains. They usually occur in shortgrass prairie or other types of grasslands. They occur in draws and along small rivers in deep cut ravines to wider meandering streambeds. Flows in these streams can be flashy, and may dry down completely for some portion of the year. Dominant species vary with the size of the stream and valley type. Plains cottonwood, willows and silver sagebrush are the most common with an herbaceous understory composed of grasses including little bluestem, western wheatgrass, and sand dropseed. Heavy use such as frequent livestock grazing or heavy agricultural runoff can increase stream salinity resulting in non-native trees such as tamarisk and Russian olive replacing native species. See also a similar system that occurs along larger rivers, for example the South Platte, called the Western Great Plains Floodplain System (University of Idaho 2012).

E.1.14 Shrub/Shrub Steppe

Colorado Plateau Blackbrush-Mormon-tea Shrubland

This ecological system occurs in the Colorado Plateau on benchlands, colluvial slopes, pediments or bajadas. Elevation ranges from 1,835 to 5,410 feet (560 to 1,650 meters). Substrates are shallow, typically

calcareous, non-saline and gravelly or sandy soils over sandstone or limestone bedrock, caliche or limestone alluvium. It also occurs in deeper soils on sandy plains where it may have invaded desert grasslands. The vegetation is characterized by extensive open shrublands dominated by *Coleogyne ramosissima* often with *Ephedra viridis, Ephedra torreyana*, or *Grayia spinosa*. Sandy portions may include *Artemisia filifolia* as codominant. The herbaceous layer is sparse and composed of graminoids such as *Achnatherum hymenoides, Pleuraphis jamesii*, or *Sporobolus cryptandrus* (NatureServe 2012).

Colorado Plateau Mixed Low Sagebrush Shrubland

This ecological system occurs in the Colorado Plateau, Tavaputs Plateau and Uinta Basin in canyons, gravelly draws, hilltops, and dry flats at elevations generally below 5,900 feet (1,800 meters). Soils are often rocky, shallow, and alkaline. This type extends across northern New Mexico into the southern Great Plains on limestone hills. It includes open shrublands and steppe dominated by *Artemisia nova* or *Artemisia bigelovii* sometimes with *Artemisia tridentata* ssp. *wyomingensis* codominant. Semi-arid grasses such as *Achnatherum hymenoides, Aristida purpurea, Bouteloua gracilis, Hesperostipa comata, Pleuraphis jamesii*, or *Poa fendleriana* are often present and may form a graminoid layer with over 25 percent cover (NatureServe 2012).

Great Basin Xeric Mixed Sagebrush Shrubland

This ecological system occurs in the Great Basin on dry flats and plains, alluvial fans, rolling hills, rocky hillslopes, saddles and ridges at elevations between 3,280 and 8,525 feet (1,000 and 2,600 meters). Sites are dry, often exposed to desiccating winds, with typically shallow, rocky, non-saline soils. Shrublands are dominated by *Artemisia nova* (mid and low elevations), *Artemisia arbuscula* ssp. *longicaulis*, or *Artemisia arbuscula* ssp. *longiloba* (higher elevation) and may be codominated by *Artemisia tridentata* ssp. *wyomingensis* or *Chrysothamnus viscidiflorus*. Other shrubs that may be present include *Atriplex confertifolia, Ephedra* spp., *Ericameria* spp., *Grayia spinosa, Lycium shockleyi, Picrothamnus desertorum, Sarcobatus vermiculatus*, and *Tetradymia* spp. The herbaceous layer is likely sparse and composed of perennial bunch grasses, such as *Achnatherum hymenoides, Achnatherum speciosum, Achnatherum thurberianum, Elymus elymoides*, or *Poa secunda* (NatureServe 2012).

Inter-Mountain Basins Greasewood Flat

This ecological system occurs throughout much of the western United States in Intermountain basins and extends onto the western Great Plains and into central Montana. It typically occurs near drainages on stream terraces and flats or may form rings around more sparsely vegetated playas. Sites typically have saline soils, a shallow water table and flood intermittently, but remain dry for most growing seasons. The water table remains high enough to maintain vegetation, despite salt accumulations. This system usually occurs as a mosaic of multiple communities, with open to moderately dense shrublands dominated or codominated by *Sarcobatus vermiculatus*. Other shrubs that may be present to codominant in some occurrences include *Atriplex canescens, Atriplex confertifolia, Atriplex gardneri, Artemisia tridentata* ssp. *wyomingensis, Artemisia tridentata* ssp. *tridentata, Artemisia cana* ssp. *cana*, or *Krascheninnikovia lanata*. Occurrences are often surrounded by mixed salt desert scrub or big sagebrush shrublands. The herbaceous layer, if present, is usually dominated by graminoids. There may be inclusions of *Sporobolus airoides, Pascopyrum smithii, Distichlis spicata* (where water remains ponded the longest), *Calamovilfa longifolia, Poa pratensis, Puccinellia nuttalliana*, or *Eleocharis palustris* herbaceous types (NatureServe 2012).

Inter-Mountain Basins Mat Saltbush Shrubland

This ecological system occurs on gentle slopes and rolling plains in the northern Colorado Plateau and Uinta Basin on Mancos shale and arid, windswept basins and plains across parts of Wyoming. It is also

found in eastern Wyoming in Great Plains areas, and may extend north into Montana and Canada. Substrates are shallow, typically saline, alkaline, fine-textured soils developed from shale or alluvium and may be associated with shale badlands. Infiltration rate is typically low. These landscapes typically support dwarf-shrublands composed of relatively pure stands of *Atriplex* spp., such as *Atriplex corrugata* (in Colorado and Utah) or *Atriplex gardneri* (Wyoming and Montana into Canada). Other dominant or codominant dwarf-shrubs may include *Artemisia longifolia, Artemisia pedatifida* (very important in Wyoming, rare in Colorado stands), or *Picrothamnus desertorum*, sometimes with a mix of other low shrubs, such as *Krascheninnikovia lanata* or *Tetradymia spinosa*. *Atriplex confertifolia* or *Atriplex canescens* may be present but do not codominate. *Artemisia tridentata* ssp. *wyomingensis* can occur in patches in this system. The herbaceous layer is typically sparse. Scattered perennial forbs occur, such as *Xylorhiza glabriuscula* and *Sphaeralcea grossulariifolia*; perennial grasses *Achnatherum hymenoides, Bouteloua gracilis* (not in Wyoming), *Elymus elymoides, Elymus lanceolatus* ssp. *lanceolatus, Pascopyrum smithii, Poa secunda*, or *Sporobolus airoides* may dominate the herbaceous layer. In less saline areas, there may be inclusions of grasslands dominated by *Hesperostipa comata, Leymus salinus, Pascopyrum smithii*, or *Pseudoroegneria spicata*. In Wyoming and possibly elsewhere, inclusions of non-saline, gravelly barrens or rock outcrops dominated by cushion plants such as *Arenaria hookeri* and *Phlox hoodii* without dwarf-shrubs may be present (these are not restricted to this system). Annuals are seasonally present and may include *Eriogonum inflatum, Plantago tweedyi, Monolepis nuttalliana*, and the introduced annual grass *Bromus tectorum*. In Montana, *Atriplex gardneri* also occurs associated with badlands, and determining which system it falls into may be difficult (NatureServe 2012).

Inter-Mountain Basins Mixed Salt Desert Scrub

This extensive ecological system includes open-canopied shrublands of typically saline basins, alluvial slopes and plains across the Intermountain western United States This type also extends in limited distribution into the southern Great Plains. Substrates are often saline and calcareous, medium- to fine-textured, alkaline soils, but include some coarser-textured soils. The vegetation is characterized by a typically open to moderately dense shrubland composed of one or more *Atriplex* species, such as *Atriplex confertifolia, Atriplex canescens, Atriplex polycarpa*, or *Atriplex spinifera*. *Grayia spinosa* tends to occur on coppice dunes that may have a silty component to them. Northern occurrences lack *Atriplex* species and are typically dominated by *Grayia spinosa, Krascheninnikovia lanata*, and/or *Artemisia tridentata*. Other shrubs present to codominant may include *Artemisia tridentata* ssp. *wyomingensis, Chrysothamnus viscidiflorus, Ericameria nauseosa, Ephedra nevadensis, Grayia spinosa, Krascheninnikovia lanata, Lycium* spp., *Picrothamnus desertorum*, or *Tetradymia* spp. In Wyoming, occurrences are typically a mix of *Atriplex confertifolia, Grayia spinosa, Artemisia tridentata* ssp. *wyomingensis, Sarcobatus vermiculatus, Krascheninnikovia lanata*, and various *Ericameria* or *Chrysothamnus* species. Some places are a mix of *Atriplex confertifolia* and *Artemisia tridentata* ssp. *wyomingensis*. In the Great Basin, *Sarcobatus vermiculatus* is generally absent but, if present, does not codominate. The herbaceous layer varies from sparse to moderately dense and is dominated by perennial graminoids such as *Achnatherum hymenoides, Bouteloua gracilis, Elymus lanceolatus* ssp. *lanceolatus, Pascopyrum smithii, Pleuraphis jamesii, Pleuraphis rigida, Poa secunda*, or *Sporobolus airoides*. Various forbs are also present (NatureServe 2012).

Inter-Mountain Basins Semi-Desert Shrub-Steppe

This ecological system occurs throughout the Intermountain western United States, typically at lower elevations on alluvial fans and flats with moderate to deep soils, and extends into south-central Montana between the Pryor and Beartooth ranges where a distinct rainshadow effect occurs. This semi-arid shrub-steppe is typically dominated by graminoids (greater than 25 percent cover) with an open shrub to moderately dense woody layer with a typically strong graminoid layer. The most widespread (but not dominant) species is *Pseudoroegneria spicata*, which occurs from the Columbia Basin to the northern

Rockies. Characteristic grasses include *Achnatherum hymenoides, Bouteloua gracilis, Distichlis spicata, Poa secunda, Poa fendleriana, Sporobolus airoides, Hesperostipa comata, Pleuraphis jamesii*, and *Leymus salinus*. The woody layer is often a mixture of shrubs and dwarf-shrubs, although it may be dominated by a single species. Characteristic species include *Atriplex canescens, Artemisia tridentata, Chrysothamnus greenei, Chrysothamnus viscidiflorus, Ephedra* spp., *Ericameria nauseosa, Gutierrezia sarothrae*, and *Krascheninnikovia lanata*. *Artemisia tridentata* or *Atriplex canescens* may be present but does not dominate. Annual grasses, especially the exotics *Bromus japonicus* and *Bromus tectorum*, may be present to abundant. Forbs are generally of low importance and are highly variable across the range but may be diverse in some occurrences. The general aspect of occurrences may be either open shrubland with patchy grasses or patchy open herbaceous layers. Disturbance may be important in maintaining the woody component. Microphytic crust is very important in some stands (NatureServe 2012).

Southern Colorado Plateau Sand Shrubland

This large-patch ecological system is found on the south-central Colorado Plateau in northeastern Arizona extending into southern and central Utah. It occurs on windswept mesas, broad basins and plains at low to moderate elevations (4,260 to 5,900 feet [1,300 to 1,800 meters]). Substrates are stabilized sandsheets or shallow to moderately deep sandy soils that may form small hummocks or small coppice dunes. This semi-arid, open shrubland is typically dominated by short shrubs (10 to 30 percent cover) with a sparse graminoid layer. The woody layer is often a mixture of shrubs and dwarf-shrubs. Characteristic species include *Ephedra cutleri, Ephedra torreyana, Ephedra viridis*, and *Artemisia filifolia*. *Coleogyne ramosissima* is typically not present. *Poliomintha incana, Parryella filifolia, Quercus havardii* var. *tuckeri*, or *Ericameria nauseosa* may be present to dominant locally. *Ephedra cutleri* and *Ephedra viridis* often assume a distinctive matty growth form. Characteristic grasses include *Achnatherum hymenoides, Bouteloua gracilis, Hesperostipa comata*, and *Pleuraphis jamesii*. The general aspect of occurrences is an open low shrubland but may include small blowouts and dunes. Occasionally grasses may be moderately abundant locally and form a distinct layer. Disturbance may be important in maintaining the woody component. Eolian processes are evident, such as pediceled plants, occasional blowouts or small dunes, but the generally higher vegetative cover and less prominent geomorphic features distinguish this system from Inter-Mountain Basins Active and Stabilized Dune (NatureServe 2012).

Wyoming Basins Dwarf Sagebrush Shrubland and Steppe

This windswept ecological system is composed of dwarf sagebrush shrubland and shrub-steppe that forms matrix vegetation and large patches on the margins of high-elevation basins in central and southern Wyoming. Typical sites are gently rolling hills and long, gently sloping pediments and fans. These sites are very windy and have shallow, often rocky soils. The distinguishing feature of this system is a short-shrub stratum in which dwarf-shrubs (less than 12 inches [30 centimeters] tall) contribute at least two-thirds of the woody canopy. Four sagebrush taxa may dominate the shrub stratum: *Artemisia tripartita* ssp. *rupicola, Artemisia nova, Artemisia arbuscula* ssp. *longiloba*, and wind-dwarfed *Artemisia tridentata* ssp. *wyomingensis*. Two or more of these sagebrushes often codominate, but any of them may occur alone. Where graminoids are common and tall, the vegetation often has the appearance of grassland without shrubs; the shrubs are obvious only when the vegetation is viewed from up close. Where graminoids contribute less cover, the vegetation is a compact shrubland. The herbaceous component of the vegetation includes both rhizomatous and bunch-form graminoids, cushion plants, and other low-growing forbs. *Bouteloua gracilis*, a common species of Inter-Mountain Basins Big Sagebrush Steppe in Wyoming, is absent (NatureServe 2012).

E.1.15 Water

Open Water (Fresh)

All areas of open water, generally less than 25 percent cover of vegetation or soil. Specifically, inland waters of streams, rivers, ponds and lakes (University of Idaho 2012).

E.1.16 Wetlands

Great Plains Prairie Pothole

The prairie pothole system is found primarily in the glaciated northern Great Plains of the United States and Canada, and is dominated by depressional wetlands formed by glaciers scraping the landscape during the Pleistocene era. This system is typified by several classes of wetlands distinguished by changes in topography, soils and hydrology. Many of the basins in this system are closed basins and receive irregular inputs of water from their surroundings (groundwater and precipitation), and export water as groundwater. Hydrology of the potholes is complex. Precipitation and runoff from snowmelt are often the principal water sources, with groundwater inflow secondary. Evapotranspiration is the major water loss, with seepage loss secondary. Most of the wetlands and lakes contain water that is alkaline (pH greater than 7.4). The concentration of dissolved solids results in water that ranges from fresh to extremely saline. The flora and vegetation of this system are a function of the topography, water regime, and salinity. In addition, because of periodic droughts and wet periods, many wetlands in this system may undergo vegetation cycles. This system includes elements of emergent marshes and wet, sedge meadows that develop into a pattern of concentric rings. This system is responsible for a significant percentage of the annual production of many economically important waterfowl in North America and houses more than 50 percent of North American's migratory waterfowl, with several species reliant on this system for breeding and feeding. Much of the original extent of this system has been converted to agriculture, and only approximately 40 to 50 percent of the system remains undrained (NatureServe 2012).

Inter-Mountain Basins Interdunal Swale Wetland

This ecological system occurs in dune fields in the Intermountain western United States as small (usually less than 0.1 hectare) interdunal wetlands that occur in wind deflation areas, where sands are scoured down to the water table. Small ponds may be associated. The water table may be perched over an impermeable layer of caliche or clay or, in the case of the Great Sand Dunes of Colorado, a geologic dike that creates a closed basin that traps water. These wetland areas are typically dominated by common emergent herbaceous vegetation such as species of *Eleocharis, Juncus*, and *Schoenoplectus*. Dune field ecological processes distinguish these emergent wetlands from similar non-dune wetlands (NatureServe 2012).

North American Arid West Emergent Marsh

This widespread ecological system occurs throughout much of the arid and semi-arid regions of western North America, typically surrounded by savanna, shrub-steppe, steppe, or desert vegetation. Natural marshes may occur in depressions in the landscape (ponds, kettle ponds), as fringes around lakes, and along slow-flowing streams and rivers (such riparian marshes are also referred to as sloughs). Marshes are frequently or continually inundated, with water depths up to 6.5 feet (2 meters). Water levels may be stable, or may fluctuate 3.3 feet (1 meter) or more over the course of the growing season. Water chemistry may include some alkaline or semi-alkaline situations, but the alkalinity is highly variable even in the same complex of wetlands. Marshes have distinctive soils that are typically mineral, but can also accumulate organic material. Soils have characteristics that result from long periods of anaerobic conditions in the soils (e.g., gleyed soils, high organic content, redoximorphic features). The vegetation is

characterized by herbaceous plants that are adapted to saturated soil conditions. Common emergent and floating vegetation includes species of *Scirpus* and/or *Schoenoplectus, Typha, Juncus, Potamogeton, Polygonum, Nuphar*, and *Phalaris*. This system may also include areas of relatively deep water with floating-leaved plants (*Lemna, Potamogeton*, and *Brasenia*) and submerged and floating plants (*Myriophyllum, Ceratophyllum*, and *Elodea*) (NatureServe 2012).

Rocky Mountain Subalpine-Montane Fen

This system occurs infrequently throughout the Rocky Mountains from Colorado north into Canada. It is confined to specific environments defined by groundwater discharge, soil chemistry, and peat accumulation of at least 15.75 inches (40 centimeters). This system includes extreme rich fens and iron fens, both being quite rare. Fens form at low points in the landscape or near slopes where groundwater intercepts the soil surface. Groundwater inflows maintain a fairly constant water level year-round, with water at or near the surface most of the time. Constant high water levels lead to accumulation of organic material. In addition to peat accumulation and perennially saturated soils, the extreme rich and iron fens have distinct soil and water chemistry, with high levels of one or more minerals such as calcium, magnesium, or iron. These fens usually occur as a mosaic of several plant associations dominated by *Carex aquatilis, Carex limosa, Carex lasiocarpa, Betula glandulosa, Kobresia myosuroides, Kobresia simpliciuscula*, and *Trichophorum pumilum (= Scirpus pumilus)*. *Sphagnum* spp. (peatmoss) is indicative of iron fens. The surrounding landscape may be ringed with other wetland systems, e.g., riparian shrublands, or a variety of upland systems from grasslands to forests (NatureServe 2012).

Western Great Plains Closed Depression Wetland

Communities associated with the playa lakes in the southern areas of this province and the rainwater basins in Nebraska characterize this system. They are primarily upland depressional basins. This hydric system is typified by the presence of an impermeable layer such as a dense clay, hydric soil and is usually recharged by rainwater and nearby runoff. They are rarely linked to outside groundwater sources and do not have an extensive watershed. Ponds and lakes associated with this system can experience periodic drawdowns during drier seasons and years, and are often replenished by spring rains. *Eleocharis* spp., *Hordeum jubatum*, along with common forbs such as *Coreopsis tinctoria, Symphyotrichum subulatum (= Aster subulatus)*, and *Polygonum pensylvanicum (= Polygonum bicorne)* are common vegetation in the wetter and deeper depression, while *Pascopyrum smithii* and *Buchloe dactyloides* are more common in shallow depressions in rangeland. Species richness can vary considerably among individual examples of this system and is especially influenced by adjacent land use, which is often agriculture, and may provide nutrient and herbicide runoff. Dynamic processes that affect these depressions are hydrological changes, grazing, and conversion to agricultural use (NatureServe 2012).

Western Great Plains Open Freshwater Depression Wetland

This Great Plains emergent marsh ecological system is composed of lowland depressions; it also occurs along lake borders that have more open basins and a permanent water source through most of the year, except during exceptional drought years. These areas are distinct from Western Great Plains Closed Depression Wetland by having a large watershed and/or significant connection to the groundwater table. A variety of species are part of this system, including emergent species of *Typha, Carex, Eleocharis, Juncus, Spartina*, and *Schoenoplectus*, as well as floating genera such as *Potamogeton, Sagittaria, Stuckenia*, or *Ceratophyllum*. The system includes submergent and emergent marshes and associated wet meadows and wet prairies. These types can also drift into stream margins that are more permanently wet and linked directly to the basin via groundwater flow from/into the pond or lake. Some of the specific communities will also be found in the floodplain system and should not be considered a separate system

in that case. These types should also not be considered a separate system if they are occurring in lowland areas of the prairie matrix only because of an exceptional wet year (NatureServe 2012).

Western Great Plains Saline Depression Wetland

This ecological system is very similar to Western Great Plains Open Freshwater Depression Wetland and Western Great Plains Closed Depression Wetland. However, strongly saline soils cause both the shallow lakes and depressions and the surrounding areas to be more brackish. Salt encrustations can occur on the surface in some examples of this system, and the soils are severely affected and have poor structure. Species that typify this system are salt-tolerant and halophytic species such as *Distichlis spicata, Sporobolus airoides*, and *Hordeum jubatum*. Other commonly occurring taxa include *Puccinellia nuttalliana, Salicornia rubra, Schoenoplectus maritimus, Schoenoplectus americanus, Suaeda calceoliformis, Spartina* spp., *Triglochin maritima*, and shrubs such as *Sarcobatus vermiculatus* and *Krascheninnikovia lanata*. During exceptionally wet years, an increase in precipitation can dilute the salt concentration in the soils of some examples of this system that may allow for less salt-tolerant species to occur. Communities found in this system may also occur in floodplains (i.e., more open depressions) but probably should not be considered a separate system unless they transition to areas outside the immediate floodplain (NatureServe 2012).

National Wetlands Inventory

The NWI data for Wyoming, Colorado, and Utah were downloaded from the FWS in January 2012. These data were incorporated into the dataset downloaded from the GAP to provide a more comprehensive inventory of wetland and riparian habitats in the Project area. NWI data coincided with GAP data when the data sets were merged. NWI data are reported in areas where GAP data reported upland land cover categories and NWI reported wetland or riparian cover types. GAP data are reported in areas where both NWI and GAP reported wetland or riparian land cover types, or where GAP reported wetland or riparian cover types and NWI reported upland vegetation.

E.2 Noxious Weeds in the Project Area

Tables E-2 through E-4 present lists of designated noxious weeds in the three states crossed by the Project. Tables E-2, E-4, and E-5 also contain information on noxious weed occurrences in BLM Field Offices and National Forests crossed by the Project, where available.

TABLE E-2
STATE- AND COUNTY-LISTED NOXIOUS WEEDS IN WYOMING FOR LANDS IN THE PROJECT AREA

Common Name[1]	Scientific Name	State-listed	Rawlins Field Office Occurrence[2]
Canada thistle	*Cirsium arvense*	✓	✓
Common burdock	*Arctium minus*	✓	✓
Common St. Johnswort	*Hypericum perforatum*	✓	UK
Common tansy	*Tanacetum vulgare*	✓	–
Dalmatian toadflax	*Linaria dalmatica*	✓	✓
Diffuse knapweed	*Centaurea diffusa*	✓	✓
Dyer's woad	*Isatis tinctoria*	✓	✓
Field bindweed	*Convolvulus arvensis*	✓	✓
Hoary cress	*Cardaria draba*	✓	✓
Houndstongue	*Cynoglossum officinale*	✓	✓

TABLE E-2
STATE- AND COUNTY-LISTED NOXIOUS WEEDS IN WYOMING FOR LANDS IN THE PROJECT AREA

Common Name[1]	Scientific Name	State-listed	Rawlins Field Office Occurrence[2]
Leafy spurge	*Euphorbia esula*	✓	✓
Musk thistle	*Carduus nutans*	✓	✓
Oxeye daisy	*Chrysanthemum leucanthemum*	✓	✓
Perennial pepperweed	*Lepidium latifolium*	✓	✓
Perennial sowthistle	*Sonchus arvensis*	✓	–
Plumeless thistle	*Carduus acanthoides*	✓	✓
Purple loosestrife	*Lythrum salicaria*	✓	UK
Quackgrass	*Elytrigia repens*	✓	–
Russian knapweed	*Acroptilon repens*	✓	✓
Russian olive	*Elaeagnus angustifolia*	✓	–
Salt cedar	*Tamarix chinensis, T. parviflora, and T. ramosissima*	✓	✓
Scotch thistle	*Onopordum acanthium*	✓	✓
Skeletonleaf bursage	*Ambrosia tomentosa*	✓	UK
Spotted knapweed	*Centaurea maculosa*	✓	✓
Yellow toadflax	*Linaria vulgaris*	✓	✓

SOURCES:
[1]Nomenclature follows Wyoming Weed and Pest Council 2012
[2]Bureau of Land Management 2008a
[3]Bureau of Land Management 2009a
NOTES:
✓ = Indicates status as a state-listed noxious weed species or the presence of a state-listed species in a field office
UK = No populations of the species currently known in a field office
– = Field office has not surveyed for the species or the species was not mentioned in the corresponding management document

TABLE E-3
DESIGNATED NOXIOUS WEEDS IN THE STATE OF COLORADO

Common Name	Scientific Name	Common Name	Scientific Name
Absinth wormwood	*Artemisia absinthium*	Jointed goatgrass[1]	*Aegilops cylindrica*
African rue	*Peganum harmala*	Leafy spurge[1]	*Euphorbia esula*
Black henbane[1]	*Hyoscyamus niger*	Mayweed chamomile	*Anthemis cotula*
Bohemian knotweed	*Polygonum x bohemicum*	Meadow knapweed	*Centaurea pratensis*
Bouncingbet	*Saponaria officinalis*	Mediterranean sage	*Salvia aethiopis*
Bulbous bluegrass	*Poa bulbosa*	Medusahead	*Taeniatherum caput-medusae*
Bull thistle[1]	*Cirsium vulgare*	Moth mullein	*Verbascum blattaria*
Camelthorn	*Alhagi pseudalhagi*	Musk thistle[1]	*Carduus nutans*
Canada thistle[1]	*Cirsium arvense*	Myrtle spurge	*Euphorbia myrsinites*
Cheatgrass/Downy brome	*Bromus tectorum*	Orange hawkweed	*Hieracium aurantiacum*
Chicory[1]	*Cichorium intybus*	Oxeye daisy[1]	*Chrysanthemum leucanthemum*
Chinese clematis	*Clematis orientalis*	Perennial pepperweed[1]	*Lepidium latifolium*
Common burdock[1]	*Arctium minus*	Perennial sowthistle	*Sonchus arvensis*
Common crupina	*Crupina vulgaris*	Plumeless thistle	*Carduus acanthoides*
Common mullein	*Verbascum thapsus*	Poison hemlock	*Conium maculatum*
Common St. Johnswort	*Hypericum perforatum*	Puncturevine	*Tribulus terrestris*
Common tansy	*Tanacetum vulgare*	Purple loosestrife[1]	*Lythrum salicaria*
Common teasel	*Dipsacus fullonum*	Quackgrass	*Elytrigia repens*

TABLE E-3 DESIGNATED NOXIOUS WEEDS IN THE STATE OF COLORADO			
Common Name	**Scientific Name**	**Common Name**	**Scientific Name**
Corn chamomile	*Anthemis arvensis*	Redstem filaree	*Erodium cicutarium*
Cutleaf teasel	*Dipsacus laciniatus*	Rush skeletonweed	*Chondrilla juncea*
Cypress spurge	*Euphorbia cyparissias*	Russian knapweed[1]	*Acroptilon repens*
Dalmatian toadflax- broad leaved[1]	*Linaria dalmatica*	Russian-olive	*Elaeagnus angustifolia*
Dalmatian toadflax- narrow leaved	*Linaria genistifolia*	Salt cedar[1]	*Tamarix chinensis, T. parviflora, and T. ramosissima*
Dame's rocket	*Hesperis matronalis*	Scentless chamomile	*Matricaria perforata*
Diffuse knapweed[1]	*Centaurea diffusa*	Scotch thistle[1]	*Onopordum acanthium*
Dyer's woad	*Isatis tinctoria*	Spotted knapweed[1]	*Centaurea maculosa*
Elongated mustard	*Brassica elongata*	Spurred anoda	*Anoda cristata*
Eurasian watermilfoil	*Myriophyllum spicatum*	Squarrose knapweed	*Centaurea virgata*
Field bindweed	*Convolvulus arvensis*	Sulfur cinquefoil	*Potentilla recta*
Giant knotweed	*Polygonum sachalinense*	Tansy ragwort	*Senecio jacobaea*
Giant reed	*Arundo donax*	Velvetleaf	*Abutilon theophrasti*
Giant salvinia	*Salvinia molesta*	Venice mallow	*Hibiscus trionum*
Halogeton	*Halogeton glomeratus*	Wild caraway	*Carum carvi*
Hoary cress[1]	*Cardaria draba*	Wild proso millet	*Panicum miliaceum*
Houndstongue[1]	*Cynoglossum officinale*	Yellow nutsedge	*Cyperus esculentus*
Hydrilla	*Hydrilla verticillata*	Yellow starthistle[1]	*Centaurea solstitialis*
Japanese knotweed	*Polygonum cuspidatum*	Yellow toadflax	*Linaria vulgaris*
Johnsongrass	*Sorghum halepense*		
SOURCE: Nomenclature follows Colorado Department of Agriculture 2012 NOTE:[1] Indicates a species known to occur in the BLM Grand Junction Field Office Bureau of Land Management 2012a			

TABLE E-4
STATE- AND COUNTY-LISTED NOXIOUS WEEDS IN UTAH FOR BUREAU OF LAND MANAGEMENT LANDS IN THE PROJECT AREA

Common Name[1]	Scientific Name	Vernal Field Office Occurrence[2]	Moab Field Office Occurrence[3]	Price Field Office Occurrence[4]	Richfield Field Office Occurrence[5]	Fillmore Field Office Occurrence[6]	Salt Lake Field Office Occurrence
Utah State-Listed Class A Weeds (Early Detection Rapid response)							
Black henbane	*Hyoscyamus niger*	✓	✓	✓	UK	–	–
Diffuse knapweed	*Centaurea diffusa*	✓	✓	–	✓	✓	✓
Johnsongrass	*Sorghum halepense*	UK	✓	–	✓	–	✓
Leafy spurge	*Euphorbia esula*	✓	–	–	UK	–	✓
Medusahead	*Taeniatherum caput-medusae*	UK	–	–	UK	–	–
Oxeye daisy	*Chrysanthemum leucanthemum*	–	–	–	–	–	–
Purple loosestrife	*Lythrum salicaria*	✓	✓	✓	UK	✓	✓
Spotted knapweed	*Centaurea maculosa*	✓	✓	✓	UK	✓	✓
Squarrose knapweed	*Centaurea virgata*	UK	✓	–	X	✓	✓
St. Johnswort	*Hypericum perforatum*	–	–	–	UK	–	–
Sulfur cinquefoil	*Potentilla recta*	–	–	–	–	–	–
Yellow starthistle	*Centaurea solstitialis*	UK	–	–	UK	–	✓
Yellow toadflax	*Linaria vulgaris*	✓	✓	–	UK	–	–
Utah State-Listed Class B Weeds (Control)							
Bermudagrass	*Cynodon dactylon*	UK	✓	–	UK	–	✓
Dalmatian toadflax	*Linaria dalmatica*	UK	✓	-	UK	–	–
Dyer's woad	*Isatis tinctoria*	✓	✓	–	UK	✓	✓
Hoary cress	*Cardaria draba*	✓	✓	✓	✓	✓	✓
Musk thistle	*Carduus nutans*	✓	✓	✓	✓	✓	✓
Poison hemlock	*Conium maculatum*	UK	✓	–	–	–	–
Perennial pepperweed	*Lepidium latifolium*	✓	✓	✓	✓	–	✓
Russian knapweed	*Acroptilon repens*	✓	✓	✓	✓	–	✓
Scotch thistle	*Onopordum acanthium*	✓	✓	✓	✓	–	✓
Utah State-Listed Class C Weeds (Containment)							
Canada thistle	*Cirsium arvense*	✓	✓	✓	✓	✓	✓
Field bindweed	*Convolvulus arvensis*	✓	✓	✓	✓	✓	✓
Houndstongue	*Cynoglossum officinale*	✓	✓	✓	–	–	–

TABLE E-4
STATE- AND COUNTY-LISTED NOXIOUS WEEDS IN UTAH FOR BUREAU OF LAND MANAGEMENT LANDS IN THE PROJECT AREA

Common Name[1]	Scientific Name	Vernal Field Office Occurrence[2]	Moab Field Office Occurrence[3]	Price Field Office Occurrence[4]	Richfield Field Office Occurrence[5]	Fillmore Field Office Occurrence[6]	Salt Lake Field Office Occurrence
Salt cedar	*Tamarix chinensis, T. parviflora, and T. ramosissima*	✓	✓	✓	✓	–	–
Quackgrass	*Elytrigia repens*	✓	✓	–	✓	✓	✓
County-listed Weeds							
Blue flowering lettuce (Juab County)	*Lactuca tatarica*	–	–	–	–	✓	–
Common teasel (Uintah County)	*Dipsacus fullonum*						
Common reed (Washington County)	*Phragmites australis*	–	✓	–	–	–	–
Puncturevine (Uintah County)	*Tribulus terrestris*						
Russian-olive (Carbon, Duchesne, Grand, and Uintah counties)	*Elaeagnus angustifolia*	✓	✓	✓	UK	–	–
Water hemlock (Duchesne County)	*Cicuta maculata*	–	–	–	–	–	–

SOURCES:
[1]Nomenclature follows Utah Department of Agriculture and Food 2009, 2010.
[2]Bureau of Land Management (BLM) 2008b
[3]BLM 2008c
[4]BLM 2008d
[5]BLM 2008e
[6]No inventories of noxious weeds have occurred in the particular BLM lands that would be crossed by the Project in this field office. Information for the BLM Fillmore Field Office was acquired from the U.S. Department of Agriculture (USDA) PLANTS database using a query of Utah state-listed noxious weeds that occur in Juab County, Utah (Natural Resource Conservation Service [NRCS] 2013a) For Juab County-listed noxious weeds, the presence of blue flowering lettuce was confirmed by the BLM Fillmore Field Office (Probert 2013).
[7]No inventories of noxious weeds have occurred in the particular BLM lands that would be crossed by the Project in this field office. Information for the BLM Salt Lake Field Office was acquired from the USDA PLANTS database using a query of Utah state-listed noxious weeds that occur in Utah County, Utah (NRCS 2013b) as the only BLM-administered public lands potentially crossed by Project alternatives in the Salt Lake Field Office occur in this county (Watson 2013).
NOTES:
✓ = Indicates status as a state-listed noxious weed species or the presence of a state- or county-listed species in a field office.
UK = No populations of the species are currently known within the field office.
– = Field office has not surveyed for the species or the species was not mentioned in the corresponding management document

TABLE E-5
STATE- AND COUNTY-LISTED NOXIOUS WEEDS IN UTAH FOR U.S. FOREST SERVICE LANDS IN THE PROJECT AREA

Common Name[1]	Scientific Name	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest
Utah State-Listed Class A Weeds (Early Detection Rapid response)				
Black henbane	*Hyoscyamus niger*	✓		
Diffuse knapweed	*Centaurea diffusa*		✓	✓
Johnsongrass	*Sorghum halepense*			✓
Leafy spurge	*Euphorbia esula*	✓		✓
Medusahead	*Taeniatherum caput-medusae*			
Oxeye daisy	*Chrysanthemum leucanthemum*	✓		✓
Purple loosestrife	*Lythrum salicaria*			
Spotted knapweed	*Centaurea maculosa*	✓		✓
Squarrose knapweed	*Centaurea virgata*		✓	✓
St. Johnswort	*Hypericum perforatum*	✓		
Sulfur cinquefoil	*Potentilla recta*			✓
Yellow starthistle	*Centaurea solstitialis*			✓
Yellow toadflax	*Linaria vulgaris*	✓	✓	
Utah State-listed Class B Weeds (Control)				
Bermudagrass	*Cynodon dactylon*			
Dalmatian toadflax	*Linaria dalmatica*	✓	✓	✓
Dyer's woad	*Isatis tinctoria*	✓	✓	✓
Hoary cress	*Cardaria draba*	✓	✓	✓
Musk thistle	*Carduus nutans*	✓	✓	✓
Poison hemlock	*Conium maculatum*		✓	
Perennial pepperweed	*Lepidium latifolium*	✓		✓
Russian knapweed	*Acroptilon repens*	✓	✓	✓
Scotch thistle	*Onopordum acanthium*	✓	✓	✓
Utah State-listed Class C Weeds (Containment)				
Canada thistle	*Cirsium arvense*	✓	✓	✓
Field bindweed	*Convolvulus arvensis*			✓
Houndstongue	*Cynoglossum officinale*	✓	✓	✓
Salt cedar	*Tamarix chinensis, T. parviflora,* and *T. ramosissima*		✓	✓
Quackgrass	*Elytrigia repens*			✓
County-listed Weeds				
Blue flowering lettuce (Juab County)	*Lactuca tatarica*			
Common teasel (Uintah County)	*Dipsacus fullonum*			✓
Puncturevine (Uintah County)	*Tribulus terrestris*			✓
Russian-olive (Carbon, Duchesne, Grand, and Uintah counties)	*Elaeagnus angustifolia*	✓		✓
Water hemlock (Duchesne County)	*Cicuta maculata*			

SOURCE: U.S. Forest Service 2013a
NOTES:
[1]Nomenclature follows Utah Department of Agriculture and Food 2009, 2010.
✓ = Indicates status as a state-listed noxious weed species or the presence of a state- or county-listed species in a National Forest.

E.3 Migratory Birds

A variety of migratory bird species use habitats in the Project area for breeding, nesting, foraging, and migration. Migratory birds are protected under several statutes described in the Regulatory Framework for Wildlife Resources (Section 3.2.7.1).

BLM direction for the management and conservation of migratory birds is provided by Instruction Memorandum (IM) WY-2013-005 in Wyoming and IM CO-2011-007 in Colorado. In Utah, migratory bird conservation direction is provided by a Memorandum of Understanding WO-230-2010-04 between the BLM and FWS. At the Project level, the Memorandum of Understanding between BLM and the FWS requires BLM to identify birds that may occur in the Project area for consideration in analysis and development of potential conservation measures.

A list migratory birds that may occur in the Project area was developed from the FWS Birds of Conservation Concern for Bird Conservation Regions crossed by the Project. Additionally, Wyoming, Colorado and Utah Partners in Flight Physiographic Areas and Priority Species Lists were used to identify priority species and their potential breeding habitats in the Project area. Table E-6 lists the Partners in Flight Priority Species and the Birds of Conservation Concern species and their associated breeding habitats that could occur in the Project area.

E.4 Special Status Species Lists

Special status species include species listed as threatened, endangered, or candidates for listing under the Endangered Species Act (ESA), species listed as sensitive by the USFS, BLM, and species assigned a special status by the State of Wyoming, Colorado, or Utah. The species analyzed were compiled from lists of threatened, endangered, and candidate species from the FWS (county level), BLM sensitive species (state level), USFS sensitive species (forest level), or species protected by the States of Wyoming, Colorado, and/or Utah.

E.4.1 Federal Threatened, Endangered, and Candidate Species

- Wyoming – Carbon (FWS 2011a) and Sweetwater (FWS 2011b) counties
- Colorado – Garfield, Mesa, Moffat, and Rio Blanco counties (FWS 2011c)
- Utah – Carbon, Duchesne, Emery, Grand, Juab, Sanpete, Uintah, Utah, and Wasatch counties (FWS 2011d)

TABLE E-6
U.S. FISH AND WILDLIFE SERVICE BIRDS OF CONSERVATION CONCERN AND PARTNERS-IN-FLIGHT PRIORITY SPECIES IN THE PROJECT AREA

Priority Species	Birds of Conservation Concern Species[1]	Partners in Flight Species	Partners in Flight North American Landbird Conservation Plan	Wyoming Partners in Flight (Physiographic Areas 62, 69, 86)	Colorado Partners in Flight (Physiographic Areas 62, 87)	Utah Partners in Flight (Physiographic Areas 69, 80, 86, 87)		
				Breeding Habitat	Breeding Habitat	Breeding Habitat I	Breeding Habitat II	Wintering Habitat
American avocet		✓	–	–	–	Wetland	Playa	Migrant
American bittern	✓		–	–	–	Wetland	Wetland	Migrant
American dipper		✓	–	–	High elevation riparian	Mountain riparian	Lowland riparian	Mountain riparian
American pipit		✓	–	–	Alpine tundra	Alpine	Wet meadow	Agriculture
American white pelican		✓	–	Wetlands	–	Water	Wetland	Migrant
Bald eagle	✓		Wetland	–	–	Lowland riparian	Agriculture	Lowland riparian
Band-tailed pigeon		✓	Mixed forest	Ponderosa pine	Ponderosa pine	Ponderosa pine	Mixed conifer	Migrant
Bendire's thrasher	✓		Western shrublands	–	–	Low desert scrub	Low desert scrub	Migrant
Black rosey-finch	✓	✓	–	–	–	Alpine	Alpine	Grassland
Black swift	✓	✓	Various	–	Cliff/Rock	Lowland riparian	Cliff	Migrant
Black-chinned hummingbird		✓	–	Pinyon-juniper	–	Pinyon-juniper	Mountain shrub	Migrant
Black-chinned sparrow	✓		Western shrublands	–	–	Low desert scrub	High desert scrub	Migrant
Black-necked stilt		✓		–	–	Wetland	Playa	Migrant
Black-throated gray warbler		✓	Mixed forest	Pinyon-juniper	–	Pinyon-juniper	Mountain shrub	Migrant
Blue grouse		✓	Coniferous forest	–	Mixed conifer	Sub-alpine conifer	Mountain shrub	Mixed conifer
Bobolink		✓	–	–	–	Wet meadow	Agriculture	Migrant
Boreal owl		✓	–	–	Spruce-fir	–	–	–
Brewer's sparrow	✓	✓	Western shrublands	Shrubsteppe/ Sagebrush shrubland	Sagebrush shrubland	Shrubsteppe	High desert scrub	Migrant
Broad-tailed hummingbird		✓	–	–	Aspen	Lowland riparian	Mountain riparian	Migrant

TABLE E-6
U.S. FISH AND WILDLIFE SERVICE BIRDS OF CONSERVATION CONCERN AND PARTNERS-IN-FLIGHT PRIORITY SPECIES IN THE PROJECT AREA

Priority Species	Birds of Conservation Concern Species[1]	Partners in Flight Species	Partners in Flight North American Landbird Conservation Plan	Wyoming Partners in Flight (Physiographic Areas 62, 69, 86)	Colorado Partners in Flight (Physiographic Areas 62, 87)	Utah Partners in Flight (Physiographic Areas 69, 80, 86, 87)		
				Breeding Habitat	Breeding Habitat	Breeding Habitat I	Breeding Habitat II	Wintering Habitat
Brown-capped rosy finch	✓	✓	Tundra	–	Alpine tundra	–	–	–
Burrowing owl	✓	✓	–	Semidesert shrubland	–	High desert scrub	Grassland	Migrant
Calliope hummingbird	✓		Western shrublands	–	–	Mountain riparian	Mountain shrub	Migrant
Cassin's finch	✓		Coniferous forest	–	–	Aspen	Sub-alpine conifer	Lowland riparian
Cassin's kingbird		✓	–	Shrubsteppe/ Pinyon-juniper	–	Lowland riparian	Pinyon-juniper	Migrant
Chestnut-collared longspur	✓		Grassland	–	–	–	–	–
Common poorwill		✓	–	Mountain shrubland	–	Pinyon-juniper	Lowland riparian	Migrant
Cordilleran flycatcher		✓	–	–	High elevation riparian	Sub-alpine conifer	Mountain riparian	Migrant
Eared grebe	✓		–	–	–	Wetland	Water	Water
Ferruginous hawk	✓	✓	–	Shrubsteppe	–	Pinyon-juniper	Shrubsteppe	Grassland
Flammulated owl	✓	✓	Mixed forest	–	Ponderosa pine	Ponderosa pine	Sub-alpine conifer	Migrant
Gambel's quail		✓	Western shrublands	–	–	Low desert scrub	Lowland riparian	Low desert scrub
Golden eagle	✓		–	–	–	Cliff	High desert scrub	High desert scrub
Grace's warbler	✓	✓	Mixed forest	Ponderosa pine	Ponderosa pine	Ponderosa pine	Mixed conifer	Migrant
Grasshopper sparrow	✓		Grassland	–	–	Grassland	Grassland	Migrant
Gray flycatcher		✓	Woodland	Pinyon-juniper	–	Pinyon-juniper	High desert scrub	Migrant
Gray vireo	✓	✓	Woodland	Pinyon-juniper	–	Pinyon-juniper	Oak	Migrant
Greater sage-grouse		✓	Western shrublands	Shrubsteppe	–	Shrubsteppe	Shrubsteppe	Shrubsteppe

TABLE E-6
U.S. FISH AND WILDLIFE SERVICE BIRDS OF CONSERVATION CONCERN AND PARTNERS-IN-FLIGHT PRIORITY SPECIES IN THE PROJECT AREA

Priority Species	Birds of Conservation Concern Species[1]	Partners in Flight Species	Partners in Flight North American Landbird Conservation Plan	Wyoming Partners in Flight (Physiographic Areas 62, 69, 86)	Colorado Partners in Flight (Physiographic Areas 62, 87)	Utah Partners in Flight (Physiographic Areas 69, 80, 86, 87)		
				Breeding Habitat	Breeding Habitat	Breeding Habitat I	Breeding Habitat II	Wintering Habitat
Greater sage-grouse (columbia basin dps)	✓		–	–	–	–	–	–
Green-tailed towhee	✓	✓	Western shrublands	–	Mountain shrubland	Mountain shrub	High desert scrub	Migrant
Gunnison sage-grouse	✓	✓	Western shrublands	Sagebrush shrubland	–	Shrubsteppe	Shrubsteppe	Shrubsteppe
Hammond's flycatcher		✓	–	–	Spruce-fir	Sub-alpine conifer	Aspen	Migrant
Horned lark		✓	–	Semidesert shrubland	–	Grassland	High desert scrub	Grassland
Juniper titmouse	✓	✓	–	Pinyon-juniper	–	Pinyon-juniper	Pinyon-juniper	Pinyon-juniper
Lazuli bunting		✓	–	–	Lowland riparian	Lowland riparian	Mountain shrub	Migrant
Lewis's woodpecker	✓	✓	Riparian	Montane shrub/ Lowland riparian	Lowland riparian/ponderosa Pine	Ponderosa pine	Lowland riparian	Oak
Loggerhead shrike			–	Semidesert shrubland	–	High desert scrub	Pinyon-juniper	High desert scrub
Long-billed curlew	✓	✓	–	–	–	Grassland	Agriculture	Migrant
Lucy's warbler		✓	Woodland	–	–	Lowland riparian	Low Desert Scrub	Migrant
Macgillivray's warbler		✓	–	–	High elevation riparian	Lowland riparian	Mountain shrub	Migrant
Marbled godwit	✓		–	–	–	–	–	–
McCown's longspur	✓	✓	Grassland	Sagebrush grasslands	–	–	–	–
Mexican spotted owl		✓	–	Ponderosa pine	Ponderosa pine	Cliff	Lowland riparian	Cliff
Mountain plover	✓	✓	–	Sagebrush grasslands	–	High desert scrub	High desert scrub	Migrant

TABLE E-6
U.S. FISH AND WILDLIFE SERVICE BIRDS OF CONSERVATION CONCERN AND PARTNERS-IN-FLIGHT PRIORITY SPECIES IN THE PROJECT AREA

Priority Species	Birds of Conservation Concern Species[1]	Partners in Flight Species	Partners in Flight North American Landbird Conservation Plan	Wyoming Partners in Flight (Physiographic Areas 62, 69, 86)	Colorado Partners in Flight (Physiographic Areas 62, 87)	Utah Partners in Flight (Physiographic Areas 69, 80, 86, 87)		
				Breeding Habitat	Breeding Habitat	Breeding Habitat I	Breeding Habitat II	Wintering Habitat
Northern harrier		✓	–	Wetlands	–	Wet meadow	High desert scrub	Agriculture
Northern sage grouse		✓	–	Sagebrush shrubland	Sagebrush shrubland	–	–	–
Olive-sided flycatcher	✓	✓	Coniferous forest	–	Spruce-fir	Sub-alpine conifer	Ponderosa pine	Migrant
Peregrine falcon	✓	✓	Various	Cliff/Rock	Cliff/Rock	Cliff	Lowland riparian	Wetland
Pinyon jay	✓	✓	Woodland	Pinyon-juniper	–	Pinyon-juniper	Ponderosa pine	Pinyon-juniper
Prairie falcon	✓	✓	–	Shrubsteppe	–	Cliff	High desert scrub	Agriculture
Purple martin		✓	–	–	Aspen	Aspen	Mixed conifer	Migrant
Red-naped sapsucker		✓	Mixed forest	–	Aspen	Aspen	Mixed conifer	Mountain riparian
Sage sparrow	✓	✓	Western shrublands	Shrubsteppe/ Sagebrush Shrubland	Sagebrush shrubland	Shrubsteppe	High desert scrub	Low desert scrub
Sage thrasher	✓	✓	Western shrublands	Shrubsteppe	–	Shrubsteppe	High Desert Scrub	Migrant
Scott's oriole		✓	Woodland	Pinyon-juniper	–	Low desert scrub	Pinyon-juniper	Migrant
Sharp-tailed grouse		✓	Western shrublands	–	–	Shrubsteppe	Grassland	Shrubsteppe
Short-eared owl		✓	Grassland	Wetlands	Wetlands	Wetland	Grassland	Agriculture
Snowy plover	✓		–		–	Playa	Playa	Migrant
Swainson's hawk	✓	✓	Grassland	Sagebrush grasslands	–	Agriculture	Aspen	Migrant
Three-toed woodpecker		✓	–	–	–	Sub-alpine conifer	Lodgepole pine	Sub-alpine conifer
Tricolored blackbird	✓		Wetland	–	–	–	–	–
Upland sandpiper	✓		–	–	–	–	–	–

TABLE E-6
U.S. FISH AND WILDLIFE SERVICE BIRDS OF CONSERVATION CONCERN AND PARTNERS-IN-FLIGHT PRIORITY SPECIES IN THE PROJECT AREA

Priority Species	Birds of Conservation Concern Species[1]	Partners in Flight Species	Partners in Flight North American Landbird Conservation Plan	Wyoming Partners in Flight (Physiographic Areas 62, 69, 86)	Colorado Partners in Flight (Physiographic Areas 62, 87)	Utah Partners in Flight (Physiographic Areas 69, 80, 86, 87)		
				Breeding Habitat	Breeding Habitat	Breeding Habitat I	Breeding Habitat II	Wintering Habitat
Veery	✓		–	–	–	Lowland riparian	Lowland riparian	Migrant
Violet-green swallow		✓	–	–	Aspen	Mountain riparian	Aspen	Migrant
Virginia's warbler	✓	✓	Woodland	Montane shrub/ Mountain shrubland	Mountain shrubland	Oak	Pinyon-juniper	Migrant
Western bluebird		✓	–	Ponderosa pine	–	Ponderosa pine	Pinyon-juniper	Pinyon-juniper
Western kingbird		✓	–	Lowland riparian	–	Lowland riparian	Agriculture	Migrant
White-headed woodpecker	✓		Coniferous forest	–	–	–	–	–
White-tailed ptarmigan		✓		–	Alpine tundra	Alpine	Mountain riparian	Mountain riparian
White-throated swift		✓	Various	Cliff/Rock	–	Cliff	Cliff	Migrant
Willet		✓	–	–	Wetlands	Wetland	Wet meadow	Migrant
Williamson's sapsucker	✓	✓	Coniferous forest	–	Mixed conifer	Sub-alpine conifer	Aspen	Migrant
Willow flycatcher	✓		Riparian	–	–	Lowland riparian	Mountain riparian	Migrant
Wilson's phalarope		✓	–	Wetlands	–	Wetland	Water	Migrant
Wilson's warbler		✓	–	–	High elevation riparian	Mountain riparian	Alpine	Migrant
Yellow rail	✓		–	–	–	–	–	–
Yellow-billed cuckoo (in United States Distinct Population Segment)	✓	✓	–	–	–	Lowland riparian	Agriculture	Migrant

SOURCES: Colorado Partners in Flight 2012; U.S. Fish and Wildlife Service 2012b; Utah Partners in Flight 2012; Wyoming Partners in Flight 2012
NOTES: [1]The Project area is located in Bird Conservation Regions 9, 10, and 16.

E.4.2 State Protected Species

- Wyoming
  - List of animals – Wyoming Game and Fish Nongame Species of Special Concern. January 2005 (Wyoming Game and Fish Department [WGFD] 2005a, b)
  - List of birds – Wyoming Game & Fish Nongame Species of Special Concern. January 2005 (WGFD 2005a)
- Colorado
  - List of animals – Colorado Threatened and Endangered List. July 7, 2010 (Colorado Parks and Wildlife [CPW] 2010)
- Utah
  - List of animals – Utah's State Listed Species by County. March 29, 2011 (Utah Division of Wildlife Resources [UDWR] 2011a)

E.4.3 BLM Sensitive Species

- Wyoming – BLM Wyoming Sensitive Species Policy and List by Field Station (Rawlins). March 31, 2010 (BLM 2010a)
- Colorado – Colorado BLM State Director's Sensitive Species List by Field Station (Little Snake, White River, Grand Junction). November 20, 2009 (BLM 2009b)
- Utah
  - List of animals – Utah BLM Sensitive Fish and Wildlife Species List. December 20, 2011 (UDWR 2011b)
  - List of plants – Interim BLM Sensitive Plant List, from State Office. February 1, 2011 (BLM 2011a)

E.4.4 USFS Sensitive Species

- Region 4 – Intermountain Region 4 (R4) Threatened, Endangered, Proposed, and Sensitive Species; Known and Suspected Distribution by Forest (USFS 2013a)

E.4.5 USFS Management Indicator Species

- Ashley National Forest – Ashley National Forest Land and Resource Management Plan (RMP) as amended (USFS 1986a)
- Manti-La Sal National Forest – Manti-La Sal National Forest Land and Resource Management Plan as amended (USFS 1986b)
- Uinta National Forest – Land and Resource Management Plan for the Uinta National Forest as amended (USFS 2003)

E.5 Special Status Species Tables

Special status plant species that are likely to occur in or near the Project area and were carried forward for detailed analysis in the EIS are included on Table E-7. Special status plants that were not carried forward for analysis are listed on Table E-8. Special status wildlife species that are likely to occur in or near the Project area and were carried forward for detailed analysis in the EIS are included on Table E-9. Special status wildlife species that were not carried forward for analysis are listed on Table E-10. These tables include a brief summary of the data available and the rationale used to determine which species were carried forward for detailed analysis.

TABLE E-7
SPECIAL STATUS PLANT SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species			U.S. Forest Service Sensitive Species			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	
Argyle Canyon phacelia	*Phacelia argylensis*				✓				The species occurs within 5 miles of transmission line alternative routes in the Uinta Basin (Bureau of Land Management [BLM] 2012d).
Barneby's cat's eye	*Cryptantha barnebyi*				✓				The species occurs within 1 mile of Link U241 (BLM 2012b).
Barneby ridge-cress	*Lepidium barnebyanum*	E							The species is known to occur in the Project area. The species is only known from a single population located on less than 500 acres. This population is approximately 3 miles from Links U402, U430, and U431 (U.S. Fish and Wildlife Service [FWS] 2011g).
Beaver Rim phlox	*Phlox pungens*		✓						The species is not known to occur in the Project area (Wyoming Natural Diversity Database [WYNDD] 2011). Suitable habitat for the species was modeled in the Project area (Fertig and Thurston 2003).
Bolander's camissonia	*Camissonia bolanderi*				✓				The species is known to occur in the Project area. Heritage data included occurrences of the species within 1 mile of Link U730 at Calf Mesa (Utah Natural Heritage Program [UNHP] 2012).
Caespitose cat's-eye	*Cryptantha caespitosa*			✓					The species is known to occur in the Project area. Heritage data included approximately 20 occurrences of the species within 5 miles of transmission line alternative routes in Utah and (Colorado Natural Heritage Program [CNHP] 2011; UNHP 2012).
Canyon sweet-vetch	*Hedysarum occidentale* var. *canone*						SS		The species is known to occur in the Project area in Carbon, Emery and Duchesne counties in Utah. Heritage data included one occurrence of the species near Tabiona approximately 7.5 miles from Link U420 (UNHP 2012).
Carrington daisy	*Erigeron carringtoniae*						SS		The species is known to occur in the Project area. Heritage data included thousands of individual occurrences of the species near Pine Spring in the East Mountains, which is approximately 0.5 mile from Link U630 (UNHP 2012).

TABLE E-7
SPECIAL STATUS PLANT SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species			U.S. Forest Service Sensitive Species			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	
Cedar Rim thistle	*Cirsium aridum*		✓						Suitable habitat was modeled near or in the Project area (Fertig and Thurston 2003) however, there are no known occurrences of the species in the Project area (WYNDD 2011). Based on discussions with agency specialists, it was determined that potentially suitable habitat for the species may or may not be present in the Project area (Blomquist 2012; Glennon 2012). Therefore, the species was carried forward for detailed analysis.
Cisco milkvetch	*Astragalus sabulosus* var. *sabulosus*	P			✓				The species is known to occur in the Project area. Heritage data included two occurrences of the species within 2.5 miles of Link U490 near the crossing of I-70 and Nash Wash southwest of Cisco, Utah (UNHP 2012).
Clay phacelia	*Phacelia argillacea*	E							The species is known to occur in the Project area along Links U539 and U530 (UNHP 2012).
Clay reed-mustard	*Schoenocrambe argillacea*	T							The species is known to occur in the Project area where Link U400 crosses the Green River (Franklin 1992).
Creutzfeldt's cat's-eye	*Cryptantha creutzfeldtii*				✓		SS		The species is known to occur in the Project area near Huntington and Kenilworth, Utah (Links U590, U630, and U765). The species also occurs northwest of Price, Utah (within 5 miles of Links U548Colorado , U595, U546, and U522) and near Soldier Creek (Links U522, U523, and U492) (CNHP 2011; UNHP 2012).
Debris milkvetch	*Astragalus detritalis*			✓					The species is known to occur in the Project area in Utah and Colorado. Several occurrences of the species have been documented in the past 30 years (BLM 2011b; CNHP 2011; UNHP 2012; WYNDD 2011).
Dense twinpod	*Physaria condensata*		✓						The species is not known to occur in the Project area (WYNDD 2011). Suitable habitat for the species was modeled in the Project area (Fertig and Thurston 2003).
Deseret milkvetch	*Astragalus desereticus*	T							The species is known to occur in the Project area. The only known population is crossed by the transmission line alternative route of Link U621 (CNHP 2011; UNHP 2012; WYNDD 2011).

TABLE E-7
SPECIAL STATUS PLANT SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species			U.S. Forest Service Sensitive Species			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	
Dolores River skeleton-plant	*Lygodesmia doloresensis*			✓	✓				The species is known to occur in the Project area. Heritage data included One recent occurrence of the species within 2 miles of transmission line alternative routes (CNHP 2011; UNHP 2012).
Duchesne milkvetch	*Astragalus duchesnensis*			✓					The species is known to occur in the Project area in proximity to transmission line alternative routes in Colorado (BLM 2011a, CNHP 2011).
Ephedra buckwheat	*Eriogonum ephedroides*			✓					The species is known to occur in the Project area. Heritage data included occurrences of the species near Link U240. The species also occurs north of Nine Mile Canyon (within 2.5 miles of Link U400) and in Dragon Canyon (within 3.2 miles of Link C196) (UNHP 2012).
Ferron's milkvetch	*Astragalus musiniensis*			✓					The species is known to occur in the Project area. Heritage data included occurrences of the species Colorado and Utah (CNHP 2011; UNHP 2012).
Gibben's beardtongue	*Penstemon gibbensii*		✓	✓					The species is known to occur in the Project area in Wyoming. Another population occurs in Browns Park National Wildlife Refuge, near the Colorado-Utah border. Suitable habitat for the species is located near transmission line alternative routes (CNHP 2011; UNHP 2012; WYNDD 2011).
Goodrich's blazingstar	*Mentzelia goodrichii*				✓	SS			The species is known to occur in the Project area. Heritage data included occurrences of the species in the vicinity of Argyle Canyon near Links U431 and U401 (UNHP 2012, WYNDD 2011).
Goodrich's columbine	*Aquilegia scopulorum* var. *goodrichii*				✓				The species occurs within 1 mile of Link U431 (BLM 2012b).

TABLE E-7
SPECIAL STATUS PLANT SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species			U.S. Forest Service Sensitive Species			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	
Graham's beardtongue	*Penstemon grahamii*	PT		✓	✓				The species is known to occur in the Project area in Colorado and Utah. Heritage data included several occurrences of the species within 5 miles of transmission line alternative routes (CNHP 2011; UNHP 2012; WYNDD 2011). Proposed critical habitat for the species also occurs in the Project area (78 *Federal Register* [FR] 47832-47858).
Graham's cat's-eye	*Cryptantha grahamii*				✓				The species occurs within 5 miles of transmission line alternative routes in the Uinta Basin (BLM 2012b).
Grand Junction suncup	*Camissonia eastwoodiae*			✓					The species is known to occur in the Project area. Heritage data included three populations within 2.5 miles of Link C270 (CNHP 2011).
Green River greenthread	*Thelesperma caespitosum*		✓		✓	SS			The species is known to occur in the Project area. Heritage and BLM data included three occurrences of the species within 1 mile of Links U404 and U401 (BLM 2012b; UNHP 2012; WYNDD 2011).
Hairy Townsend daisy	*Townsendia strigosa* var. *prolixa*				✓				The species occurs within 5 miles of transmission line alternative routes in the Uinta Basin (BLM 2012b).
Hamilton's milkvetch	*Astragalus hamiltonii*				✓				The species was recorded along Link U322 in 1981 (UNHP 2012). BLM-mapped potential habitat for the species is crossed by Links U410, U391, and U390 (BLM 2012b).
Horseshoe milkvetch	*Astragalus equisolensis*			✓	✓				The species is known to occur in the Project area. Heritage data included occurrences of the species near Green River, Utah (Links U310, U321, U322, U380 and U390) (BLM 2012b; CNHP 2011; UNHP 2012). BLM-mapped potential habitat for the species is crossed by Links U390 and U310 (BLM 2012b).
Huber's pepperwort	*Lepidium huberi*				✓				The species occurs within 5 miles of transmission line alternative routes in the Uinta Basin (BLM 2012b).
Jones' bluestar	*Amsonia jonesii*			✓					The species is known to occur in the Project area. Heritage data included occurrences of the species 1.5 miles from Link U390 (UNHP 2012). Heritage data included several other occurrences within 3 miles of Link C270 (CNHP 2011).

TABLE E-7
SPECIAL STATUS PLANT SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species			U.S. Forest Service Sensitive Species			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	
Jones' cycladenia	*Cycladenia humilis* var. *jonesii*	T							The species has not been recorded north of Interstate 80 in Utah. Heritage data did not include any occurrences of the species within 10 miles of transmission line alternative routes (CNHP 2011; UNHP 2012; WYNDD 2011). The BLM Price Field Office conducted a study in 2012 to document distribution, identify habitat requirements and model the extent of suitable habitat of the species (Sansom and Elliot 2012). The results of the study indicated that potentially suitable habitat for the species could be present along Links U727, U728, U729, U730, U732, U733 and U734 in Emery County, Utah.
Laramie false sagebrush	*Sphaeromeria simplex*		✓						Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011). Suitable habitat for the species was modeled in the Project area (Fertig and Thurston 2003). Based on discussions with agency specialists, the species was carried forward for detailed analysis (Blomquist 2012).
Large-fruited bladderpod	*Lesquerella macrocarpa*		✓						The species is not known to occur in the Project area (WYNDD 2011). Suitable habitat for the species was modeled in the Project area (Fertig and Thurston 2003).
Ligulate feverfew	*Parthenium ligulatum*			✓					The species is known to occur in the Project area. Heritage data included occurrences of the species near Links C220 and U242 (CNHP 2011; UNHP 2012).
Meadow pussytoes	*Antennaria arcuata*		✓						The species is not known to occur in the Project area (WYNDD 2011). Suitable habitat for the species was modeled in the Project area (Fertig and Thurston 2003).
Narrowleaf evening primrose	*Oenothera acutissima*			✓					The species is known to occur in the Project area. Heritage data included occurrences of the species near Link U30 (CNHP 2011; UNHP 2012).
Narrow-stem gilia	*Gilia stenothyrsa*			✓					The species is known to occur within 1 mile of transmission line alternative routes near Links C186 and C196 in Colorado (BLM 2011a; CNHP 2011).

TABLE E-7
SPECIAL STATUS PLANT SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species			U.S. Forest Service Sensitive Species			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	
Ownbey's thistle	*Cirsium ownbeyi*		✓						The species is known to occur near the transmission line alternative routes in Utah and Colorado (BLM 2011a; CNHP 2011; UNHP 2012). Suitable habitat for the species is modeled in the Project area in Wyoming (Fertig and Thurston 2003).
Pariette cactus	*Sclerocactus brevispinus*	T							The species is known to occur in the Project area. The entire population of the species is within 5 miles of Links U400 and U402. Numerous occurrences of the species are within 1 mile of Link U402. (UNHP 2012). According to FWS a single population that occupies approximately 72,000 acres in the Pariette Draw encompasses the entire species (FWS 2011f).
Persistent-sepal yellowcress	*Rorippa calycina*		✓						The species is known to occur in the Project area. Heritage data included occurrences of the species along Link W30 (WYNDD 2011). Suitable habitat for the species was modeled in the Project area (Fertig and Thurston 2003).
Piceance bladderpod	*Lesquerella parviflora*			✓					The species is known to occur in the Project area. Heritage data included occurrences of the species within 20 miles of transmission line alternative routes (CNHP 2011; UNHP 2012; WYNDD 2011).
Psoralea globemallow (Head sphaeromeria)	*Sphaeralcea psoraloides*				✓				The species is known to occur in the Project area. Heritage data included occurrences of the species along Link U730, west of the town of Green River. Data from the BLM, Price Field Office includes two populations of 15,000 individual plants. Heritage data did not include any other occurrences of the species within 35 miles of transmission line alternative routes (UNHP 2012).
Racemose milkvetch	*Astragalus racemosus* var. *treleasei*		✓						The species is not known to occur in the Project area (WYNDD 2011). Potentially suitable habitat for the species was modeled in the Project area (Fertig and Thurston 2003).
Rock hymenoxys	*Hymenoxys lapidicola*				✓				The species occurs within 5 miles of transmission line alternative routes in the Uinta Basin (BLM 2012b).

TABLE E-7
SPECIAL STATUS PLANT SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species			U.S. Forest Service Sensitive Species			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	
Rollins' cat's-eye	*Cryptantha rollinsii*			✓					The species is known to occur in the Project area. Heritage data included several occurrences of the species near transmission line alternative routes in Wyoming and Colorado (BLM 2011a; CNHP 2011; UNHP 2012; WYNDD 2011).
San Rafael cactus	*Pediocactus despainii*	E							The species is known to occur in the Project area. Heritage data included one small population near Furniture Draw, within 0.3 mile of Link U733. Other populations are within 5 miles of Link U730, U732, U733, and U734 (UNHP 2012).
Shrubby reed-mustard	*Schoenocrambe suffrutescens*	E							The species is known to occur in the Project area. FWS data included one occurrence of the species within 1 mile of Link U401 in the vicinity of Badlands Cliff/Wrinkles Road (FWS 2010). Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Spanish bayonet	*Yucca harrimaniae* var. *sterilis*				✓				The species is known to occur in the Project area. Heritage data included seven known occurrences of the species, however, only one occurrence is less than 30 years old (2006) and is within 5 miles of Links U400 and U402 (UNHP 2012).
Stemless beardtongue	*Penstemon acaulis* var. *acaulis*		✓			SS			The species is not known to occur within 20 miles of transmission line alternative routes in Utah or Wyoming (UNHP 2012; WYNDD 2011) but does occur in proximity to transmission line alternative routes in Colorado (BLM 2011a). Potentially suitable habitat for the species was modeled in the Project area in Wyoming (Fertig and Thurston 2003).
Thompson's talinum	*Talinum thompsonii*				✓				The species is known to occur in the Project area. Heritage data included occurrences of the species within 5 miles of Links U732, U733, and U734 along Cedar Mountain. Heritage data indicates that the entire population may be within 5 miles of transmission line alternative routes (UNHP 2012).

TABLE E-7
SPECIAL STATUS PLANT SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species			U.S. Forest Service Sensitive Species			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	
Twisted buckwheat	*Eriogonum contortum*			✓					The species is known to occur in the Project area. Heritage data included occurrences of the species along Link U490 with additional occurrences near transmission line alternative routes in Utah and Colorado (CNHP 2011; UNHP 2012; WYNDD 2011).
Uinta Basin hookless cactus	*Sclerocactus wetlandicus*	T							The species is known to occur in the Project area. Heritage data included several occurrences of the species near transmission line alternative routes and more than 100 occurrences of the species in the Project area. One occurrence is within 0.5 mile of Link U402 (CNHP 2011; UNHP 2012; WYNDD 2011).
Uinta Basin spring-parsley	*Cymopterus duchesnensis*			✓					The species is known to occur in the Project area. Heritage data included occurrences of the species but most of them were more than 25 years old. None of the occurrences were within 1 mile of the transmission line alternative routes (CNHP 2011).
Untermann's daisy	*Erigeron untermannii*				✓	SS			The species is known to occur in the Project area. Heritage data included occurrences of two large populations located on the Ashley National Forest along Links U431 and U432 (CNHP 2011; UNHP 2012).
Ute ladies'-tresses	*Spiranthes diluvialis*	T							The species is known to occur in the Project area. Heritage data included occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Western prairie fringed orchid	*Platanthera praeclara*	T							The species is found along the Platte River system and may be affected by water use in the Platte River watershed. The species is not known to occur near the Project area (CNHP 2011; UNHP 2012; WYNDD 2011) but could be indirectly affected by withdrawals of water from the Platte River basin for construction of the Project. Habitat for the species is not likely to be directly affected by the Project.

TABLE E-7
SPECIAL STATUS PLANT SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species			U.S. Forest Service Sensitive Species			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	
Wheeler's angelica	*Angelica wheeleri*							SS	The species is known to occur in the Project area. Heritage data included two occurrences at the junction of Salt Creek Canyon and McCune Canyon on the Uinta National Forest, which is approximately 5 miles from Link U650.
White River beardtongue	*Penstemon scariosus* var. *albifluvis*	PT		✓	✓				The species is known to occur in Uintah County, Utah and western Rio Blanco County, Colorado near the White River to the vicinity of Evacuation Creek and in the vicinity of Willow Creek (FWS 2011j). Populations located along the White River near the Utah-Colorado border are located near Links U240 and C220. Proposed critical habitat for the species also occurs in the Project area (78 FR 47832-47858).

SOURCE: Nomenclature follows U.S. Fish and Wildlife Service 2012c for federally listed Threatened and Endangered species and NatureServe Explorer NatureServe 2012 for all others.
NOTES:

Endangered Species Act
- C = Candidate
- E = Endangered
- P = Petitioned
- PT = Proposed Threatened
- T = Threatened

U.S. Forest Service
- SS = Sensitive species with known habitat on the national forest

TABLE E-8
SPECIAL STATUS PLANT SPECIES NOT CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species			U.S. Forest Service Sensitive Species			Rationale
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	
Abajo daisy	*Erigeron abajoensis*						SS		The species is not known to occur in the Project area (Colorado Natural Heritage Program [CNHP] 2011; Utah Natural Heritage Program [UNHP] 2012).
Abajo Peak draba	*Draba abajoensis*						SS		The species is not known to occur in the Project area (CNHP 2011; UNHP 2012).
Ackerman's green gentian	*Frasera ackermaniae*				✓				The species is not known to occur in the Project area (UNHP 2012).
Alcove rock-daisy	*Perityle specuicola*				✓				The species is not known to occur within 10 miles of transmission line alternative routes (UNHP 2012).
Angell's cinquefoil	*Potentilla cottamii*				✓				The species is not known to occur in the Project area (UNHP 2012).
Arapien stickleaf	*Mentzelia argillosa*				✓				The species is not known to occur in the Project area (UNHP 2012).
Arctic poppy	*Papaver radicatum*					SS			The species is not known to occur in the Project area (UNHP 2012; Wyoming Natural Diversity Database [WYNDD] 2011).
Arizona willow	*Salix arizonica*						SS		The species is not known to occur in the Project area (CNHP 2011; UNHP 2012).
Aromatic Indian breadroot	*Pediomelum aromaticum*			✓					The species is not known to occur within 15 miles of transmission line alternative routes (CNHP 2011).
Atwood's columbine	*Aquilegia atwoodii*				✓				The species is not known to occur in the Project area (UNHP 2012).
Barneby reed-mustard	*Schoenocrambe barnebyi*	E							The species is not known to occur in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Barneby woody aster	*Tonestus (=Aster) kingii* var. *barnebyana*							SS	The species is not known to occur in the Project area (UNHP 2012).
Bicknell milkvetch	*Astragalus consobrinus*								The species is not known to occur in the Project area (CNHP 2011; UNHP 2012).

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SPECIAL STATUS PLANT SPECIES NOT CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species			U.S. Forest Service Sensitive Species			Rationale
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	
Blowout penstemon	*Penstemon haydenii*	E							The species is not known to occur in the Project area. Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011). The Project is located outside the U.S. Fish and Wildlife (FWS) range for the species.
Brownie ladyslipper	*Cypripedium fasciculatum*					SS			The species is not known to occur within 10 miles of transmission line alternative routes (CNHP 2011; UNHP 2012; WYNDD 2011).
Burke's draba	*Draba burkei*								The species is not known to occur in the Project area (UNHP 2012).
Cache beardtongue	*Penstemon compactus*								The species is not known to occur in the Project area (UNHP 2012).
Canyonlands lomatium	*Lomatium latilobum*			✓	✓		SS		The species is not known to occur within 5 miles of transmission line alternative routes (CNHP 2011; UNHP 2012).
Cathedral Bluff dwarf gentian	*Gentianella tortuosa*			✓					The species is not known to occur within 20 miles of transmission line alternative routes (CNHP 2011).
Cathedral Bluff meadow-rue	*Thalictrum heliophilum*			✓					The species is not known to occur within 9 miles of transmission line alternative routes (CNHP 2011).
Cedar Mountain Easter daisy	*Townsendia microcephala*		✓						The species is not known to occur in the Project area (WYNDD 2011).
Chatterley onion	*Allium geyeri* var. *chatterleyi*						SS		The species is not known to occur in the Project area (CNHP 2011; UNHP 2012).
Cisco milkvetch B	*Astragalus sabulosus* var. *vehiculus*	P			✓				The species is not known to occur in the Project area (UNHP 2012).
Clay hill buckwheat	*Eriogonum viridulum*			✓					The species is not known to occur within 20 miles of transmission line alternative routes (CNHP 2011).

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SPECIAL STATUS PLANT SPECIES NOT CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species			U.S. Forest Service Sensitive Species			Rationale
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	
Colorado hookless cactus	*Sclerocactus glaucus*	T							The species was recorded within 2 miles of Link C270 (CNHP 2001). All other occurrences of the species are at least 15 miles from the transmission line alternative routes (CNHP 2011; UNHP 2012; WYNDD 2011). The occurrence within 2 miles of Link C270 is likely erroneous, and there are no verified occurrences within 25 miles of the transmission line alternative routes (Clayton 2012).
Cottam cinquefoil	*Potentilla cottamii*								The species is not known to occur in the Project area (UNHP 2012).
Cronquist daisy	*Erigeron cronquistii*								The species is not known to occur in the Project area (UNHP 2012).
Dainty moonwort	*Botrychium crenulatum*					SS		SS	The species is not known to occur in the Project area (UNHP 2012; WYNDD 2011).
DeBeque milkvetch	*Astragalus debequaeus*			✓					The species is not known to occur in the Project area (CNHP 2011).
DeBeque phacelia	*Phacelia submutica*	T							The species is not known to occur in the Project area (CNHP 2011).
Desolation Canyon columbine	*Aquilegia desolaticola*				✓				The species is not known to occur in the Project area (UNHP 2012).
Dudley Bluffs bladderpod	*Physaria congesta*	T							The species is not known to occur in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Dudley Bluffs twinpod	*Physaria obcordata*	T							The species is not known to occur in the Project area (FWS 2011h).
Dune wildrye	*Elymus simplex* var. *luxurians*		✓						The species is not known to occur in the Project area (WYNDD 2011).
Eastwood's monkeyflower	*Mimulus eastwoodiae*			✓					The species is not known to occur within 20 miles of transmission line alternative routes (CNHP 2011).
Entrada skeletonplant	*Lygodesmia entrada*				✓				The species is not known to occur within 5 miles of transmission line alternative routes (UNHP 2012).

TABLE E-8
SPECIAL STATUS PLANT SPECIES NOT CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species			U.S. Forest Service Sensitive Species			Rationale
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	
Fisher milkvetch	*Astragalus piscator*			✓					The species is not known to occur in the Project area (CNHP 2011).
Flat-top buckwheat	*Eriogonum corymbosum* var. *smithii*				✓				The species is not known to occur in the Project area (UNHP 2012).
Garrett bladderpod	*Lesquerella garrettii*							SS	The species is not known to occur in the Project area (UNHP 2012).
Garrett's fleabane	*Erigeron garrettii*							SS	The species is not known to occur in the Project area (UNHP 2012).
Giant fourwing saltbush	*Atriplex canescens* var. *gigantea*				✓				The species is not known to occur in the Project area (UNHP 2012).
Goodrich cleomella	*Cleomella palmeriana* var. *goodrichii*				✓				The species is not known to occur in the Project area (UNHP 2012).
Goodrich's penstemon	*Penstemon goodrichii*				✓				The species was recorded approximately 4 miles from Link U410 in 1979 (UNHP 2012). No other occurrences of the species have been recorded within 8 miles of transmission line alternative routes in the past 30 years (CNHP 2011; UNHP 2012; WYNDD 2011).
Graham columbine	*Aquilegia grahamii*					SS			The species is not known to occur in the Project area (UNHP 2012; WYNDD 2011).
Grand Junction milkvetch	*Astragalus linifolius*			✓					The species is not known to occur in the Project area (CNHP 2011).
Gypsum Valley cat's-eye	*Cryptantha gypsophila*			✓					The species is not known to occur within 35 miles of transmission line alternative routes (CNHP 2011).
Heliotrope milkvetch	*Astragalus montii*	T							The species is not known to occur within 25 miles of transmission line alternative routes (CNHP 2011; UNHP 2012; WYNDD 2011).
Horse Canyon stickleaf	*Mentzelia multicaulis* var. *librina*				✓				The species is not known to occur within 5 miles of transmission line alternative routes (UNHP 2012).

TABLE E-8
SPECIAL STATUS PLANT SPECIES NOT CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species			U.S. Forest Service Sensitive Species			Rationale
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	
Isely's milkvetch	*Astragalus iselyi*	P			✓		SS		The species is not known to occur in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Jane's globemallow	*Sphaeralcea janeae*				✓				The species is not known to occur within 30 miles of transmission line alternative routes (UNHP 2012).
Jones' indigo-bush	*Psorothamnus polydenius* var. *jonesii*				✓				The species is not known to occur in the Project area (UNHP 2012).
Jones' Townsend daisy	*Townsendia jonesii* var. *lutea*				✓				The species is not known to occur in the Project area (UNHP 2012).
Kachina daisy	*Erigeron kachinensis*			✓			SS		The species is not known to occur in the Project area (CNHP 2011; UNHP 2012).
Laramie columbine	*Aquilegia laramiensis*		✓						The species is not known to occur in the Project area (WYNDD 2011).
LaSal daisy	*Erigeron mancus*						SS		The species is not known to occur in the Project area (CNHP 2011; UNHP 2012).
Last Chance townsendia	*Townsendia aprica*	T							The species is not known to occur in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Lesser yellow lady's slipper	*Cypripedium parviflorum (Cypripedium calceolus* var. *parviflorum)*								The species is not known to occur within 20 miles of transmission line alternative routes (UNHP 2012).
Limber pine	*Pinus flexilis*		✓						The species is not known to occur in the Project area (WYNDD 2011).
Link Trail columbine	*Aquilegia flavescens* var. *rubicunda*						SS		The species was recorded 4.75 miles from Link U630 in 1972. No other occurrences of the species have been recorded in the Project area (CNHP 2011; UNHP 2012).

TABLE E-8
SPECIAL STATUS PLANT SPECIES NOT CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species			U.S. Forest Service Sensitive Species			Rationale
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	
Logan buckwheat	*Eriogonum loganum (E. brevicaule* var. *loganum)*								The species is not known to occur in the Project area (UNHP 2012).
Maguire campion	*Silene petersonii*						SS		The species is not known to occur within 10 miles of transmission line alternative routes in the past 30 years (CNHP 2011; UNHP 2012).
Maguire draba	*Draba maguirei*								The species is not known to occur in the Project area (UNHP 2012).
Maguire's daisy	*Erigeron maguirei*				✓				The species is not known to occur within 15 miles of transmission line alternative routes within the past 30 years (UNHP 2012).
Meadow milkvetch	*Astragalus diversifolius*		✓						The species is not known to occur in the Project area (WYNDD 2011).
Musinea groundsel	*Senecio musiniensis*						SS		The species is not known to occur in the Project area (CNHP 2011; UNHP 2012).
Mussentuchit gilia	*Alicielia tenuis*				✓				The species is not known to occur in the Project area (UNHP 2012).
Naturita milkvetch	*Astragalus naturitensis*			✓					The species is not known to occur in the Project area (CNHP 2011).
Neese narrowleaf penstemon	*Penstemon angustifolius* var. *dulcis*				✓				The species is not known to occur within 5 miles of transmission line alternative routes (UNHP 2012).
Osterhout's cryptantha	*Cryptantha osterhoutii (Oreocarya osterhoutii)*			✓					The species is not known to occur in the Project area (CNHP 2011).
Parachute beardtongue	*Penstemon debilis*	T							The species is not known to occur in the Project area (CNHP 2011).
Park rockcress	*Arabis vivariensis*				✓				The species is not known to occur within 5 miles of transmission line alternative routes (UNHP 2012).

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SPECIAL STATUS PLANT SPECIES NOT CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species			U.S. Forest Service Sensitive Species			Rationale
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	
Peabody milkvetch	*Astragalus pubentissimus* var. *peabodianus*				✓				The species is not known to occur in the Project area (UNHP 2012).
Petiolate wormwood	*Artemisia campestris* ssp. *borealis* var. *petiolata*					SS			The species is not known to occur in the Project area (UNHP 2012; WYNDD 2011).
Pinnate spring-parsley	*Cymopterus beckii*						SS		The species is not known to occur in the Project area (UNHP 2012; CNHP 2011).
Precocious milkvetch	*Astragalus proimanthus*		✓						The species is not known to occur in the Project area (WYNDD 2011).
Roan Cliffs blazingstar	*Mentzelia rhizomata (Nuttallia argillosa, Mentzelia argillosa)*			✓					The species is not known to occur within 20 miles of transmission line alternative routes (CNHP 2011).
Rock tansy	*Sphaeromeria capitata*			✓					The species was recorded 4.8 mile from Link C61 in 1983. No other occurrences of the species have been recorded in the Project area (WYNDD 2011).
Rockcress draba	*Draba globosa (=D. densifolia* var. *apiculata)*					SS		SS	The species is not known to occur within 4 miles of transmission line alternative routes (UNHP 2012; WYNDD 2011).
San Rafael milkvetch	*Astragalus rafaelensis*			✓					The species is not known to occur within 5 miles of transmission line alternative routes in the past 30 years (CNHP 2011).
Santaquin draba	*Draba santaquinensis*							SS	The species is not known to occur in the Project area (UNHP 2012).
Shultz stickleaf	*Mentzelia shultziorum*				✓				The species is not known to occur within 15 miles of transmission line alternative routes (UNHP 2012).
Singlestem buckwheat	*Eriogonum acaule*			✓					The species is not known to occur in the Project area (CNHP 2011).

TABLE E-8
SPECIAL STATUS PLANT SPECIES NOT CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species			U.S. Forest Service Sensitive Species			Rationale
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	
Slender moonwort	*Botrychium lineare*					SS			The species is not known to occur within 1.5 miles of transmission line alternative routes in the last 60 years (UNHP 2012; WYNDD 2011). Surveys at the site in 2003 failed to locate the species (Franklin 2005).
Small rockcress (Fremont County rockcress)	*Boechera (Arabis) pusilla*	C	✓						The species is not known to occur in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Smith violet	*Viola franksmithii*								The species is not known to occur in the Project area (UNHP 2012).
Sweet-flowered rock jasmine	*Androsace chamaejasme* ssp. *carinata*						SS		The species is not known to occur in the Project area (CNHP 2011; UNHP 2012).
Trotter's oreoxis	*Oreoxis trotteri*				✓				The species is not known to occur within 15 miles of transmission line alternative routes (UNHP 2012).
Tufted frasera	*Frasera paniculata*			✓					The species is not known to occur within 20 miles of transmission line alternative routes (CNHP 2011).
Uinta greenthread	*Thelesperma pubescens*		✓						The species is not known to occur in the Project area (UNHP 2012; WYNDD 2011).
Utah ivesia	*Ivesia utahensis*							SS	The species is not known to occur in the Project area (UNHP 2012).
Utah phacelia	*Phacelia utahensis*				✓				The species is not known to occur within approximately 4 miles of transmission line alternative routes in the past 80 years (UNHP 2012).
Utah spurge	*Euphorbia nephradenia*				✓				The species was recorded 3.3 miles from Link U730 in 1979. No other occurrences of the species have been recorded in the Project area (UNHP 2012).
Ward beardtongue	*Penstemon wardii*				✓				The species is not known to occur in the Project area (UNHP 2012).

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SPECIAL STATUS PLANT SPECIES NOT CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species			U.S. Forest Service Sensitive Species			Rationale
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	
Wasatch draba	*Draba brachystylis*								The species was recorded within 1 mile of Links U460 and U621 in 1901. No other recent occurrences of the species have been recorded in the Project area (UNHP 2012).
Wasatch fitweed	*Corydalis caseana spp. brachycarpa*							✓	The species is not known to occur in the Project area (UNHP 2012).
Wasatch jamesia	*Jamesia americana* var. *macrocalyx*							✓	The species is not known to occur within 15 miles of transmission line alternative routes (UNHP 2012).
Wasatch pepperwort	*Lepidium montanum* var. *alpinum*								The species is not known to occur in the Project area (UNHP 2012).
Wasatch shooting star	*Dodecatheon utahense*								The species is not known to occur in the Project area (UNHP 2012).
Winkler cactus	*Pediocactus winkleri*	T							The species is not known to occur in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Woodside buckwheat	*Eriogonum tumulosum*			✓					The species is not known to occur within 15 miles of transmission line alternative routes (CNHP 2011).
Wright fishhook cactus	*Sclerocactus wrightiae*	E							The species is outside of the range for the species identified by FWS in the 2008 status review of the species (FWS 2008a). The species is not known to occur within approximately 9 miles of transmission line alternative routes (CNHP 2011; UNHP 2012; WYNDD 2011).

TABLE E-8
SPECIAL STATUS PLANT SPECIES NOT CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species			U.S. Forest Service Sensitive Species			Rationale
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	
Wyoming tansymustard	*Descurainia torulosa*		✓						The species is not known to occur in the Project area (WYNDD 2011). Suitable habitat for the species was modeled in the Project area (Fertig and Thurston 2003). However, based on discussions with agency specialists, it was determined that suitable habitat for the species is likely absent from the Project area (Glennon 2012). Therefore the species was not carried forward for detailed analysis.

SOURCE: Nomenclature follows FWS 2012f for federally listed Threatened and Endangered species and NatureServe Explorer NatureServe 2012 for all others.
NOTES:
Endangered Species Act
C = Candidate
E = Endangered
P = Proposed
T = Threatened

U.S. Forest Service
SS = Sensitive Species with known habitat on the national forest

TABLE E-9
SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
American beaver	*Castor canadensis*							MIS				Potentially suitable habitat for the species is present on the Uinta National Forest. The Project area is in the known range for the species (Smithsonian 2011). Heritage data did not include any occurrences of the species in the Project area (Colorado Natural Heritage Program [CNHP] 2011; Utah Natural Heritage Program [UNHP] 2012; WYNDD 2011).
American bittern	*Botaurus lentiginosus*								NSS3			The species is known to occur in the Project area. Heritage data included occurrences of the species at Stevies Lake, which is immediately west of Hanna, Wyoming, in 1985. No other occurrences of the species have been recorded in the Project area. Breeding Bird Survey and Christmas Bird Count report little, if any detection of the species in the Project area (Gough et al. 1998).

TABLE E-9
SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
American marten	*Martes americana*								NSS4			Portions of the Project area are in known range for the species (Wyoming Game and Fish Department [WGFD] 2010a). Heritage data included occurrences of the species in Flat Canyon in Manti-La Sal National Forest in 1954. Other occurrences of the species were recorded during surveys in the 1990s in the Taylor Mountain area of Ashley National Forest, which is located within approximately 20 miles from transmission line alternative routes (UNHP 2012; WYNDD 2011).
American pika	*Ochotona princeps*								NSSU			Portions of the Project area are in the species range in Utah and Wyoming (Smithsonian 2011). Heritage data included two occurrences of the species on the Manti-La Sal National Forest in the 1950s. Heritage data did not include any recent occurrences in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
American white pelican	*Pelecanus erythrorhynchs*			✓	SS						SPC	The species frequents lakes and reservoirs throughout the Project area during spring and fall migration. Heritage data included occurrences of the species in portions of the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).

TABLE E-9
SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Aquatic snails	Combined account								NSSU			Wyoming Heritage data for this group of species is lacking and little is known regarding distribution (WYNDD 2011). Aquatic snails are potentially present in portions of the Project area based on habitat requirements.
Ash-throated flycatcher	*Myiarchus cinerascens*								NSS3			The species is known to occur in the Project area. Heritage data included occurrences of the species along Red Creek at Richards Gap (Links W492, W493 and W520). Wyoming Heritage data included three other occurrences of the species in the Project area along the Little Snake River near the Wyoming/Colorado border (WYNDD 2011).
Baird's sparrow	*Ammodramus bairdii*		✓									The species is known to occur in the Project area. Transient individuals of the species may occur in portions of the Project area during seasonal migration. Heritage data included two occurrences of the species (essentially the same location) along Link W30 in 1981 (WYNDD 2011).
Bald eagle	*Haliaeetus leucocephalus*		✓	✓	SS	SS	SS	SS	NSS2	SC	SPC	The species is known to occur in the Project area. The species is wide-ranging and suitable habitat exists in Wyoming, Colorado and Utah.

TABLE E-9
SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Big brown bat	*Eptesicus fuscus*								NSS4			The entire Project area is in the known range of the species (WGFD 2010a). Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Big free-tailed bat	*Nyctinomops macrotis*				SS						SPC	The species is known to occur in the Project area. Summer range for the species occurs in the Project area in Utah (Bradley et al. 2006).
Bigmouth shiner	*Notropis dorsalis*								NSS4			Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011). The species was carried forward for analysis because it is known to inhabit the Platte River (U.S. Geological Survey [USGS] 2004).

TABLE E-9
SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Black rosey finch	*Leucosticte atrata*								NSSU			Portions of the Project area are in the known range for the species (WGFD 2010a). Heritage data included one occurrence of the species near Crescent Junction, Utah in 1953 (Link U490). The species was observed at Buckhorn Wash, which is approximately 1 mile from Links U730 and U731. A flock was observed in 2002 at Bowrey Spring, which is approximately 1.5 miles from Link U90 (UNHP 2012). Heritage data did not include any occurrences of the species near the Project area in Wyoming (where the species is listed) (WYNDD 2011).
Black swift	*Cypseloides niger*				SS						SPC	Portions of the Project area are in the known range for the species. Potentially suitable breeding habitat for the species may occur around Utah Lake, which is near the Project area (Birds of North America 2005). Heritage data included one occurrence of the species in Utah at Red Creek near Fruitland in 1963 (UNHP 2012).

TABLE E-9
SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Black tern	*Chlidonias niger*								NSS3			Wyoming Game and Fish have mapped foraging and nesting colonies of the species in the Project area. Portions of the Project are located within suspected breeding areas for the species (WGFD 2010a). Wyoming Heritage data included one occurrence of the species at Hogback Lake, which is within 1 mile of the Project area (WYNDD 2011). Utah Heritage data included occurrences of the species near the Project area at Pelican Lake and Ouray National Wildlife Refuge (UNHP 2012).
Black-crowned night-heron	*Nycticorax nycticorax*								NSS3			Portions of the Project area are within known range for the species (Birds of North America 2005). Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Black-footed ferret	*Mustella nigripes*	EX								FE/SE	S-ESA	The species could potentially occur in the Project area. Portions of the Project area are located near white-tailed prairie dog colonies with known populations of black-footed ferrets (U.S. Fish and Wildlife Service [FWS] 2008b).
Bluehead sucker	*Catostomus discobolus*		✓	✓	CA				NSS1		CS	The species is known to occur in the Project area. The species inhabits rivers crossed by transmission line alternative routes of the Project (CNHP 2011; UNHP 2012; WYNDD 2011).

TABLE E-9
SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Bobolink	*Dolichonyx oryzivorus*				SS				NSS4		SPC	Most of the Project area in Wyoming is within the known range for the species (WGFD 2010a). Portions of the Project area in Utah and Colorado have potentially suitable habitat for the species. Heritage data included three occurrences of the species within 2 miles of the Project area; one occurrence of the species in Utah near Vernal (1963); one occurrence in Powell Park along the White River, west of Meeker; and one occurrence within 1 mile of the Project area along the Yampa River east of Craig (CNHP 2011; UNHP 2012; WYNDD 2011).
Bonneville cutthroat trout	*Oncorhynchus clarkii utah*				CA		SS	SS/ MIS	NSS3		CS	Transmission line alternative routes are located near and/or cross known habitat for the species. Heritage data included occurrences of the species on the western end of Project in Utah (UNHP 2012).
Bonytail	*Gila elegans*	E				o	o	o		FE/SE	S-ESA	Transmission line alternative routes are located near and/or cross known habitat for the species. The species inhabits the Green, Yampa, and Colorado River systems which are crossed by transmission line alternative routes.

TABLE E-9
SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Boreal toad	*Bufo boreas boreas*	Petitioned	✓	✓	CA	SS	SS	SS	NSS1	SE	SPC	Transmission line alternative routes are located near and/or cross potentially suitable habitat for the species. Heritage data included four records of specimens collected in Utah and Colorado within 1 mile of the Project area, but all are from approximately 50 years ago. No recent occurrences of the species have been recorded (CNHP 2011; UNHP 2012; WYNDD 2011). However, 110 individuals were translocated to Strawberry Reservoir, which is near the Project area in Utah.
Brassy minnow	*Hybognathus hankinsoni*								NSS4	ST		The Project area is within predicted range for the species (WGFD 2010a). Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011). The species was carried forward for analysis because it inhabits the Platte River system.
Brewer's sparrow	*Spizella breweri*		✓	✓					NSS4			The species is known to occur in the Project area. The species is wide ranging and occupies portions of the Project area during the breeding season (Birds of North America 2005). Heritage data included occurrences of the species in the Project area in Wyoming (CNHP 2011; UNHP 2012; WYNDD 2011).

TABLE E-9
SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Brown-capped rosy finch	*Leucosticte australis*								NSSU			The Project area is within the predicted range for the species in Wyoming (WGFD 2010a). Portions of the Project area in Mesa County, Colorado, are on the fringe of the known range for the species (Birds of North America 2005; Johnson et al. 2000).
Burrowing owl	*Athene cunicularia*		✓		SS				NSSU	ST	SPC	The species is known to occur in the Project area. The species is wide ranging and suitable habitat exists in the Project area in Wyoming, Colorado and Utah (Birds of North America 2005). Heritage data included numerous occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Bushtit	*Psaltriparus minimus*								NSS3			The Project area is within the known range for the species (Sloane 2001; WGFD 2010a). Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
California floater	*Anodonta californiensis*								NSSU		SPC	The species is known to occur near the Project area. Heritage data included one occurrence of the species at Burraston Ponds south of Mona, Utah, which is within 1 mile of the terminus of the Project (UNHP 2012; WYNDD 2011).

TABLE E-9
SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Canvasback	*Aythya valisineria*								NSS3			Heritage data indicated that the specie is not known to occur in the Project area (WYNDD 2011). However, Christmas Bird Count and Breeding Bird Survey include occurrences of the species near water bodies in the Project area (Gough et al. 1998). Seasonal migrants of the species may occur in portions of the Project area.
Canyon mouse	*Peromyscus crinitus*								NSS3			The Project area is within known range for the species (Smithsonian 2011). Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Caspian tern	*Hydroprogne caspia*								NSS3			The Project area is within predicted range for the species (WGFD 2010a). Heritage data included a single occurrence of the species in 1988 at Lake Boreham (Link U430), which is on the edge of the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Chestnut-collared longspur	*Calcarius ornatus*								NSS4			The species is known to occur near the Project area. Heritage data included recent occurrences of the species in the Project area in Wyoming (WYNDD 2011).
Clark's grebe	*Aechmophorus clarkii*								NSSU			The species is known occur in the Project area.

TABLE E-9
SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Cliff chipmunk	*Tamias dorsalis*								NSS3			The Project area is within predicted range for the species (WGFD 2010a) and known range for the species (Smithsonian 2011). Heritage data did not include any occurrences of the species within 15 miles of transmission line alternative routes (CNHP 2011; UNHP 2012; WYNDD 2011).
Colorado pikeminnow	*Ptychocheilus lucius*	E				o	o	o		FE/ST	S-ESA	Some transmission line alternative routes for the Project are located near and/or cross known habitat for the species. Spawning sites for the species are located in the Green and Yampa rivers, which are crossed by transmission line alternative routes (FWS 2002a). Heritage data included occurrences of the species in all three states (CNHP 2011; UNHP 2012; WYNDD 2011).
Colorado River cutthroat trout	*Oncorhynchus clarkii pleuriticus*		✓	✓	CA	SS/ MIS	SS	SS/ MIS	NSS2	SC	CS	Some transmission line alternative routes for the Project are located near and/or cross known habitat for the species. Heritage data included occurrences of the species near transmission line alternative routes in Utah and Colorado (CNHP 2011; UNHP 2012, WYNDD 2011).

TABLE E-9
SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Columbia spotted frog	*Rana luteiventris*		✓		CA		SS	SS	NSS3		CS	Some transmission line alternative routes for the Project are located near and/or cross potentially suitable habitat for the species. Heritage data included occurrences of the species in the Project area in Utah within the past 10 years. Heritage data also included occurrences of the species along the San Pitch River near Mount Pleasant and north of Fairview (Links U631 and U600) and in the West Creek area south of Mona (Link U650) (CNHP 2011; UNHP 2012, WYNDD 2011).
Columbian sharp-tailed grouse	*Tympanuchus phasianellus columbianus*		✓	✓	SS				NSS4	SC	S-ESA	The species is known to occur near the Project area. Heritage data included occurrences of the species near Links C13 and C100 (CNHP 2011; UNHP 2012; WYNDD 2011).
Common loon	*Gavia immer*								NSS1			The species is not known to occur in the Project area nor the Platte River system (Birds of North America 2005). However, the Wyoming Wildlife Action Plan predicts that suitable habitat for the species may be present in the Project area (WGFD 2010a). Heritage data included one occurrence of the species near the Project area in 1978. A single individual was observed along the North Platte River south of the junction with Interstate 80 along Link W30 (WYNDD 2011).

TABLE E-9
SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Common shiner	*Luxilus cornutus*								NSS4	ST		The species is known to inhabit the Platte River system in eastern Wyoming (WGFD 2010a). Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Cornsnake	*Elaphe guttata*										SPC	The species inhabits areas along the Green River between Moab and Dinosaur National Monument (Bosworth 2003). Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Desert bighorn sheep	*Ovis canadensis nelsoni*			✓			SS					Portions of the Project area are within designated suitable habitat for the species (Colorado Division of Wildlife [CDOW] 2006; Utah Division of Wildlife Resources [UDWR] 2005b; WGFD 2010a).
Devil crayfish	*Cambarus diogenes*								NSSU			The species is not known to occur in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011). However, distribution of the species is not well established. Therefore, the species was carried forward for analysis.
Dwarf shrew	*Sorex nanus*								NSS3			The Project area is within the known range for the species (WGFD 2010a). Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).

TABLE E-9
SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Eastern red bat	*Lasiurus borealis*								NSSU			The Project area is in the eastern edge of the predicted range for the species (WGFD 2010a). Heritage data did not include any occurrences of the species in the Project area (WYNDD 2011).
Elk	*Cervus elaphus*					MIS	MIS					The species is known to occur within the Project area. Designated crucial habitats and migration corridors for the species are present in some portions of the Project area (CDOW 2006; UDWR 2005a; WGFD 2010a).
Eureka mountainsnail	*Oreohelix eurekensis*										SPC	The species is known to occur near the Project area. Heritage data included occurrences of the species near transmission line alternative routes in the Red Narrows area on the southern end of Uinta National Forest. Other occurrences of the species are recorded near transmission line alternative routes (UNHP 2012).
Fairy and tadpole shrimp	Combined account								NSSU			The distribution of species in these groups is poorly understood. Heritage data did not include any occurrences of this group of species (CNHP 2011; UNHP 2012; WYNDD 2011). However, based on habitat requirements, the species could be present in portions of the Project area.

TABLE E-9
SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Fatmucket	*Lampsilis siliquoidea*								NSSU			The Project area is outside the predicted range for the species (WGFD 2010a). Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011). The species was carried forward for analysis because it is known to inhabit the Platte River system.
Ferruginous hawk	*Buteo regalis*		✓	✓	SS				NSSU	SC	SPC	The species commonly occurs in the Project area.
Flammulated owl	*Otus flammeolus*					SS	SS	SS				The species is known to occur near the Project area. Heritage data included occurrences of the species in the Uinta Mountains. Heritage data included a single occurrence of the species north of Helper, Utah, in 1982 and older occurrences from the 1960s (CNHP 2011; UNHP 2012; WYNDD 2011).
Flannelmouth sucker	*Catostomus latipinnis*		✓	✓	CA				NSS1		CS	Some transmission line alternative routes for the Project are located near and/or cross known habitat for the species (CNHP 2011; UNHP 2012; WYNDD 2011).
Flathead chub	*Platygobio gracilis*								NSS4	SC		The species is not known to occur in the Project area. The species was carried forward for analysis because it is known to inhabit the Platte River system.

TABLE E-9
SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Forster's tern	*Sterna forsteri*								NSS3			The species is known to occur in the Project area. Heritage data included three occurrences of the species southwest of Rawlins near Hogback Lake (Link W30) (CNHP 2011; UNHP 2012; WYNDD 2011).
Franklin's gull	*Leucophaeus pipixcan*								NSS3			According to the Wyoming Wildlife Action Plan, the Project area is within predicted range for the species (WGFD 2010a). However, Birds of North America indicates that the Project area is well outside known range for the species (Birds of North America 2005). Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011). The species was carried forward for analysis because water bodies near the Project area exhibit characteristics of suitable habitat for the species and are within the range of the species.

TABLE E-9
SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Fringed myotis	*Myotis thysanodes*		✓	✓	SS				NSS3		SPC	Heritage data did not include any known occurrences of the species in the Project area; however, some occurrences have been recorded within 10 miles of transmission line alternative routes in Utah (CNHP 2011; UNHP 2012; WYNDD 2011). The species was carried forward for analysis because portions of the Project area are located in suitable habitat for the species.
Golden eagle	*Aquila chrysaetos*					MIS	MIS					The species commonly occurs in the Project area.
Grasshopper sparrow	*Ammodramus savannarum*				SS				NSS4		SPC	Migrant individuals of the species may pass through the Project area in the summer, even though habitats in the Project area are considered marginal for the species. Heritage data included five occurrences of the species in the Uinta Basin (CNHP 2011; UNHP 2012; WYNDD 2011).

TABLE E-9
SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Gray wolf	*Canis lupus*	SPC								FE/SE		Suitable habitats for the species are located in portions of the Project area. Utah Heritage data included two occurrences of the species near the Project area in Utah that were reported by members of the general public (UNHP 2012). Both observations were made in 1989 and may have been the same individual wolf. Wyoming Heritage data included one occurrence of the species in 2003 and was the first observation in the area in 22 years (WYNDD 2011). This observation was made by a WGFD employee.
Great Basin gopher snake	*Pituophis catenifer deserticola*								NSS2			The Project area is within the known range for the species (WGFD 2010a). Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Great Basin pocket mouse	*Perognathus parvus*								NSS3			The Project area is within the predicted range for the species (WGFD 2010a). Heritage data did not include any occurrences of the species in the Project area in the past 50 years. The closest recent occurrence of the species was recorded approximately 18 miles from transmission line alternative routes in 1990 (CNHP 2011; UNHP 2012; WYNDD 2011).

TABLE E-9
SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Great Basin spadefoot	*Spea intermontana*		✓	✓					NSSU			The Project area is within the predicted range for the species (WGFD 2010a). Heritage data included occurrences of the species in the Project area in Wyoming and Colorado (CNHP 2011; UNHP 2012; WYNDD 2011).
Greater sage-grouse	*Centrocercus urophasianus*	C	✓	✓	CN	SS/ MIS	SS	SS	NSS2	SC	S-ESA	The species is known to occur in the Project area in all three states and is heavily monitored (CNHP 2011; UNHP 2012; WYNDD 2011).
Greater sandhill crane	*Grus canadensis tabida*								NSS4	SC		The species is known to occur in the Project area. Portions of the Project area include suitable habitat for the species (CDOW 2006; WGFD 2010a). Heritage data included occurrences of the species along the North Platte River, Little Snake River, Yampa River, and in Routt National Forest (CNHP 2011; WYNDD 2011).
Greater short-horned lizard	*Phrynosoma hernandesi*								NSS4			The Project area is within predicted range for the species (WGFD 2010a). Heritage data did not include any occurrences of the species in the Project area (WYNDD 2011).
Humpback chub	*Gila cypha*	E				o	o	o		FE/ST	S-ESA	The species is known to occur within the Project area. Heritage data included four known occurrences of the species that are crossed by or are in close proximity to transmission line alternative routes (CNHP 2011; UNHP 2012; WYNDD 2011).

TABLE E-9
SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Iowa darter	*Etheostoma exile*								NSS3	SC		The species is known to occur within the Project area. The species is found in the Yampa River near Dinosaur National Monument (USGS 2004).
Juniper titmouse	*Baeolophus ridgwayi*								NSS3			The species is known to occur in the Project area. Heritage data included ten occurrences of the species in the Project area along Links W492, W520, and W493 (CNHP 2011; UNHP 2012; WYNDD 2011). A Christmas Bird Count and Breeding Bird Survey report included occurrences of the species in Colorado and Utah (Gough et al. 1998).
Kit fox	*Vulpes macrotis*			✓	SS					SE	SPC	Portions of the Project area are within the known range for the species (CDOW 2006; UDWR 2005a). Heritage data included occurrences of the species in the Project area in Grand County, Utah, and Mesa County, Colorado (CNHP 2011, UNHP 2012).
Land snails	Combined account								NSSU			Wyoming Heritage data for this group of species is lacking and little is known regarding distribution (WYNDD 2011). Land snails are potentially present in portions of the Project area based on habitat requirements.

TABLE E-9
SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Lark bunting	*Calamospiza melanocorys*								NSS4			The species may occur within the Project area in Wyoming during summer months. Heritage data included one occurrence of the species 20 years ago and two other observations from 1940 along Link U490 in Utah (UNHP 2012). Wyoming Heritage data did not include any occurrences of the species (WYNDD 2011).
Least chub	*Iotichthys phlegethontis*	C			CN						S-ESA/ CS	A UDWR study referenced monitored populations of the species in Burraston Ponds near Mona, Utah, which is approximately 1 mile from Links U640 and U650 (Bailey et al. 2005).
Least tern (interior population)	*Sternula antillarum*	E								FE/SE		The species inhabits areas along the Platte River in Nebraska (Birds of North America 2005). Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Lesser scaup	*Aythya affinis*								NSS3			The species was reported in the general Project area, but no detailed locations were available (Cook 1984). A Christmas Bird Count and Breeding Bird Survey report occurrences of the species near bodies of water in the Project area (Gough et al. 1998).

TABLE E-9
SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Lewis's woodpecker	*Melanerpes lewis*				SS				NSSU		SPC	Known breeding habitat for the species is located in portions of the Project area (Birds of North America 2005). Heritage data included occurrences of the species in the Project area along Nebo Creek and numerous occurrences of the species along the Green River (UNHP 2012).
Lincoln's sparrow	*Melospiza lincolnii*					MIS						The Project area is within known range of the species (Birds of North America 2005). Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Little brown myotis	*Myotis lucifugus*								NSS4			The Project area is within predicted range for the species (WGFD 2010a). Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Loggerhead shrike	*Lanius ludovicianus*		✓									Known breeding habitat for the species is located in portions of the Project area (Birds of North America 2005). Heritage data included occurrences of the species in the Project area in Wyoming (CNHP 2011; UNHP 2012; WYNDD 2011).
Long-billed curlew	*Numenius americanus*		✓	✓	SS				NSS3	SC	SPC	The species is known to occur in the Project area (Birds of North America 2005).

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SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Long-eared myotis	*Myotis evotis*		✓						NSS3			Portions of the Project area are within predicted range for the species (WGFD 2010b). Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Long-legged myotis	*Myotis volans*								NSS3			The Project area is within predicted range for the species (WGFD 2010a). Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Long-nosed leopard lizard	*Gambelia wislizenii*			✓						SC		The species is known to occur in the Project area. Heritage data included several occurrences of the species in the Project area in Garfield and Mesa counties, Colorado (CNHP 2011).
Macroinvertebrates (aquatic)	Combined Account					MIS	MIS					Numerous species inhabit the waterways in the Project area.
McCown's longspur	*Calcarius mccownii*								NSS4			The species may breed and forage in grassland habitats near the Aeolus substation during the summer (Birds of North America 2005). Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).

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SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Merlin	*Falco columbarius*								NSSU			The species is known to occur within the Project area. Heritage data included relatively recent occurrences of the species along Muddy Creek (Link W111), east of Hogback Lake and along the North Platte River (Link W30) (WYNDD 2011).
Mexican spotted owl	*Strix occidentalis lucida*	T								FT/ST	S-ESA	The Project area is within the known range for the species (Birds of North America 2005). The Project area is outside designated critical habitat for the species. Potentially suitable habitat for the species may be present within portions of the Project area. Heritage data did not include any occurrences of the species within the Project (CNHP 2011; UNHP 2012; WYNDD 2011).
Milk snake	*Lampropeltis triangulum taylori*			✓								Distribution, range and recorded observations of this subspecies are lacking. Heritage data included occurrences of the species in Utah (UNHP 2012).
Moose	*Alces alces*								NSS4			The species is known to occur within the Project area. Portions of the Project area are within suitable habitats and range for the species.
Mountain plover	*Charadrius montanus*		✓	✓	SS				NSSU	SC	SPC	Portions of the Project area include known breeding areas for the species (Birds of North America 2005).

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SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Mountain sucker	*Catostomus platyrhynchus*			✓						SC		Portions of the Project area in Colorado and Utah are within the known range for the species (Colorado Parks and Wildlife 2010); (Belica et al. 2006). Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Mountain whitefish	*Prosopium williamsoni*								NSS4			The species inhabits the Yampa River system (WGFD 2010a), which is crossed by transmission line alternative routes. Heritage data included two occurrences of the species in the Yampa River near Hayden, Colorado (CNHP 2011; UNHP 2012; WYNDD 2011).
Mule deer	*Odocoileus hemionus*					MIS	MIS					The species is known to occur throughout the Project area. Portions of the Project area are within suitable habitats and range for the species.
Northern flying squirrel	*Glaucomys sabrinus*								NSS4			The Project area is on the extreme edge of predicted range for the species (WGFD 2010a). Wyoming Heritage data did not include any occurrences of the species in the Project area (WYNDD 2011). Utah Heritage data included one occurrence of the species from 1966 in Brook Meadow, which is approximately 10 miles northeast of Helper (UNHP 2012).

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SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Northern goshawk	*Accipter gentilis*		✓	✓	CA	SS/ MIS	SS/MI S	SS/ MIS	NSSU		CS	The species is known to occur within portions of the Project area. Heritage data included occurrences of the species, primarily on USFS lands throughout the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Northern leatherside chub	*Lepidomeda copei*		✓		CA				NSSU			The Utah Vertebrate Report included maps that indicate that the species may occur in the Project area (UNHP 2003). Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Northern leopard frog	*Rana pipiens*		✓	✓					NSSU	SC		The species is known to occur within portions of the Project area. Heritage data included occurrences of the species in Utah (UNHP 2012).
Northern pintail	*Anas acuta*								NSS3			The species may occur near water habitats in the Project area, primarily in winter months. Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Northern plains killifish	*Fundulus kansae*								NSS4			The species is known to occur within the eastern Platte River system in Wyoming (WGFD 2010a). Heritage data did not include any occurrences of the species in the Project area (WYNDD 2011).

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SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Northern tree lizard	*Urosaurus ornatus wrighti*								NSS1			The Project area is within known range for the species (WGFD 2010a; Stebbins 2003). Heritage data did not include any occurrences of the species in the Project area (WYNDD 2011).
Olive-backed pocket mouse	*Perognathus fasciatus*								NSS4			The species is known to occur within the Project area. Heritage data included occurrences of the species in the Project area (WYNDD 2011).
Oreohelix mountain snails	Combined account								NSSU			The distribution of this group of species is poorly understood but could be present in Project area based on habitat requirements. Wyoming Heritage data did not include any occurrences of the species for this group of species (WYNDD 2011).
Pale milksnake	*Lampropeltis triangulum multistriata*								NSS3			The Project area extends into the western edge of the predicted range for the species (WGFD 2010a). Heritage data did not include any occurrences of the species of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Pallid bat	*Antrozous pallidus*								NSS3			The Project area is within the known range for the species (WGFD 2010a). Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).

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Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Pallid sturgeon	*Scaphirhynchus albus*	E										The species is native to the Platte River in eastern Nebraska and is not known to occur in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011) but may be affected by water use within the Platte River watershed in Wyoming.
Peregrine falcon	*Falco peregrinus anatum*		✓	✓		SS	SS	SS	NSS3	SC		The species is known to occur within portions of the Project area. Heritage data included occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Pill clams	Combined account								NSSU			This group of species may be present in the Project area based on habitat requirements (WGFD 2010a). Wyoming Game and Fish indicates that pill clams could be present in some water systems in the Project area in Wyoming. Heritage data did not include any occurrences for this group of species (WYNDD 2011).
Pinyon mouse	*Peromyscus truei*								NSS3			The Project area is within known range for the species (Smithsonian 2011). Heritage data included one occurrence of the species in the Project area approximately 5 miles west of Baggs, Wyoming in 1977 (WYNDD 2011).

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SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Piping plover	*Charadrius melodus circumcinctus*	T								FT/ST		The species has no designated critical habitat in the Project area. Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011). The species was carried forward for detailed analysis because it inhabits habitats along the Platte River system.
Plain pocketbook	*Lampsilis cardium*								NSSU			The Project area is outside predicted range for the species (WGFD 2010a). The species was carried forward for detailed analysis because it occurs in the Platte River system.
Plains black-headed snake	*Tantilla nigriceps*								NSSU			The Project area is within the predicted range for the species (WGFD 2010a). Other sources indicated that the Project area is outside known range for the species (Stebbins 2003). Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Plains orangethroat darter	*Etheostoma spectabile*								NSSU	SC		The species occurs in the extreme eastern Platte River in Wyoming (WGFD 2010a). Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).

TABLE E-9
SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Plains topminnow	*Fundulus sciadicus*								NSS3			The species occurs in the extreme eastern Platte River in Wyoming (WGFD 2010a). Heritage data did not include any occurrences of the species in the Project area (WYNDD 2011).
Pond snails	Combined Account (*Stagnicola*)								NSSU			Wyoming Heritage data for this group of species is lacking and little is known regarding distribution (WYNDD 2011). This group of species was carried forward for detailed analysis because they are potentially present in portions of the Project area based on habitat requirements.
Pygmy nuthatch	*Sitta pygmaea*								NSSU			Project area is within predicted range for the species (WGFD 2010a). Heritage data did not include any occurrences of the species in the Project area (WYNDD 2011).
Pygmy rabbit	*Brachylagus idahoensis*	SPC	✓		SS				NSS3		SPC	The species is known to occur within portions of the Project area (CDOW 2006; UDWR 2005a; WGFD 201ab). Heritage data included occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).

TABLE E-9
SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Razorback sucker	*Xyrauchen texanus*	E				o	o	o		FE/SE	S-ESA	The species is known to occur in the Project area in Utah and Colorado. The species inhabits the Green, Yampa, and Colorado River systems, which are crossed by transmission line alternative routes (FWS 2002b). Heritage data included occurrences of the species (CNHP 2011; UNHP 2012; WYNDD 2011).
Redhead	*Aythya americana*								NSS3			Winter migrants of the species may be present near areas of water in the Project area (Gough et al. 1998). Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Red-naped sapsucker	*Sphyrapicus nuchalis*					MIS						The Project area is within known range for the species (Birds of North America 2005). Heritage data did not include any occurrences of the species in the Project area (UNHP 2012; WYNDD 2011).
Ringed crayfish	*Orconectes neglectus*								NSSU			The species inhabits the Platte River system (WGFD 2010a). Heritage data did not include any occurrences of the species in the Project area (WYNDD 2011).
River otter	*Lontra canadensis*								NSSU	ST		The species is known to inhabit river systems in the Project area. Heritage data included occurrences of the species near Flaming Gorge, Wyoming (CNHP 2011; UNHP 2012; WYNDD 2011).

TABLE E-9
SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Rocky Mountain bighorn sheep	*Ovis canadensis canadensis*					SS		SS	NSS4			The species is known to occur in the Project area. Potentially suitable habitat for the species is present within portions of the Project area.
Roundtail chub	*Gila robusta*		✓	✓	CA				NSS1	SC	CS	The species is known to inhabit river systems in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Sage sparrow	*Amphispiza belli*		✓						NSS4			The species is known to occur within portions of the Project area. Breeding habitat for the species is present in the Project area (Birds of North America 2005).
Sage thrasher	*Oreoscoptes montanus*		✓						NSS4			The species is known to occur within portions of the Project area. Wyoming Heritage data included occurrences of the species in the Project area (WYNDD 2011).
Short-eared owl	*Asio flammeus*				SS				NSS4		SPC	The species is known to occur within the Project area. Suitable habitat for the species is scattered throughout the Project area.
Smooth greensnake	*Opheodrys vernalis*								NSS3		SPC	Project area is within known range of the species (Redder et al. 2006). Utah Heritage data included one occurrence of the species near Current Creek at Link U420 (UNHP 2012).
Snowy egret	*Egretta thula*								NSS3			The species is known to occur along some waterways in the Project area in Wyoming (Birds of North America 2005).

TABLE E-9
SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Song sparrow	*Melospiza melodia*					MIS						The Project area is within known range for the species (Birds of North America 2005). Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Southern Bonneville springsnail	*Pyrgulopsis transversa*										SPC	The species is known to occur in the Project area. Heritage data included occurrences of the species in Thistle Creek, near Link U625 (UNHP 2012).
Southern leatherside chub	*Lepidomeda aliciae*				CA		SS	SS			SPC	The species is known to occur in water systems in the Project area (UNHP 2012).
Southwestern willow flycatcher	*Empidonax traillii extimus*	E								FE/SE	S-ESA	Portions of the Project area in Utah are within the breeding range of the species (Sedgwick 2000). Critical habitat for the species has been designated along the Colorado River, downstream from transmission line alternative routes (FWS 2005). Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Spotted bat	*Euderma maculatum*		✓		SS	SS	SS	SS	NSS3		SPC	Suitable roosting and foraging habitats for the species are present in the Project area (Luce and Keinath 2007). Heritage data included one occurrence of the species along Chokecherry Creek on the Ashley National Forest; approximately 3 miles north of Link U401 (CNHP 2011; UNHP 2012; WYNDD 2011).

TABLE E-9
SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Stonecat	*Noturus flavus*									SC		The species is known to inhabit the Platte River system, which is in the Project area (USGS 2004). Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Suckermouth minnow	*Phenacobius mirabilis*								NSS2	SE		The species is known to inhabit the Platte River system, which is in the Project area (USGS 2004). Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Swainson's hawk	*Buteo swainsoni*								NSSU			The species is known to occur within portions of the Project area. Heritage data included occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Three-toed woodpecker	*Picoides dorsalis*				SS	SS	SS	SS/ MIS	NSSU		SPC	The Project area is within the known range for the species (Birds of North America 2005). Heritage data included one occurrence of the species in the Project area, near transmission line alternative routes, in 1930. A single adult was detected along Reservation Ridge during a playback survey in 1989. Two other adults were detected along Reservation Ridge in 1989. Links 513 and 515 are located along Reservation Ridge (Allen 2013; CNHP 2011; UNHP 2012; WYNDD 2011).

TABLE E-9
SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Townsend's big-eared bat	*Corynorhinus townsendii*		✓	✓	SS	SS	SS	SS	NSS2	SC	SPC	Suitable roosting and foraging habitats for the species are present in the Project area (Oliver 2000). Heritage data did not include any occurrences of the species within 1 mile of transmission line alternative routes (CNHP 2011; UNHP 2012; WYNDD 2011).
Trumpeter swan	*Cygnus buccinator*		✓						NSS2			The species is occasionally present within portions of the Project area in Wyoming. Heritage data included one occurrence of the species at Hogback Lake in 1985 and one occurrence along Muddy Creek in 1997, which are both near Link W110 (WYNDD 2011).
Vagrant shrew	*Sorex vagrans*								NSS4			The Project area is outside the known range for the species according to North American Mammals online database (Smithsonian 2011). However, the Project area is within predicted range for the species according to the Wyoming Wildlife Action Plan (WGFD 2010a). Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Virginia rail	*Rallus limicola*								NSS3			Project area is within known range for the species (Birds of North America 2005).

TABLE E-9
SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Warbling vireo	*Vireo gilvus*					MIS						The Project area is within known range for the species (Birds of North America 2005). Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Western red bat	*Lasiurus blossevillii*				SS						SPC	The Project area is at the eastern edge of species range (Smithsonian 2011). Heritage data included one occurrence of the species near Helper, Utah, in 1937 and one occurrence near Utah Lake in 1991 (UNHP 2012).
Western scrub-jay	*Aphelocoma californica*								NSS3			Breeding Bird Surveys and Christmas Bird Counts have identified occurrences of the species in Colorado and Utah (Gough et al. 1998). Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Western small-footed myotis	*Myotis ciliolabrum*								NSS4			The Project area is within predicted range for the species (WGFD 2010a). Heritage data did not include any occurrences of the species in the Project area (WYNDD 2011).

TABLE E-9
SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Western snowy plover	*Charadrius alexandrinus nivosus*			✓	SS					SC		UDWR has identified habitat for the species in the Uinta Basin and south of the Book Cliffs (UDWR 2005a). Heritage data included one occurrence of the species within 1 mile of Link U490 in 2005. Heritage data included one other occurrence near Pelican Lake in 1963 (CNHP 2011; UNHP 2012; WYNDD 2011).
Western spiny softshell	*Apalone spinifera hartwegi*								NSS4			The species may occur within river systems in northern Carbon County, Wyoming (WGFD 2010a). Heritage data did not include any occurrences of the species in the Project area (WYNDD 2011).
White-faced ibis	*Plegadis chihi*		✓	✓					NSS3			Important habitats for the species are located within 4 miles of the Project area. Heritage data included occurrences of the species in the Project area in Wyoming and Colorado (CNHP 2011; UNHP 2012; WYNDD 2011).
White-tailed prairie dog	*Cynomys leucurus*	SPC	✓	✓	SS						SPC	The species is known to occur within the Project area. Heritage data included mapped colonies in Utah (CNHP 2011; UNHP 2012; WYNDD 2011).

TABLE E-9 SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS												
			Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			
Common Name	**Scientific Name**	**Endangered Species Act**	**Wyoming**	**Colorado**	**Utah**	**Ashley National Forest**	**Manti-La Sal National Forest**	**Uinta National Forest**	**Wyoming**	**Colorado**	**Utah**	**Rationale and Nearest Known Location to the Project Area**
Whooping crane	*Grus americana*	E								FE/SE		The species is not known to occur in the Project area in Colorado (CNHP 2011). Heritage data included occurrences of the species in Utah in the 1970s but the species is not suspected to presently inhabit Utah (UNHP 2012). According to the Colorado Action Plan, the species is not known to have breeding populations in Colorado (CDOW 2006). The Project area is outside known range according to (Birds of North America 2005). Designated critical habitat for the species occurs downstream from the Project on the Platte River and may be affected by water use within the Platte River watershed.
Willow flycatcher	*Empidonax traillii*								NSS4			Portions of the Project area are within potentially suitable breeding habitats for the species (Birds of North America 2005). Heritage data did not include any occurrences of the species in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Wood frog	*Lithobates sylvaticus*								NSS2	SC		The Project area is within the predicted range for the species (WGFD 2010a). However, Heritage data indicated that the closest occurrence of the species is more than 40 miles away from transmission line alternative routes (CNHP 2011; UNHP 2012; WYNDD 2011).

TABLE E-9
SPECIAL STATUS WILDLIFE SPECIES CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species			State Sensitive Species[2]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Wyoming pocket gopher	*Thomomys clusius*	SPC	✓						NSS3			The Project area is within known range and distribution of the species (WGFD 2010a). Heritage data included occurrences of the species in the Project area in Wyoming (WYNDD 2011).
Yellow-billed cuckoo	*Coccyzus americanus*	PT	✓	✓	CN	SS	SS	SS	NSSU	SC	S-ESA	The species has been observed along various waterways in the Project area (Cerovski et al. 2004). Heritage data included occurrences of the species within and near Ouray National Wildlife Refuge (CNHP 2011; UNHP 2012; WYNDD 2011).

NOTES:
[1]Listed by at least one of the Bureau of Land Management districts
[2] Special status species in at least one state

Endangered Species Act
- C = Candidate
- E = Endangered
- EX = Experimental/nonessential
- T = Threatened
- P = Proposed
- SPC = Species of Concern

Bureau of Land Management
- ✓ = Sensitive species present in district
- CA = Conservation Agreement species
- CN = Candidate species
- SS = BLM Sensitive Species

U.S. Forest Service
- ✓ = Potential habitat within Forest
- o = Off-site, primarily relates to downstream fish
- MIS = Management Indicator Species
- SS = Sensitive Species with known habitat on Forest

Wyoming
- NSSU = Native Species Status Unknown
- NSS# = Native Species Status – the lower the number, the greater the conservation need; NSS1-NSS4 = Species of Greatest Conservation Need

Colorado
- FE = Federally Endangered
- FT = Federally Threatened
- SE = State Endangered
- ST = State Threatened
- SC = State Special Concern (not a statutory category)

Utah
- S-ESA = Sensitive as a result of being listed under the ESA
- CS = Conservation Agreement Species
- SPC = Species of Conservation Concern

TABLE E-10
SPECIAL STATUS WILDLIFE SPECIES NOT CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species[2, 3]			State Sensitive Species[4]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Abert's squirrel	*Sciurus aberti*						MIS					Abert's squirrel is an MIS on the Manti-La Sal National Forest. Abert's squirrel is a Utah State high interest species found only on the Monticello District in Utah (U.S. Forest Service [USFS] 1986b). The Monticello Ranger District of the Manti-La Sal National Forest is not in the Project or study area.
Allen's big-eared bat	*Idionycteris phyllotis*				SS						SPC	The Project area is outside of the predicted range for the species. The species occurs in extreme southern Utah with range extending only into southern Grand County (Utah Division of Wildlife Resources [UDWR] 2005b).
Arizona toad	*Bufo microscaphus*				SS							The Project area is outside of the predicted range for the species. The species occurs in extreme southwestern Utah (UDWR 2005a).
Arkansas darter	*Etheostoma cragini*									ST		The species is not known to occur in the Project area (Colorado Natural Heritage Program [CNHP] 2011). The species occurs in the Arkansas River east of Canon City, Colorado (almost 200 miles from the Project area) (U.S. Geological Survey [USGS] 2004).

TABLE E-10
SPECIAL STATUS WILDLIFE SPECIES NOT CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species[2, 3]			State Sensitive Species[4]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Barrow's goldeneye	*Bucephala islandica*								NSS3			The species is not known to occur in the Project area (WYNDD 2011). Breeding Bird Survey and Christmas Bird Count have not identified the species as occurring in the Project area (Gough et al. 1998). The Project area includes minimal habitat for the species based on Wyoming Game and Fish Department (WGFD) range map (WGFD 2010a).
Bear Lake sculpin	*Cottus extensus*										SPC	Predicted range for the species is outside the Project area (UDWR 2005a).
Black Hills red-bellied snake	*Storeria occipitomaculata pahasapae*								NSSU			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
Black-backed woodpecker	*Picoides arcticus*								NSSU			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
Black-tailed prairie dog	*Cynomys ludovicianus*	SPC	✓							SC		Predicted range for the species is outside the Project area (Colorado Division of Wildlife [CDOW] 2006).

TABLE E-10
SPECIAL STATUS WILDLIFE SPECIES NOT CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species[2, 3]			State Sensitive Species[4]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Boreal owl	*Aegolius funereus*					SS			NSS3			Potentially suitable habitat for the species occurs in the Project area but the species is not known to occur in the Project area. The species is known to occur within Uinta Mountains on the Ashley National Forest; suitable coniferous habitat does not occur on the portion of the Forest within the Project area. Heritage data included a single occurrence of the species in the Project area in Wyoming in 1989. However, the accuracy of the species identification has been questioned (Jorgensen 2013, Utah Natural Heritage Program [UNHP] 2012; Wyoming Natural Diversity Database [WYNDD] 2011).
Botta's pocket gopher	*Thomomys bottae rubidus*									SC		The species is not known to occur in the Project area (CNHP 2011). The species is known to occur in the eastern half of Colorado (CDOW 2006).
Burbot	*Lota lota*								NSS3			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
Calico crayfish	*Orconectes immunis*								NSS4			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).

TABLE E-10
SPECIAL STATUS WILDLIFE SPECIES NOT CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species[2, 3]			State Sensitive Species[4]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
California condor	*Gymnogyps californianus*	E/X										The species has not been observed in the Project area. The Project area is approximately 120 miles from Lake Powell and portions of the Colorado River where the species has been reintroduced. The species would not be affected by the Project.
Canada lynx	Lynx canadensis	T								FT/SE	S-ESA	Colorado Parks and Wildlife reintroduced lynx in Colorado from 1999 to 2006. A predictive map of lynx habitat use in Colorado indicates that lynx could occupy habitats east of the Project in the Routt and White River National Forests (Colorado Parks and Wildlife 2012a). Both forests are located within the Project area but are not directly crossed by any of the Project alternatives. The natural lynx population in Utah has likely been extirpated; however released lynx have been tracked dispersing across northern Utah in the high Uinta Mountains, but none are known to have settled in Utah (UDWR 2005a). The Uinta-Wasatch-Cache National Forest contains designated lynx analysis units and linkage areas, though no lynx are known to occur on the forest (Jorgensen 2013). USFS announced that Canada lynx hair was found along Link U630 in the Manti-La Sal National Forest in 2002 (UDWR 2005a), though no lynx have been reported since.

TABLE E-10
SPECIAL STATUS WILDLIFE SPECIES NOT CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species[2, 3]			State Sensitive Species[4]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Canyon treefrog	*Hyla arenicolor*			✓								The species is not known to occur in the Project area. All occurrences of the species are located south of Interstate 70 (I-70) in Colorado, which is outside Project area (CNHP 2011). The known range for the species is south of Moab and Grand Junction (CDOW 2006; UDWR 2005a).
Cave physa	*Physella spelunca*								NSSU			The species is not known to occur in the Project area (WYNDD 2011). The species is only known to inhabit a single cave near Lovell, Wyoming (more than 200 miles north of the Project area) (WGFD 2010a).
Central stoneroller	*Campostoma anomalum*								NSS4			The species is not known to occur in the Project area (WYNDD 2011). Species does not occur in Carbon or Sweetwater counties (WGFD 2010a).
Common chuckwalla	*Sauromalus ater*				SS							The species is not known to occur in the Project area (UNHP 2012). The species occurs in the Mojave Desert, which is outside of the Project area (UDWR 2005a).
Common garter snake	*Thamnophis sirtalis*									SC		UNHP data included one occurrence within 1 mile of transmission line alternative routes at Seely Pond, which is north of Mount Pleasant, Utah (Link U631) (UNHP 2012). CNHP data included no occurrences of the species within Colorado (where the species is listed) (CNHP 2011). The Project area in Colorado is outside known range for the species (Stebbins 2003).

TABLE E-10
SPECIAL STATUS WILDLIFE SPECIES NOT CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species[2, 3]			State Sensitive Species[4]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Common king snake	*Lampropeltis getula*									SC		The species is not known to occur in the Project area (CNHP 2011). The species range only extends into the extreme southwestern corner of Colorado (CDOW 2006).
Coral Pink Sand Dunes tiger beetle	*Cicindela albissima*				CN							The Project area is outside the predicted range for the species (UDWR 2005a). The species is only known know to occur in Kane County near Kanab, Utah (UDWR 2005a).
Couch's spadefoot	*Scaphiopus couchii*									SC		The species is not known to occur in the Project area (CNHP 2011). The species range only extends into the extreme southwestern corner of Colorado (AmphibiaWeb 2012).
Cylindrical papershell	*Anodontoides ferussacianus*								NSSU	SC		The species is not known to occur in the Project area (CNHP 2011; WYNDD 2011).
Dark kangaroo mouse	*Microdipodops megacephalus*				SS						SPC	The Project area is outside the known range for the species (Smithsonian 2011). The species is not known to occur in the Project area (UNHP 2012).
Desert iguana	*Dipsosaurus dorsalis*				SS							The species is not known to occur in the Project area (UNHP 2012). The species occurs in the Mojave Desert, which is outside of the Project area (UDWR 2005a).
Desert night lizard	*Xantusia vigilis*				SS							The species is not known to occur in the Project area (UNHP 2012). The species occurs in the Mojave Desert, which is outside of the Project area (UDWR 2005a).

TABLE E-10
SPECIAL STATUS WILDLIFE SPECIES NOT CARRIED FORWARD FOR ANALYSIS

Common Name	Scientific Name	Endangered Species Act	Bureau of Land Management Sensitive Species[1]			U.S. Forest Service Sensitive Species[2, 3]			State Sensitive Species[4]			Rationale and Nearest Known Location to the Project Area
			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Desert sucker	*Catostomus clarkii*				SS							The species is not known to occur in the Project area (UNHP 2012). The species occurs in the Virgin River system, which is outside of the Project area (UDWR 2005a).
Dickcissel	*Spiza americana*								NSS4			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
Finescale dace	*Phoxinus neogaeus*								NSS2			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
Fisher	*Martes pennanti*							SS	NSSU			Predicted range for the species is outside the Project area in Wyoming (WGFD 2010a). The species is believed to be extirpated from Utah. Only one occurrence of the fisher has been reported in Utah. In 1938, fisher tracks were photographed near Trial Lake in Summit County, outside of the Project area. No other occurrences of the fisher in the state have been documented in Utah (UNHP 2012; WYNDD 2011).
Giant floater	*Pyganodon grandis*								NSSU			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
Gila monster	*Heloderma suspectum*				SS							The species is not known to occur in the Project area (UNHP 2012). The species occurs in the Virgin River system, which is outside of the Project area (UDWR 2005a).

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			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Goldeye	*Hiodon alosoides*								NSS3			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
Great Basin silverspot butterfly	*Speyeria nokomis nokomis*			✓								Predicted range for the species is outside the Project area (CDOW 2006). The species is not known to occur in the Project area (CNHP 2011).
Great Basin skink	*Plestiodon skiltonianus utahensis*								NSSU			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
Great gray owl	*Strix nebulosa*					SS			NSSU			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (UNHP 2012; WYNDD 2011).
Great Plains earless lizard	*Holbrookia maculata maculata*								NSSU			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
Great Plains narrowmouth toad	*Gastrophryne olivacea*									SC		Predicted range for the species is outside the Project area (AmphibiaWeb 2012). The species is not known to occur in the Project area (CNHP 2011)
Great Plains toad	*Bufo cognatus*				SS				NSSU		SPC	The species is believed to be extinct in Utah (Bosworth 2003) and is not known to occur in western Colorado or western Wyoming (CNHP 2011; UNHP 2012; WYNDD 2011).

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			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Greenback cutthroat trout	*Oncorhynchus clarkii stomias*	T								FT/ST		The species was discovered in Manti-La Sal National Forest in 2009 in Beaver Creek, a tributary to La Sal Creek (UDWR 2009a). Beaver Creek is on the southern end of the forest unit, outside the Project area. Heritage data did not include any known occurrences of the species in the Project area.
Grizzly bear	*Ursus arctos horribilis*	T								FT/SE	S-ESA	The predicted range for the species does not extend south of Yellowstone National Park (Smithsonian 2011). Heritage data included one occurrence from the 1870 and one occurrence from the "early 1900s" near transmission line alternative routes (CNHP 2011; UNHP 2012; WYNDD 2011).
Gunnison sage-grouse	*Centrocercus minimus*	C		X	CN					SC	S-ESA/ CS	All occurrences of the species included in Heritage data were south of I-70. The Project area is north of I-70 and is approximately 8 miles from the closest occurrence (brood/nesting habitat). All occupied habitat and occurrences are south of the Colorado River. The Project area is north of the Colorado River (CNHP 2011; UNHP 2012).
Gunnison's prairie-dog	*Cynomys gunnisoni*				SS						SPC	Predicted range for the species is outside the Project area (UDWR 2006). All occurrences of the species are south of I-70 (UNHP 2012). Transmission line alternative routes are north of I-70 and are approximately 28 miles from the closest occurrence.

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			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Harlequin duck	*Histrionicus histrionicus*								NSS3			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
Hayden's shrew	*Sorex haydeni*								NSS4			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
Hidden Forest Uinta chipmunk	*Neotamias umbrinus nevadensis*								NSS4			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
Hispid pocket mouse	*Chaetodipus hispidus*								NSS3			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
Hornyhead chub	*Nocomis biguttatus*		✓						NSS2			The species is not known to occur in the Project area (UNHP 2012). The species is believed to be extinct within the Platte River system. The species is found no further west than around Wheatland, Wyoming (Miller et al. 2005).
Idaho pocket gopher	*Thomomys idahoensis*		✓						NSS3			Predicted range for the species is outside the Project area (WGFD 2010b; Smithsonian 2011).
Jackson Lake springsnail	*Pyrgulopsis robusta*								NSSU			The predicted range for the species is outside the Project area in northwestern Wyoming (WGFD 2010a).

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			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
June sucker	*Chasmistes liorus*	E						o			S-ESA	No known occurrences of the species exist in the 2-mile-wide study corridor (UNHP 2012). Sucker populations occur in tributaries of Utah Lake including the Provo River. It is probable that the June sucker once spawned in the Spanish Fork River, but irrigation depletions and habitat alteration have left this area uninhabited (FWS 1999a). Hobble Creek is designated as critical habitat for June sucker on the Uinta National Forest (FWS 2012d). The Project does not cross the Hobble Creek watershed, which is located approximately 13 miles north of transmission line alternative route.
Kendall Warm Springs dace	*Rhinichthys osculus thermalis*	E										Predicted range for the species is outside the Project area. The species occurs in Sublette County, Wyoming (WGFD 2010a).
Lake chub	*Couesius plumbeus*									SE		Predicted range for the species is outside the Project area (CDOW 2006). The species is not known to occur in the Project area (CNHP 2011). The species may occur in upper Green River above Flaming Gorge. The species does not occur in Colorado River watersheds in the Project area.
Least weasel	*Mustela nivalis*								NSSU			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).

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			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Lesser prairie-chicken	*Tympanuchus pallidicinctus*									ST		Predicted range for the species is outside the Project area (CDOW 2006). The species is not known to inhabit areas west of the Rocky Mountains.
Massasauga	*Sistrurus catenatus*									SC		Predicted range for the species is outside the Project area (CDOW 2006). The species is not known to occur in the Project area (CNHP 2011). The species occurs in southern Colorado.
Mojave rattlesnake	*Crotalus scutulatus*				SS							The species is not known to occur in the Project area (UNHP 2012). The species occurs in the Mojave Desert, which is outside of the Project area.
Ninemile pyrg	*Pyrgulopsis nonaria*										SPC	Predicted range for the species is outside the Project area. The species is only known occur in springs near Nine Mile Reservoir south of Sterling, Utah (approximately 30 miles from the Project area) (Oliver and Bosworth 1999).
North American wolverine	*Gulo gulo luscus*	C				SS			NSS3	SE		Predicted range for the species is outside the Project area. The species may have been extirpated from Wyoming and Utah. (UDWR 2005a; WGFD 2010a). UNHP data included two occurrences of the species near Link U600 in Manti-La Sal National Forest. However, the sightings appear to have been contested (UNHP 2012).
Northern cricket frog	*Acris crepitans*									SC		The species is not known to occur in the Project area (CNHP 2011).

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			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Northern many-lined skink	*Plestiodon multivirgatus multivirgatus*								NSSU			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
Northern myotis	*Myotis septentrionalis*								NSS3			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
Northern pocket gopher	*Thomomys talpoides macrotis*									SC		The species is not known to occur in the Project area (CNHP 2010). Colorado GAP data indicated that the Project area is outside the range for the species.
Northern pygmy-owl	*Glaucidium gnoma californicum*								NSSU			Predicted range for the species is outside the Project area (Birds of North America 2005; (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
Northern redbelly dace	*Phoxinus eos*									SE		Predicted range for the species is outside the Project area (USGS 2004). The species is not known to occur in the Project area (CNHP 2010).
Northern rubber boa	*Charina bottae*								NSS3			Predicted range for the species is outside the Project area in Wyoming (WYNDD 2011). Utah Heritage data included three occurrences of the species near the western end of the Project area in Utah (UNHP 2012).
Ornate box turtle	*Terrapene ornata ornata*								NSSU			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).

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			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Pearl dace	*Margariscus margarita*								NSS2			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
Pilose crayfish	*Pacifastacus gambelii*								NSSU			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
Plains garter snake	*Thamnophis radix*								NSSU			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
Plains harvest mouse	*Reithrodontomys montanus*								NSS3			Predicted range for the species is outside the Project area (Smithsonian 2011; WGFD 2010b). The species is not known to occur in the Project area (WYNDD 2011).
Plains hog-nosed snake	*Heterodon nasicus*								NSSU			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
Plains leopard frog	*Rana blairi*									SC		Predicted range for the species is outside the Project area (CDOW 2006). The species is not known to occur in the Project area (CNHP 2011).
Plains minnow	*Hybognathus placitus*								NSS3	SE		Predicted range for the species is outside the Project area. The species is not known to occur in the Project area (CNHP 2011; WYNDD 2011).

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			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Plains pocket gopher	*Geomys bursarius*								NSS3			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
Plains pocket mouse	*Perognathus flavescens*								NSS3			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
Plains sharp-tailed grouse	*Tympanuchus phasianellus jamesii*									SE		Predicted range for the species is outside the Project area (CDOW 2006). The species is not known to occur in the Project area (CNHP 2011).
Plains spadefoot	*Spea bombifrons*								NSSU			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
Prairie lizard	*Sceloporus consobrinus*								NSSU			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
Prairie racerunner	*Aspidoscelis sexlineatus viridis*								NSSU			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
Preble's shrew	*Sorex preblei*				SS				NSS3			Predicted range for the species is outside the Project area (Smithsonian 2011; WGFD 2010a). The species is not known to occur in the Project area (UNHP 2012; WYNDD 2011).

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			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Preble's meadow jumping mouse	*Zapus hudsonius preblei*	T								FT/ST		Predicted range for the species is outside the Project area (Smithsonian 2011; WGFD 2010a). The species is not known to occur in the Project area (CNHP 2011; WYNDD 2011).
Pygmy shrew	*Sorex hoyi*								NSS2			Predicted range for the species is outside the Project area. (Smithsonian 2011). The species is not known to occur in the Project area (WYNDD 2011).
Red-sided garter snake	*Thamnophis sirtalis parietalis*								NSSU			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
Rio Grande chub	*Gila pandora*									SC		Predicted range for the species is outside the Project area (CDOW 2006). The species is not known to occur in the Project area (CNHP 2011).
Rio Grande cutthroat trout	*Oncorhynchus clarkii virginalis*	C								SC		Predicted range for the species is outside the Project area (CDOW 2006). The species is not known to occur in the Project area (CNHP 2011).
Rio Grande sucker	*Catostomus plebeius*									SE		Predicted range for the species is outside the Project area (CDOW 2006). The species is not known to occur in the Project area (CNHP 2011).
Rocky Mountain capshell	*Acroloxus coloradensis*									SC		Predicted range for the species is outside the Project area (CDOW 2006). The species is not known to occur in the Project area (CNHP 2011).
Roundtail horned lizard	*Phrynosoma modestum*									SC		The species is not known to occur in the Project area (CNHP 2011).

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			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Sauger	*Sander canadensis*								NSS3			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
Shovelnose sturgeon	*Scaphirhynchus platorynchus*								NSS3			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
Sidewinder	*Crotalus cerastes*				SS							Predicted range for the species is outside the Project area (UDWR 2005a). The species is not known to occur in the Project area (UNHP 2012).
Silky pocket mouse	*Perognathus flavus*				SS				NSS3			Predicted range for the species is outside the Project area (Smithsonian 2011; WGFD 2010a). The species is not known to occur in the Project area (UNHP 2012; WYNDD 2011).
Snake River cutthroat trout	*Oncorhynchus clarkii spp.*								NSS4			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
Southern redbelly dace	*Phoxinus erythrogaster*									SE		The species is not known to occur in the Project area (CNHP 2011). The species occurs in the Arkansas River in the eastern half of Colorado.
Speckled rattlesnake	*Crotalus mitchellii*				SS							Predicted range for the species is outside the Project area (UDWR 2005a). The species is not known to occur in the Project area (UNHP 2012).

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			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Spotted ground squirrel	*Spermophilus spilosoma*								NSS4			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
Sturgeon chub	*Macrhybopsis gelida*								NSS1			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
Swift fox	*Vulpes velox*		✓						NSS4	SC		Predicted range for the species is outside the Project area (Smithsonian 2011; Sovada et al. 2011; WGFD 2010a). The species is not known to occur in the Project area (CNHP 2011; UNHP 2012; WYNDD 2011).
Texas blind snake	*Leptotyphlops dulcis*									SC		The species is not known to occur in the Project area (CNHP 2011). The species is only known to occur in extreme southeastern Colorado (CDOW 2006).
Texas horned lizard	*Phrynosoma cornutum*									SC		The species is not known to occur in the Project area (CNHP 2011). The species is known to occur in southeastern Colorado (CDOW 2006).
Triploid checkered whiptail	*Cnemidophorus neotesselatus*									SC		The species is not known to occur in the Project area (CNHP 2011). The species is known to occur in southeastern Colorado (CDOW 2006).
Upland sandpiper	*Bartramia longicauda*								NSSU			The species is not known to occur in the Project area (WYNDD 2011).
Utah physa	*Physella utahensis*										SPC	The species was historically found in Utah Lake, but is believed to be extirpated. The only existing populations in Utah are in Box Elder County (Oliver and Bosworth 1999).

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			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Utah prairie-dog	*Cynomys parvidens*	T									S-ESA	Established range for the species is outside the Project area. Historic records indicate populations as far north as Sanpete County near Gunnison, which is approximately 30 miles from transmission line alternative routes (UDWR 2005a). The species is not known to occur in the Project area (UNHP 2012).
Valley garter snake	*Thamnophis sirtalis fitchi*								NSSU			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
Virgin River spinedace	*Lepidomeda mollispinis mollispinis*				CA							Predicted range for the species is outside the Project area (UNHP 2012).
Water vole	*Microtus richardsoni*								NSS3			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
Western banded gecko	*Coleonyx variegatus*				SS							Predicted range for the species is outside the Project area (UDWR 2005a).
Western painted turtle	*Chrysemys picta bellii*								NSS4			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
Western pearlshell	*Margaritifera falcata*								NSSU			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).

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			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Western silvery minnow	*Hybognathus argyritis*								NSS2			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
Western threadsnake	*Leptotyphlops humilis*				SS							Predicted range for the species is outside the Project area (UDWR 2005a).
White heel splitter	*Lasmigona complanata*								NSSU			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
White-tailed ptarmigan	*Lagopus leucura*					MIS						An introduced population of the species exists in the northern portion of Ashley National Forest, west of Flaming Gorge. However, predicted range for the species is outside the Project area (Birds of North America 2005). The species is not known to occur in the Project area (UNHP 2012; WYNDD 2011). Additionally, the Project area does not occur within high alpine meadows that are typical of white-tailed ptarmigan habitat (Birds of North America 2005).
Wyoming toad	*Anaxyrus baxteri*	E							NSS1			Predicted range for the species is outside the Project area (WGFD 2010b). The species is not known to occur in the Project area (WYNDD 2011).
Yellow mud turtle	*Kinosternon flavescens*									SC		The species is not known to occur in the Project area (CNHP 2011). The species range does not extend into western Colorado (CDOW 2006).

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			Wyoming	Colorado	Utah	Ashley National Forest	Manti-La Sal National Forest	Uinta National Forest	Wyoming	Colorado	Utah	
Yellow-pine chipmunk	*Neotamias amoenus*								NSS4			Predicted range for the species is outside the Project area (WGFD 2010a). The species is not known to occur in the Project area (WYNDD 2011).
Yellowstone cutthroat trout	*Oncorhynchus clarkii bouvieri*				CA				NSS2			Predicted range for the species is outside the Project area (UDWR 2005a; WGFD 2010a). The species is not known to occur in the Project area (UNHP 2012; WYNDD 2011).
Zebra-tailed lizard	*Callisaurus draconoides*				SS							Predicted range for the species is outside the Project area (UDWR 2005a).

NOTES:
[1]Listed by at least one of the Bureau of Land Management districts
[2]Known habitat within at least one Forest
[3]MIS species on at least one forest, but no known habitat
[4]Special status species in at least one state

Endangered Species Act
- E = Endangered
- T = Threatened
- E = Experimental/nonessential
- C = Candidate
- P = Proposed
- SPC = Species of Concern

Bureau of Land Management
- ✓ = Sensitive species present in district
- CA = Conservation Agreement species
- CN = Candidate species
- SS = BLM Sensitive Species

U.S. Forest Service
- SS = Sensitive Species with known habitat on Forest
- o = Off-site, primarily relates to downstream fish
- MIS = Management Indicator Species

Wyoming
- NSSU = Native Species Status Unknown
- NSS# = Native Species Status – the lower the number, the greater the conservation need; NSS1-NSS4 = Species of Greatest Conservation Need

Colorado
- FE = Federally Endangered
- FT = Federally Threatened
- SE = State Endangered
- ST = State Threatened
- SC = State Special Concern (not a statutory category)

Utah
- S-ESA = Sensitive as a result of being listed under the ESA
- CS = Conservation Agreement Species
- SPC = Species of Conservation Concern

E.6 Special Status Species Accounts

Special status species include plants or animals listed as threatened, endangered, or candidates for listing under the Endangered Species Act (ESA) as well as species assigned sensitive status by the USFS, BLM or the three states crossed by the Project.

Tables E-5 and E-7 include all of the special status plant and special status wildlife species that were carried forward for detailed analysis in the EIS. The known distribution, habitat requirements, and recent and historical locations for those species carried forward for analysis are detailed in the summaries below. The species accounts were compiled through review of scientific literature, agency reports, spatial data available from natural heritage programs, and collaboration with agency resource specialists. Species accounts for special status plant and wildlife that were not carried forward for analysis have not been included as these species will not be affected by the Project.

E.6.1 Special Status Plants

E.6.1.1 Federally Listed Threatened, Endangered, Candidate, and Proposed Plant Species

Barneby Ridge-cress (*Lepidium barnebyanum*) – FWS: Endangered

Regulatory Status

Barneby ridge-cress was first proposed for listing along with 1,700 other vascular plants on June 16, 1976 (41 *Federal Register* [FR] 24523). On December 10, 1979, the FWS withdrew the proposal, because it was not finalized within the 2-year time limit from the initial publication in the *Federal Register* (44 FR 70796). Beginning on October 13, 1983 and each successive year, the FWS made 1-year findings that the petition to list the species was warranted but precluded by other listing actions of higher priority. The final rule to list the species as endangered was published on September 28, 1990 (55 FR 39860). No critical habitat for Barneby ridge-cress has been designated to protect the species from potential vandalism that could occur if the specific geographical area of distribution was widely known. The FWS initiated a 5-year review on October 6, 2008 (73 FR 58261) and published their findings of the 5-year review in July 2011 (FWS 2011e).

The recovery plan for Barneby ridge-cress was published in 1993. The goals of the plan are to prevent the extinction and serious habitat degradation of the species and to downlist Barneby ridge-cress to threatened status. The species eventual recovery and delisting is uncertain. Downlisting criteria described in the plan includes: (1) existing stands and population numbers are maintained; (2) formal management designations for each of the three existing populations are established; (3) a total population of 20,000 individuals is documented for 5 years; and (4) five separate stands of at least 2,000 individuals are maintained (FWS 1993).

Taxonomy and Life History

Barneby ridge-cress, also known as Barneby's pepper-grass (UDWR 2005b), is a member of the mustard family, *Brassicaceae*. It was first discovered by Rupert Barneby in 1947 and later described as a subspecies of *Lepidium montanum* by Hitchcock in 1950. In 1967, James Reveal compared the type specimen to other samples and reclassified Barneby ridge-cress to a unique species, *Lepidium barnebyanum* (FWS 1993).

Barneby ridge-cress is a perennial herb. It grows to approximately half a foot tall and forms easily recognizable raised clumps up to 8 inches wide. It has a deep woody taproot with a smooth, hairless stem

and clumped leaves at the base of the plant. The flowers are cream-colored and 0.25 inches across. The flowers bloom in early May producing very small seeds that are shed from June through July (FWS 1993).

Distribution and Habitat Requirements

The known spatial distribution of Barneby ridge-cress has not changed since completion of the 1993 Recovery Plan. Barneby ridge-cress is known from one population with three separate stands endemic to thin limestone caps on ridge lines near Indian Canyon approximately 3 miles south and southwest of the town of Duchesne, Utah (FWS 2011e).

No new information concerning the demography of Barneby ridge-cress is available since FWS listed the species in 1990 and developed the Recovery Plan in 1993. In the Recovery Plan, FWS estimated the species' population at 5,000 individuals on about 500 acres of suitable habitat occurring entirely on the Ute Indian Tribe's Uintah and Ouray Reservation. Comprehensive surveys of Barneby ridge-cress were conducted in 2010 and 2011. Approximately 2/3 of known suitable habitat was surveyed, and 4,082 plants were counted. By extrapolating out to the rest of the known suitable habitat, the total population for the species was estimated to be approximately 6,000 individuals across approximately 500 acres of suitable habitat (FWS 2011e).

The species is a rare local endemic occurring solely on Tribal lands and access to the species and its habitat is limited. The species' plant community is comprised of small statured shrubs and semi-woody cushion plants on infrequently occurring limestone barrens within broader woodlands dominated by Utah juniper (*Juniperus osteosperma*) and pinyon pine (*Pinus edulis*). The limestone substrate where Barneby ridge-cress grows has the appearance of highly weathered concrete. This particular limestone barren is an unnamed geological stratum of the geologic Uinta Formation. The species is restricted to that stratum. Barneby ridge-cress is an edaphically (soil related) controlled endemic of the Uinta Basin (Welsh et al. 2003).

Primary Threats to Survival

The primary threat to the survival of Barneby ridge-cress is damage due to oil and gas exploration. Ridge-cress habitat is underlain by petroleum deposits with current and potential future development and the potential for significant loss from petroleum resource development is high. The listing of the species as endangered has made huge strides in protecting its habitat from oil and gas development activities (FWS 1993). The recovery plan cites Barneby ridge-cress as being threatened by vehicular impacts due to its narrow distribution along ridgelines. Since the species' listing in 1990, recreational (trail riding and hunting related) off-highway vehicle (OHV) use within the species' occupied habitat has been very light due in large part to Tribal control and active policing to prevent trespass. Therefore, FWS considers the threat of recreational OHV to be low throughout the species' range. Listing under the ESA provides the Tribe an increased awareness of the species' vulnerability and provides the ability to further protect the species by reinforcing laws and regulations pertaining to violations of trespass laws (FWS 2011e). Livestock grazing was reported as a concern in the recovery plan for adverse impact to Barneby ridge-cress and its habitat. However, grazing is no longer allowed within Barneby ridge-cress habitat. Thus, although we do not know how much livestock grazing affected the species historically, we no longer consider livestock grazing to be a threat (FWS 2011e).

Occurrence in the Project Area

The single known population of Barneby ridge-cress is on the Uintah and Ouray Indian Reservation near the city of Duchesne, Utah. The location is near Indian Creek and Indian Canyon, approximately 3 miles

south of Starvation Reservoir (FWS 1993). The entirety of this population is located approximately 3 miles from the junction of Links U402, U430, and U431.

Cisco Milkvetch (*Astragalus sabulosus* var. *sabulosus*) – FWS: Petitioned; BLM: Utah

Regulatory Status

The full species (*Astragalus sabulosus*) was considered a category 2 candidate for listing in 1993 (58 FR 51152); however, the species was never listed. In 2009, the species was petitioned for listing and in their 90-day finding, the FWS determined that listing may be warranted (74 FR 41656). With that determination, the FWS began a status review to determine if listing is warranted. If it is determined that listing is warranted, the species will become a candidate.

Taxonomy and Life History

The Cisco milkvetch is a member of the pea family (*Fabaceae*) (Utah Native Plant Society [UNPS] 2012). The species was split into two varieties (*sabulosus* and *vehiculus*) in 1998 (Franklin 2005).

Cisco milkvetch have coarse leaves and pods with a stiff papery to leathery texture. Flowers are yellowish to whitish and approximately 1.25 inches in length. The variety *vehiculus* has flowers that are smaller and less yellow. The variety flowers from late March through early May (UNPS 2012).

Distribution and Habitat Requirements

This variety of Cisco milkvetch is endemic to the Grand River Valley in Grand County, Utah. It is only known to occur in the 20 miles between Cisco Mesa and Whipsaw Flat (Franklin 2005; UNPS 2012). The species is known from five locations occupying a total area of approximately 800 acres (74 FR 41656). Four extant populations of this variety are known from surveys conducted in 1995 and 1997. Two populations are located in Whipsaw Flat south of Thompson, one population is located along Bread Knolls, and one population approximately 4 miles southwest of Cisco (Utah Natural Heritage PRogram [UNHP] 2012). The Cisco milkvetch occurs on the Mancos Shale Formation in salt desert shrub communities from 4,250 to 5,250 feet (UNPS 2012). The species is highly dependent on sufficient moisture at the right time for seeds to germinate (Franklin 2005).

Primary Threats to Survival

Potential threats include off-road vehicles, energy development, oil and gas development, uranium mining, and natural gas development. In addition to the direct impacts these developments may have, the vibrations created may have an impact on the soils and plants in the vicinity of roads and developments (74 FR 41656).

Occurrence in the Project Area

All known occurrences of this variety lie within 4 miles of Link U490. Two occurrences are located within the 1-mile buffer of Link U490. One is located along Interstate 70 (I-70) approximately 2 miles west of Cisco. This occurrence is based on a museum collection from 1890, but surveys conducted in 1988 and 1995 failed to find any Cisco milkvetch present. The second occurrence is 4 miles southwest of Cisco along I-70. Surveys conducted in 1997 found 210 individuals occupying 5 acres (UNHP 2012).

Clay Phacelia (*Phacelia argillacea*) – FWS: Endangered

Regulatory Status

Clay phacelia was first proposed for listing on June 16, 1976, along with 1,700 other vascular plant species (41 FR 24523). On June 28, 1978, the FWS published a final rule listing clay phacelia as an endangered species (43 FR 44810). No critical habitat has been designated.

The recovery plan for clay phacelia was published in 1982 (FWS 1982). The objective of the plan is to establish a self-sustaining population of 2,000 to 3,000 individuals on 120 acres of protected habitat and possibly establish at least one new population. Once the objective is achieved, clay phacelia can possibly be downlisted, depending on the nature of the existing threats to the species. The FWS is currently re-evaluating recovery goals for clay phacelia to create more meaningful, measurable, and achievable recovery criteria (FWS et al. 2013).

Taxonomy and Life History

Clay phacelia is a member of the waterleaf family (*Hydrophyllaceae*) (UDWR 2005b). It was first collected in 1883 by Marcus E. Jones at Pleasant Valley Junction in Wasatch County, Utah and again in 1894 at Clear Creek near Soldier Summit in Utah County in 1894. However, Jones failed to recognize it as a new species. It was rediscovered in 1971 by N.D. Atwood who identified it as the closely related glandular phacelia (*Phacelia glandulosa*). However, on further examination, substantial differences were seen in the Utah populations and they were thus given unique species status (FWS 1982).

Clay phacelia is a winter annual that reaches heights of 12 inches. The stems are finely pubescent with pinnate leaves. The inflorescence is a compound cyme with blue to violet flowers. It germinates in the fall if there is significant moisture, but can germinate in the spring if conditions in fall are not wet enough. Flowering takes place in late May to early June and fruits are produced from mid-June to September and persist up to 2 weeks. Each fruit can contain up to four seeds. Pollen is primarily spread by wind and possibly bees (FWS 1982).

Dispersed seeds lodge in cracks or crevices on the shale-covered slopes where they germinate when conditions are suitable. Basal rosettes are formed by early to mid-October and they then over-winter growing slowly underneath the snow pack. Where they occur, the extant populations of clay phacelia cover only 3 to 5 percent of the slope's surface in scattered patches (FWS 1982). Overall vegetative cover is generally around 10 percent in habitat for the species (NatureServe 2013).

Distribution and Habitat Requirements

Historically, clay phacelia was known only from the two locations recorded by Jones in Pleasant Valley and Clear Creek. However, later searches were only able to locate the remaining population at Clear Creek near Soldier Summit in Utah County. The Pleasant Valley population remains to be rediscovered or has been eradicated since its initial discovery (UDWR 2005b).

In 1977, only nine plants were known to exist. This may have been occasioned by the construction of a railroad line directly through the population. By 1980 only four plants were left at the site due to trampling by sheep. The population was fenced off and the land was purchased by The Nature Conservancy. In 1989, a search turned up two subpopulations on open slopes approximately 5 miles west-northwest of the Clear Creek site. Today the species is stable but the remaining population totals only about 200 individuals. Clay phacelia is only found in the Spanish Fork Canyon of Utah (FWS 1982).

Clay phacelia grows on steep slopes in sparsely populated juniper-pinyon and mountain brush communities (Welsh et al. 1975). The slopes are very steep; a 70 percent grade at the largest population.

The substrate is described as "shaley clay colluviums" of the Green River Formation (Atwood 1975). As a result, the loose shale on the surface is continually sloughing down the face of the slopes. The majority of the plants grow on slopes facing west or southeast, at elevations between 6,000 and 7,000 feet. Populations are not likely to exist at elevations greater than 8,000 feet above mean sea level (UNPS 1989). Habitat areas are free of snow at least once during the winter and are typically dry in early spring. Associated vegetation includes skunkbush sumac (*Rush trilobata*) and Juneberry (*Amerlanchier alnifolia*) with a degraded sagebrush steppe at the base of the slope (FWS 1982). Overall, vegetation cover is generally around 10 percent in habitat for the species (NatureServe 2013).

Suitable habitat for clay phacelia has been modeled in the Project area by the USFS in the vicinity of known locations and a reintroduction sites. The habitat model for the species uses the parameters of slope, aspect, elevation, vegetative cover, geology, precipitation, and soil pH reported in literature for the species.

Primary Threats to Survival

The primary threat to the survival of clay phacelia is the vulnerability that results from such a drastically small population size. In populations with less than 1,000 individuals, demographic uncertainties can play a significant role in extinction probability. The species is a winter annual with habitat that faces restriction by climactic changes and soil factors. Destruction of portions of the population and modification of potential habitat has severely jeopardized clay phacelia. The Denver and Rio Grande Western Railroad and its associated maintenance road bisect the only known population. The railroad company is aware of the plant and has a positive attitude toward its protection. In addition, sheep moving through the area have trampled some of the plants and squirrels have caused considerable damage by grazing on portions of the plant (FWS 1982).

Occurrence in the Project Area

Clay phacelia is known to occur in the western portion of the Project area in Utah County. It has a population estimated at less than 200 individuals, all of which are known to occur in Spanish Fork Canyon of Utah. The species has been located in the vicinity of Tucker and down-canyon near Mill Fork (UDWR 2005b). Known occurrences of the species are in the Project area along Links U539 and U530. Twelve reintroduction sites for clay phacelia are located in Spanish Fork Canyon, and the USGS has collected and cultivated clay phacelia seeds in a greenhouse for use in reintroduction of the species at four of these sites. The USFS has documented emergence of plants at three of the four reintroduction sites; however, only one individual has been observed as having completed the biennial life cycle and successfully producing seeds.

Clay Reed-mustard (*Schoenocrambe argillacea*) – FWS: Threatened

Regulatory Status

Clay reed-mustard was first listed as a candidate to add to the list of endangered species on December 15, 1980 (45 FR 82480). Beginning on October 13, 1983 and each successive year, the FWS made 1-year findings that the petition to list the species was warranted but precluded by other listing actions of higher priority. On April 12, 1991, the FWS published a proposed rule proposing to list clay reed-mustard as an endangered species (56 FR 14910). Surveys for the species conducted after the proposal date revealed significant additional populations of the species, possibly twice as large as previously thought. Taking the new survey results into account, the FWS found it more appropriate to list clay reed-mustard as a threatened species (57 FR 1398). No critical habitat has been designated because the benefits of publicizing critical habitat are outweighed by the added dangers (57 FR 1398). The FWS initiated a 5-year review on October 6, 2008 (73 FR 58261). The FWS concluded the 5-year review and published the

summary and evaluation for the species on July 11, 2011. The FWS concluded that clay reed-mustard should retain its classification as a threatened species throughout its range, primarily due to threats associated with oil and gas development.

The recovery plan for the Utah reed-mustards was published in 1994. The goal of the plan is to delist clay reed-mustard. Delisting criteria described in the plan includes: (1) discovering or establishing a minimum of ten separate populations with 2,000 or more individuals per population; and (2) documenting or establishing formal land management designations that would provide for long-term protection on undisturbed habitat for the above ten populations (FWS 1994a).

Taxonomy and Life History

Clay reed-mustard, also known as clay Schoenocrambe and the Uinta Basin plainsmustard (UDWR 2005b), was discovered by Duane Atwood in 1976 on a site in the southern portion of the Uinta Basin in Uintah County, Utah, approximately 1 mile from the discovery site of the shrubby reed-mustard (*Schoenocrambe suffrutescens*). It was originally described as *Thelypodiopsis argillacea*. In 1982, the genus was changed to *Schoenocrambe* by Rollins after evaluating the cruciferous genera that also includes the endangered shrubby reed-mustard (*Schoenocrambe suffretescens*) and Barneby reed-mustard (*Schoenocrambe barnebyi*) (FWS 1994a).

Clay reed-mustard is a perennial, herbaceous plant that reaches 1 foot in height. It has a wood root crown. It has alternate leaves arranged on the stem and are connected without a petiole. The flowers are pale lavender to white with prominent purple veins and grow to half an inch in length in a raceme of 3 to 20 flowers at the end of the plant's leafy stem (FWS 1994a).

All three species of reed-mustards flower from April to May with fruit appearing May to June. Reproduction is sexual and pollination is aided by insects. Little is known about the long-term population dynamics, disease, parasitism, effect of grazing, competition, and viability of any of the species (FWS 1994a).

Distribution and Habitat Requirements

Six populations of clay reed-mustard are known within a 19-mile range from the west side of the Green River to the east side of Willow Creek in southwestern Uintah County, Utah. One population is known from the eastern slopes of Big Pack Mountain; one in Broome Canyon to the east; a third is located along the west slopes of Wild Horse Bench; a fourth is immediately north in Long Bottom; a fifth is immediately north of Long Bottom called King's Bottom; and the sixth population is along the slopes of the canyons about Ray's Bottom, on the west side of the Green River. The total population is estimated from approximately 5,300 to 7,450 plants (FWS 2011i).

Clay reed-mustard grows in mixed salt desert shrub communities, generally on north-facing slopes composed of clay soils rich with gypsum overlain with sandstone talus. The sandstone talus of the clay reed-mustard is derived from a mixture of shales and sandstones from the zone of contact between the Uinta and Green River geologic formations. Populations grown on protected sites are generally more robust than those that grow on exposed surfaces (FWS 1994a). Associated vegetation includes crispleaf buckwheat (*Eriogonum corymbosum*), Torrey's jointfir (*Ephedra torreyana*), shadscale, valley saltbush, and saline wildrye (UDWR 2005b).

Primary Threats to Survival

Primary threats to clay reed-mustard include habitat disruption associated with energy development and off-road vehicle use. Most known populations are on federal lands that are leased for oil and gas energy

reserves and petroleum deposits that are being developed in adjacent habitats. In addition, the entire range of the species is underlain by oil shale (FWS 1994a). Most sites of clay reed-mustard contain less than 200 individuals, which increases the chance that populations may be lost as a result of natural variation in population numbers and less genetic diversity thus making the populations more susceptible to natural disasters (57 FR 1398-1403).

Occurrence in the Project Area

Clay reed-mustard inhabits areas in western Uintah County, Utah. There are six distinct populations. Two alternative routes (Links U117 and U400) cross a portion of the King's Bottom population and are within 1 mile of the Ray's Bottom population (FWS 2011i).

Deseret Milkvetch (*Astragalus desereticus*) – FWS: Threatened

Regulatory Status

Deseret milkvetch was first addressed in the July 1, 1975, indicating that the species was probably extinct (40 FR 27823). On June 16, 1976, the FWS published a proposed rule to designate 1,700 plants, including Deseret milk-vetch, as endangered species (41 FR 24523). On December 10, 1979, the FWS withdrew the proposal, because it was not finalized within the 2-year time limit from the initial publication in the *Federal Register* (44 FR 70796). In the December 15, 1980 notice of review, Deseret milkvetch was listed as a category 1 species, indicating that sufficient information on biological vulnerability and threats to support preparation of listing proposals was available. It was also noted that it was believed that Deseret milkvetch may have recently become extinct. In 1981, a population was discovered that led to a relisting as a Category 2 candidate, for which data was not sufficient to support issuance of a listing proposal (48 FR 53640). Surveys in 1990 and 1991 resulted in additional information that reinstated the Category 1 candidate assignment in 1993 (58 FR 51144). The species was eventually listed as a threatened species on October 20, 1999 (64 FR 56590).

On January 25, 2007, an advanced notice of proposed rulemaking was released announcing the intent to remove Deseret milkvetch from the federal list of endangered and threatened plants. Proposed delisting is occurring because threats to the species at the time of listing are not as significant as earlier believed and are managed such that the species is not likely to become in danger of extinction throughout all or a significant portion of its range in the foreseeable future (72 FR 3379). A 5-year review was initiated on April 18, 2007 (72 FR 19549). As of 2011, no critical habitat has been designated, no recovery plan has been published, and no official delisting has occurred for Deseret milkvetch. FWS did not find any threats to the species during the 5-year review process and therefore recommended delisting the species. However the FWS also noted that a single project, such as a major transmission line project, within or affecting occupied habitat could elevate the threats to the species to the point that it will not be able to be delisted (FWS 2011j).

Taxonomy and Life History

Deseret milkvetch is a member of the legume family (*Leguminosae, Fabaceae*). It was first collected near Indianola, Utah in 1893 and 1909 by Marcus E. Jones and Ivar Tidestrom, respectively. It was not described as a separate species until 1964 by Rupert Barneby using specimens from various herbaria. At that time, effort was made to find the original populations from which Jones and Tidestrom collected specimens, but they were unsuccessful. The species was believed to be extinct until found near Birdseye, Utah in 1981. This population is the only current known occurrence (64 FR 56590).

Deseret milkvetch is a perennial, herbaceous species that is nearly stemless and can reach a height of 6 inches. The flowers are typical of the bean family and are white with a purple tip on the keel. The seed

pods are just under an inch long, hairy, and contain 14 to 16 seeds (64 FR 56590). Because the milkvetch is a short-lived perennial, it has no means of vegetative propagation. The survival of the species depends on successful reproduction and germination of seeds annually. Growth and reproduction begin after the annual snow melt, by mid-April (NatureServe 2008a). Flowering and seed setting occurs in May and June. Like most species in the pea family, the flower of Deseret milkvetch is primarily designed to be pollinated by bees. The seeds lay dormant over the winter and germinate in the spring when favorable conditions return (64 FR 56590).

Distribution and Habitat Requirements

Deseret milkvetch is endemic to central Utah and known from only one location on the east side of the Thistle Creek Valley near the town of Birdseye in Utah County (UDWR 2005b). The population consists of an estimated 86,775 to 98,818 individuals growing on 146 acres on both state and privately owned land (FWS 2011j). The known location of Deseret milkvetch is within an open to sparse juniper-sagebrush community on open, steep, naturally disturbed south and west (rarely north) facing slopes of sandy-gravelly soils of the Moroni Formation (UDWR 2005b). On west-facing road cuts, the individuals tend to grow larger. The vegetation is dominated by pinyon pine and Utah juniper. Other associated vegetation includes sagebrush, scrub oak, Indian ricegrass, antelope bitterbrush, and plateau beardtongue (*Penstemon scariosus*) (64 FR 56590).

Primary Threats to Survival

The primary threats to the survival of Deseret milkvetch are residential development, highway widening, and livestock grazing and trampling. The development of real estate adjacent to the single known population poses several threats. The construction could eliminate habitat or interfere with the reproductive success of the species. Increased real estate development would also increase recreational activities that could ultimately lead to decreased milk-vetch habitat. In addition, the limited population size makes the species more susceptible to dangers resulting from limited genetic diversity (64 FR 56590).

Although the distribution is still small and restricted, evidence shows that there has been little to no habitat disturbance in recent years and that there are no foreseeable potential threats to the State-owned portion of the species' range. Only one house has been built on private property within the species' range, affecting less than 1 percent of occupied habitat. As of 2006, there were no plans for highway widening to occur within the range of the species. Livestock grazing is being managed by the UDWR, reducing the threat of trampling of vital habitat (72 FR 3379).

Occurrence in the Project Area

Deseret milkvetch is known to occur in the Project area in Utah County. It has been identified on the east side of Thistle Creek Valley near the town of Birdseye (UDWR 2005b). Link U621 is located within 1 mile of the known Deseret milkvetch population.

Graham's Beardtongue (*Penstemon grahamii*) – FWS: Proposed Threatened; BLM: Colorado and Utah

Regulatory Status

Graham's beardtongue was initially proposed to be listed as endangered on June 16, 1976 (41 FR 24523). However, on December 10, 1979, the species was withdrawn as a candidate because the species had not been listed within 2 years (as required by a 1978 amendments to the ESA). The species was designated as a category 2 candidate for listing on December 15, 1980 (45 FR 82480). On November 28, 1983, Graham's beardtongue was elevated to a category 1 candidate for listing (48 FR 53640–53670). On

January 9, 2006, Graham's beardtongue was proposed to be listed as threatened with critical habitat designated in Uintah County, Utah, and Rio Blanco County, Colorado (71 FR 3158–3196). However, on December 19, 2006, the FWS withdrew the proposed rule to list the species as threatened as threats to the species were determined to be unlikely to threaten or endanger the species in the foreseeable future throughout all or a significant portion of its range. Withdrawal of this proposed rule to list the species also removed the species from candidate status (71 FR 76024–76035). Graham's beardtongue was proposed again for listing as a threatened species on August 6, 2013 (78 FR 47590-47611) and proposed critical habitat was established (78 FR 47532-47858).

Taxonomy and Life History

Graham's beardtongue is a member of the figwort family (*Scrophulariaceae*). The species is a perennial herb that is typically 2.8 to 7 inches in height. Each individual has one to three stems coming from a taproot (78 FR 47591).

The species flowers from late May through mid-June (UNPS 2012). Flowers emerge as a cluster of 3 to 20 flowers. Flowers vary from light to dark lavender or pinkish. Flowers produce 5 to 50 seeds from each of four stamens (78 FR 47591).

Distribution and Habitat Requirements

Graham's beardtongue is limited to the Uinta Basin within known occurrences in Carbon, Duchesne, and Uintah counties in Utah and Rio Blanco County, Colorado (UNPS 2012). The species inhabits exposed raw shale knolls and slopes. The majority of populations are associated with exposed oil shale Mahogany ledge (71 FR 3160).

Primary Threats to Survival

The 2013 proposed rule to list Graham's beardtongue and White River beardtongue as threatened identified present and potential energy exploration and development as the predominant threat to the continued existence of these species (78 FR 47590). Additional threats are invasive weeds and climate change. Livestock grazing, unauthorized collection, road maintenance and construction, wildfire, and small population size were determined not to be threats to these species at present (78 FR 47602-47605).

Occurrence in the Project Area

There are total of 62 occurrences of Graham's beardtongue within 5 miles of Links C22, C188, C196, U240, U242, and U400. Only two occurrences fall within the 1-mile buffer. One occurrence is located approximately 9 miles west of Rangely on the north side of the White River, near Link C220. The other occurrence is close to the centerline of Links C188 and U242 on Raven Ridge near the Utah-Colorado Stateline. Proposed critical habitat for Graham's beardtongue occurs approximately 1 mile from Link U242 and within 1 mile of Link U400 in Utah.

Jones' Cycladenia (*Cycladenia humilis* var. *jonesii*)–FWS: Threatened

Regulatory Status

Jones' cycladenia was proposed for listing on January 10, 1985 (50 FR 1247-1251). On May 5, 1986, the FWS listed Jones' cycladenia as a threatened species (51 FR 16526-16530).

Critical habitat has not been designated for Jones' cycladenia. FWS has not finalized or approved a comprehensive recovery plan for the species but a recovery outline was published in December 2008

(FWS 2008c). The recovery outline is intended to guide recovery efforts and inform consultation and permitting activities until a comprehensive recovery plan for the species has been finalized and approved.

Taxonomy and Life History

The genus *Cycladenia* consists of one species *Cycladenia humilis* treated as having two varieties in California (var. *humilis*, var. *venusta*) (Hickman 1993) and a third variety, Jones' cycladenia (*Cycladenia humilis* var. *jonesii*) found in Utah and Arizona. The closest taxonomic relative to Jones' cycladenia is thought to be *Mandevilla*, a neotropical genus (FWS 2008c).

Jones' cycladenia is a long-lived herbaceous perennial in the Dogbane family (*Apocynaceae*) that grows 4 to 6 inches (10 to 15 centimeters) tall. It has orbicular, wide-oval or elliptical leaves and produces pink or rose-colored, trumpet shaped showers that resemble small morning glories from mid-April to early June (FWS 2008c).

Jones' cycladenia is rhizomatous (FWS 2008c). It overwinters as subterranean rhizomes (roots). Several to a hundred above-ground stems (or ramets) could be a single genetic individual (or genet) (FWS 2008c). Depending on the location, flowering and fruiting occurs from mid-May through June.

Little to no information about age of individual plants, years to reproductive adulthood, survivorship, mortality, or fecundity rates is available. Fruit and seed production is believed extremely limited (FWS 2008c). Its possible pollinators may have been lost or may be migratory and appear episodically (FWS 2008c). In 1992, enzyme electrophoresis research determined that clones do not extend more than 10 meters in any direction. Heterozygosity was low, which suggested inbreeding or population sub-structuring. Genetic variation was great between separated populations (FWS 2008c).

Distribution and Habitat Requirements

Jones' cycladenia occurs between 4,390 to 6,000 feet (1,338 to 1,829 meters) in plant communities of mixed desert scrub, juniper, or wild buckwheat-Mormon tea. It is found on gypsiferous, saline soils of Cutler, Summerville, and Chinle Formations (FWS 2008c). Populations are found on all aspects and on slopes that range from moderate to steep (FWS 2008d).

Primary Threats to Survival

At the time of listing, Jones' cycladenia was known from three sites with low numbers. It was thought to be a Tertiary relict, poorly adapted to the present-day arid climatic regime. Jones' cycladenia's ecosystem was thought fragile, easily degraded and slow to recover (51 FR 16526-16530). Ongoing and potential anthropogenic impacts on habitat include: OHV use; oil, gas, and mineral exploration including uranium mining and tar sands; and livestock grazing (although the rule notes the probability of grazing causing serious damage was low) (51 FR 16526-16530). Habitat disturbance was thought to be reducing seedling establishment. Jones' cycladenia was also at risk due to inadequate state and federal regulatory mechanisms (FWS 2008c).

The variety's threatened status has prompted federal land managers to implement protective measures to limit impacts from OHV and mountain bike use, cattle grazing, and extractive activities. While these threats have been managed to reduce anthropogenic impacts, these issues remain an ongoing and long-term concern. Specifically, mountain biking and OHV use occurs near the Moab and San Rafael complexes; cattle grazing occurs at sites in the San Rafael complex; and uranium mining and tar sands extraction are foreseeable threats in the both the San Rafael and Greater Circle Cliffs complex (both complexes are within Designated Special Tar Sands Areas) (FWS 2008c).

Since listing, a number of other biological limiting factors have been revealed. Preliminary research (1988 to 1993) has shown that the plant has low fruit production and seed set, likely due to a complicated pollination system and inadequate pollinator abundance (i.e., pollinators may have been lost or may be migratory and appear episodically). No seedling germination events have been documented (FWS 2008c). Genetic research at San Rafael (the Spotted Wolf Canyon site), Moab (two separate sites at Onion Creek and Castle Valley) and Greater Circle Cliffs complexes (one site at Deer Point, one site at Silver Falls Canyon, and one site at Purple Hills) indicates that these sites of Jones' cycladenia are genetically distinct and not inbred, but may face other genetic limitations, such as genetic bottlenecking or genetic drift. Several researchers have concluded that an ongoing lack of population recruitment may result in a permanent loss of genetically-important individuals or occupied sites. The species' fractured distribution could further complicate issues associated with limited natural reproduction, dispersal constraints, and genetic risks (FWS 2008c).

As a Tertiary relict, Jones' cycladenia may be affected by global climate change. It is very likely that hot extremes, heat waves, and heavy precipitation will increase in frequency (Intergovernmental Panel on Climate Change 2007). Increased temperatures could result in the need for the species to colonize cooler, higher elevation sites (FWS 2008c).

Other factors reported since the time of listing include, natural predation and relations to fragile cryptobiotic crusts in some locations (FWS 2008c).

Occurrence in the Project Area

The species has not been recorded north of Interstate 80 in Utah. Heritage data did not include any occurrences of the species within 10 miles of transmission line alternative routes (Colorado Natural Heritage Program [CNHP] 2011; UNHP 2012; WYNDD 2011). The BLM Price Field Office conducted a study in 2012 to document distribution, identify habitat requirements and model the extent of suitable habitat of the species (Sansom and Elliott 2012). The results of the study indicated that potentially suitable habitat for the species could be present along Links U727, U728, U729, U730, U732, U733 and U734 in Emery County, Utah.

Pariette Cactus (*Sclerocactus brevispinus*) – FWS: Threatened

Regulatory Status

Pariette cactus was listed as threatened under the ESA on October 11, 1979, based primarily on threats of over-collection and habitat destruction (44 FR 58868). At that time, it was listed as part of *Sclerocactus* complex of three species: Pariette cactus (*Sclerocactus brevispinus*), Colorado hookless cactus (*Sclerocactus glaucus*), and Uinta Basin hookless cactus (*Sclerocactus wetlandicus*). In 2006, a petition was filed to remove the *Sclerocactus* complex from the list of threatened plants but after a 90-day review, the petition was denied, and the status of these species remained unchanged (71 FR 75215). On September 18, 2007, the FWS initiated a 12-month petition to change the taxonomy of the threatened *Sclerocactus* complex to three distinct species to reflect the taxonomy generally accepted in scientific literature. Because all three species were once considered part of the *Sclerocactus* complex when the species was listed as threatened, all would remain listed as threatened under the new taxonomic status. In the same petition, the FWS also proposed to upgrade Pariette cactus to endangered status (72 FR 53211). On March 28, 2008, a 5-year review was released that determined that upgrading Pariette cactus from threatened to endangered was warranted, but was precluded by higher priority actions. The FWS officially recognized the taxonomic revision in September 2009 and listed each species as threatened independent of the other species (74 FR 47112–47117).

A recovery outline for Pariette cactus was published in April 2010. No critical habitat for Pariette cactus has been designated (72 FR 75215). However, the FWS and BLM are currently working to identify core conservation areas and develop management recommendations to ensure that *Sclerocactus* species can be recovered, especially in light of potential energy development projects that could increase the level of development in *Sclerocactus* habitat and across the species range. Core areas are based on pollinator travel distance and are designed to provide habitat connectivity between populations and individuals.

Taxonomy and Life History

Pariette cactus has had an involved taxonomic history. Individuals in the *Sclerocactus* complex were first collected by Schumann in 1898 and initially described as *Echinocactus glaucus.* In 1917, considering the Schumann publication to be illegitimate, Rydberg described the species as *Echinocactus subglaucus*. In 1925, Purpus treated the species as a variety of Whipple's fishhook cactus (*Echinocactus whipplei* var. *glaucus)*. By 1939, the species was first placed in the genus *Sclerocactus* as *Sclerocactus franklinii* (Evans 1939). In 1966, Benson assigned six species to the *Sclerocactus* genus and noted that *S. glaucus* was distinguished from others in the genus by a large unhooked central spine and noticeably smaller seeds (Benson 1966). In 1972, Arp changed the genus to *Pediocactus*, leading to an assignment of *Pediocactus glaucus* (Arp 1972). In 1981, the species was restored to Benson's concept of *Sclerocactus* (Heil et al. 1981) and reestablished as *Sclerocactus glaucus* in the taxonomic literature (FWS 1990a).

Sclerocactus glaucus remained the accepted name until revisions to the taxonomy of the Uinta Basin hookless cactus in 1989 resulted in three distinct species, once part of the *Sclerocactus* complex. This reclassification was based on genetic studies, common garden experiments (Welsh et al. 2003), distribution, and a reevaluation of the morphological characteristics. The FWS officially recognized the taxonomic revision in September 2009 and listed each species as threatened independent of the other species (74 FR 47112–47117).

Pariette cactus is a morphologically unique *Sclerocactus*. It is much smaller (less than 3.1 inches tall) and retains the vegetative characteristics of juvenile *Sclerocactus wetlandicus* individuals in adult flowering plants (72 FR 53211). It has spheric and unbranched stems, short spines, and small pink flowers. Flowers also bloom in late April to May but the species produces green to tan fruits, sometime suffused with pink. The seeds are small, black, and convex (Flora of North America Editorial Committee 1993+).

Although no long-term demographic data is available, it is believed that the species may live for 10 to 20 years in good conditions. Populations range from 1 to more than 1,000 individuals with a wide range of ages. Known predators include the cactus borer beetle and rodents (FWS 1990a).

Distribution and Habitat Requirements

The known distribution of the *Sclerocactus* complex includes federal, state, tribal, and private lands in Utah (Uintah, Duchesne, and Carbon counties) and Colorado (Mesa, Delta, Garfield, and Montrose counties). At the time of listing, eight populations of the *Sclerocactus* complex were known to occur in five counties in western Colorado and eastern Utah. Since that time, two small outlier populations near Gateway, Colorado and Bonanza, Utah have been identified. Ninety percent of the total population of the three species occurs on BLM-managed lands (FWS 1990a). Because the specific distribution and habitat requirements vary for the three species, they are described separately.

Pariette cactus occurs only in the clay badlands of Pariette Draw in the central Uinta Basin south of Myton, Utah, which gradates into *Sclerocactus wetlandicus* near the mouth of Pariette Draw south of Ouray, Utah (FWS 1990a). The species is restricted to only one known population in an area about 10 miles long by 3 miles wide along the Duchesne-Uintah County boundary. The population is located on Bureau of Land Management, Ute Tribe, State of Utah, and private lands. The total species population is

estimated to be about 8,000 individuals on 18,000 acres. In a 1985 species inventory, 3,795 individuals were located on approximately 15,000 acres of BLM-administered land and minor amounts of state and private lands. BLM estimated that this population represented 75 percent of the total population on BLM-managed lands. Based on that information, the estimated 1985 population of Pariette cactus on BLM-managed land was approximately 5,000 individuals (72 FR 75215).

Pariette cactus grows on fine soils in clay badlands derived from the Uinta formation. It inhabits a low hilly terrain overlain with gravel and stone (UDWR 2005b). The habitat is a sparsely vegetated desert shrubland dominated by saltbush, rabbitbrush, and horsebrush. Approximately 72 percent of the range occurs within the approved Castle Pak/Eightmile Flat oil and gas the Project area and the pending Gasco Uinta Basin Natural Gas Field Development project (FWS 2008e). The remaining portion of the range contains wells drilled in the Sand Wash and Greater Boundary Units (72 FR 75215).

Primary Threats to Survival

The primary threats to the survival of the *Sclerocactus* complex stem from mineral and energy development, water development, and collection. Most of the range of the species is within existing oil and gas fields or undeveloped oil and gas lease areas. This activity has the potential to devastate local populations. The cactus is also sought out by professional and amateur cactus growers for its beautiful flowers. Because of its natural scarcity, it is a prized species for collectors and therefore could be highly threatened by the unregulated commercial trade of those plants collected from the wild (FWS 1990a). An important natural threat to *S. brevispinus* is genetic swamping from the more widespread *S. wetlandicus*, near the crossing of habitat at the mouth of the Pariette Draw (Flora of North America Editorial Committee 1993+).

Occurrence in the Project Area

The entire population of Pariette cactus is believed to be confined to a 30-square mile area around the Pariette Draw. This area lies within 5 miles of Link U402. A 2007 study located 30 occurrences of the species within 1 mile of the proposed centerline of Link U402 in the vicinity of Pariette Draw.

San Rafael Cactus (*Pediocactus despainii*) – FWS: Endangered

Regulatory Status

On December 15, 1980, the FWS published a notice of review for plants that included San Rafael cactus as a candidate for listing (45 FR 82479). Amendments to the ESA in 1982 required that a finding must be made as to whether a requested action is warranted, not warranted, or warranted but precluded by other activity within 12 months of the initial intent to list. All petitions pending as of October 12, 1982, were treated as having been received on that date. Each successive year after the 1982 amendments, the FWS released notice that an endangered determination for the San Rafael cactus was warranted but precluded by other listing activity. The final rule to list the species as endangered was published on September 16, 1987 (52 FR 34914). Critical habitat has not been designated as to prevent the escalation of illegal collection of the plant.

A draft recovery plan for the San Rafael and Winkler cactus was published in 1995. In 2007, a recovery outline for the two species was released, indicating that the final approved plan is expected in September 2009 (FWS 2007a); however, as of 2011, the final plan had not been released. Due to the species' small, restricted populations and desirability to collectors, the species is vulnerable to over-collection making it unlikely that it will be safely removed from the protection of the ESA in the foreseeable future. Thus, the object of the draft recovery plan is to downlist the species to threatened and this can be considered when: (1) a minimum of five additional separate populations with 2,000 or more individuals per population are

discovered; (2) formal land management designations and management plans that would provide long-term protection on undisturbed habitat for each population are implemented; (3) viable populations of the species are maintained by ensuring the protection of the current populations and occupied habitat for both species through enforcing the conservation provisions of Sections 7 and 9 of the ESA (FWS 1995a).

Taxonomy and Life History

San Rafael cactus is a member of the cactus family (*Cactaceae*). It was discovered by Kim Despain in 1978 and described by Welsh and Goodrich (Welsh and Goodrich 1980). It can also be known as Despain's footcactus or Despain pincushion cactus (UDWR 2005b). The genus *Pediocactus* contains eight species endemic to the Colorado Plateau region of Utah, Colorado, New Mexico, and Arizona. All eight of the species are either listed as endangered or are being considered for listing. It is believed that the seven disjunct species are relict species of a once more widespread genus that was fragmented by climate change (52 FR 34914).

San Rafael cactus is a small, ovoid, leafless, stem succulent. The cactus is distinguished from other members of the genus by its larger stem, hairless areoles, and bronze tint (52 FR 34914). There is generally only one stem that reaches 2.5 inches tall and 3.7 inches in diameter. The stem lacks a central spine, but white radial spines are common, numbering 9 to 13. The flowers grow up to 1 inch and can be yellow bronze, peach bronze, or pink with a purple midstripe. The fruit is initially green turning to reddish-brown with age. The kidney-shaped seeds are shiny and black (FWS 1995a).

Flowering occurs from April to May with fruits produced in May to June but can vary in accordance with temperature and moisture conditions. Reproduction is sexual and pollination is believed to be done by wild bees of the family *Halictidae* (FWS 1995a). The San Rafael cactus has been observed to shrink underground for several months to a year during dry or cold seasons. It is only noticeable for a short amount of time in the spring when it is in bloom. These habits make the cactus especially difficult to locate (52 FR 34914).

Distribution and Habitat Requirements

As of 1995, there are three known populations of the San Rafael cactus with an estimated total population of 20,000 individuals. Most of the plants occur on lands managed by the BLM. It is entirely restricted to the San Rafael Swell of Utah (central Emery County). One population exists in the north-central portion of the San Rafael Swell, north of the San Rafael River. The second population occurs in the south-central portion of the San Rafael Swell, south of I-70, and the third population is found in the western portion of the swell, near I-70 (FWS 1995a).

San Rafael cactus grows in fine textured, mildly alkaline soils rich in calcium derived from limestone substrates of the Carmel Formation and the Sinbad member of the Moenkopi formation. The species is most commonly found on benches, hill tops and gentle slopes with a southern exposure. It grows in open woodland of scattered Utah juniper and pinyon pine with an understory of shrubs and grasses (FWS 1995a).

Primary Threats to Survival

There are three primary threats to the survival of San Rafael cactus: over-collection, trampling, and destruction of habitat for access to oil and gas reserves. In addition, the small size of the population and limited range render the species extremely vulnerable to small disturbances. Although the San Rafael cactus can be difficult to cultivate, it is a highly prized, rare species desired in cactus collections. Cactus collectors are very active in the Colorado Plateau and, even though, it is forbidden by the National Park

Service and BLM, remoteness of the habitat of the cactus makes collection difficult to control (FWS 1995a).

San Rafael cactus habitat is vulnerable to destruction caused by off-road vehicle use and livestock. The plant itself can be shrunken into the ground during some portions of the year, which provides some natural protection from trampling. However, the species forms flower buds in the fall at ground level leaving it very vulnerable to surface disturbance and potentially reducing reproductive capacity. The spines of most cacti prevent major damage from grazing, but the size and shortness of spines on the San Rafael cactus provide very little security (FWS 1995a).

The habitat of San Rafael cactus is underlain by bentonite clay, uranium ore deposits, gypsum, petroleum, and other minerals. Future development of these resources has potential for adverse effects on the cactus and associated habitat (FWS 1995a).

Occurrence in the Project Area

San Rafael cactus is known to occur in the central portion of the Project area in Emery and Wayne counties, Utah. It has been identified from the eastern base of Cedar Mountain, southwest to The Wedge and The Red Ledges and south into Cathedral Valley (UDWR 2005b). The species is known to occur in the Project area along Links U728, U729, and U733.

Shrubby Reed-mustard (*Schoenocrambe suffrutescens*) – FWS: Endangered

Regulatory Status

On July 1, 1975, the FWS published a notice that included shrubby reed-mustard as a candidate for listing (41 FR 24523). Amendments to the ESA in 1978 required that all petitions more than 2 years old be withdrawn, but that petitions already more than 2 years old were subject to a 1-year grace period. On December 10, 1979, the FWS withdrew the petition to list the shrubby reed-mustard because it was not finalized within the 1-year grace period (44 FR 70796). The species was once again listed as a candidate species in the December 15, 1980 notice of review. Amendments to the ESA in 1982 required that a finding must be made as to whether a requested action is warranted, not warranted, or warranted but precluded by other activity within 2 years of the intent to list. All petitions pending as of October 12, 1982 were treated as having been received on that date. Each successive year after the 1982 amendments, the FWS released notice that an endangered determination for the shrubby reed-mustard was warranted but precluded by other listing activity. The final rule to list the species as endangered was published on October 6, 1987 (52 FR 37416). In September 1985, approximately 7,360 acres of critical habitat was proposed in the vicinity of Hill Creek in Uintah County (50 FR 36118–36112). No final rule has been issued finalizing designation of critical habitat for the species.

The recovery plan for three Utah reed-mustards was published in 1994. The goal of the plan is to delist or downlist the shrubby reed-mustard. Due to a small total population, vulnerability of the habitat to ongoing and potential oil and gas activity, and unrestricted off-road vehicle use, downlisting and delisting of the shrubby reed-mustard appears unlikely in the near future. However, criteria for downlisting include (1) discovering or establishing a minimum of five separate populations with 2,000 or more individuals per population and (2) document or establish formal land management designations that would provide for long-term protection on undisturbed habitat for the above five populations. The species may be considered for delisting when the above criteria are expanded to ten populations (FWS 1994a). The FWS initiated a 5-year review on October 6, 2008 (73 FR 58261). The 5-year review determined that the species should retain its current listing status (FWS 2010).

Taxonomy and Life History

Shrubby reed-mustard, also known as toad-flax cress, Graham's schoenocrambe, shrubby glaucocarpum, and the Uinta Basin waxfruit, is a member of the mustard (*Brassicaceae*) family (UDWR 2005b). It was first discovered in the Uinta Basin of Uintah County, Utah in 1935 and described by Reed C. Rollins as *Thelypodium suffrutescens*. Following further taxonomic research, in 1938 Rollins described it to the monotypic genus *Glaucocarpum*. By 1992, the name was changed to shrubby reed-mustard (S*choenocrambe suffrutescens*) to complete a morphologically discrete phylogenetic unit of five species that also includes the threatened clay reed-mustard (*S. argillacea*) and endangered Barneby reed-mustard (S*choenocrambe barnebyi*) (57 FR 1398). The genus is under some review and is commonly placed in either *Glaucocarpum* or *Schoenocrambe* (UDWR 2005b).

Shrubby reed-mustard is a perennial, herbaceous plant with multiple, clumped stems that reach 1 foot in height. The leaves are alternately arranged and attached to the stem by a short petiole. The flowers are light yellow or greenish yellow that grow to half an inch, displayed in a raceme of 5 to 20 flowers at the plant's leafy stems (FWS 1994a).

All three species of reed-mustards flower from April to May with fruit appearing May to June. Reproduction is sexual and pollination is aided by insects, primarily several species of bees. Within the raceme, flowers mature closest to the stem first and spread upward. The flowers are most fragrant in the morning and decline as the day progresses. Little is known about the long-term population dynamics, disease, parasitism, effect of grazing, competition, and viability of any of the species (FWS 1994a).

Distribution and Habitat Requirements

Shrubby reed-mustard is confined to localized geological formations of buff-colored calcareous shale of the Green River Formation in the Uinta Basin of eastern Utah (Duchesne and Uintah counties). In 1985, eight parcels of this habitat totaling 7,360 acres were proposed as critical habitat, but the rule was never finalized (50 FR 36118–36112). This area supports the majority of the known populations and appears to be necessary to the continued survival of the species (FWS 1994a).

There are currently seven known populations of shrubby reed-mustard. Four populations lie between Hill Creek and Willow Creek (Big Pack Mountain, Thorn Ranch, Johnson Draw, and Agency Draw) totaling approximately 2,440 individuals). Two populations are located on the west side of Hill Creek (Gray Knolls and Dog Knoll) and comprise approximately 320 individuals. A single population exists in Duchesne County approximately 15 miles from the other populations. It is located approximately 1.5 miles north of the junction of Nine Mile Creek and Daddy Canyon. This population (Badlands Cliff/Wrinkles Road) has a population of approximately 170 individuals (FWS 2010).

Shrubby reed-mustard occurs in desert-shrub communities with sparse juniper and pinyon pine trees. It grows on clay soils with white shale. In contrast to the other listed *Schoenocrambe* species, the shrubby reed-mustard generally grows on level to moderately sloping round surfaces. The soil is derived from the Evacuation Creek Member of the Green River geological formation at an elevation of 5,400 to 6,000 feet (FWS 1994a).

Primary Threats to Survival

Primary threats to shrubby reed-mustard include threats associated with the oil and gas industry, off-road vehicle use, and small population. All known populations are on federal lands that are leased for oil and gas energy reserves and petroleum deposits being developed in adjacent habitats with the exception of a small portion on Uintah and Ouray Reservation of the Ute Indian tribe. In addition, the entire range of the

species is underlain by oil shale. The species is also vulnerable to ground-disturbing activities associated with energy development (FWS 1994a).

Another particular threat to shrubby reed-mustard is association of habitat with commercially valuable native building stone composed of volcanic ash deposited during the prehistoric Uinta Lake during the Eocene epic. Previous commercial stone excavation is believed to have caused the extirpation of a portion of the population near the Big and Little Pack Mountains (50 FR 36118). In addition, there are risks associated with the species having only three small populations that could be devastated by an unpredictable catastrophe such as an extreme weather event (Beacham et al. 2005).

Occurrence in the Project Area

Shrubby reed-mustard is known to occur in the central portion of the Project area in Uintah and Duchesne counties, Utah. The Badlands Cliff/Wrinkles Road population falls within 1 mile of transmission line alternative routes.

Uinta Basin Hookless Cactus (*Sclerocactus wetlandicus*) – FWS: Threatened

Regulatory Status

Uinta Basin hookless cactus was listed as threatened under the ESA of 1973 on October 11, 1979, based primarily on threats of over-collection and habitat destruction (44 FR 58868). At that time, it was listed as part of *Sclerocactus* complex of three species: Pariette cactus (*Sclerocactus brevispinus*), Colorado hookless cactus (*Sclerocactus glaucus*), and Uinta Basin hookless cactus (*Sclerocactus wetlandicus*). In 2006, a petition was filed to remove the *Sclerocactus* complex from the list of threatened plants but after a 90-day review, the petition was denied, and the status of these species remained unchanged (71 FR 75215). On September 18, 2007, the FWS initiated a 12-month petition to change the taxonomy of the threatened *Sclerocactus* complex to three distinct species to reflect the taxonomy generally accepted in scientific literature. Because all three species were once considered part of the *Sclerocactus* complex when the species was listed as threatened, all would remain listed as threatened under the new taxonomic status. The FWS officially recognized the taxonomic revision in September 2009 and listed each species as threatened independent of the other species (74 FR 47112–47117).

A recovery outline for the *Sclerocactus* complex was published in April 2010. No critical habitat for Uinta Basin hookless cactus has been designated (72 FR 75215). However, the FWS and BLM are currently working to identify core conservation areas and develop management recommendations to ensure that *Sclerocactus* species can be recovered, especially in light of potential energy development projects that could increase the level of development in *Sclerocactus* habitat and across the species range. Core areas are based on pollinator travel distance and are designed to provide habitat connectivity between populations and individuals.

Taxonomy and Life History

Uinta Basin hookless cactus has had an involved taxonomic history. It was first collected by Schumann in 1898 and initially described as *Echinocactus glaucus.* In 1917, considering the Schumann publication to be illegitimate, Rydberg redescribed the species as *Echinocactus subglaucus*. In 1925, Purpus treated the species as a variety of Whipple's fishhook cactus *Echinocactus whipplei* var. *glaucus*. By 1939, the species was first placed in the genus *Sclerocactus* as *Sclerocactus franklinii* by Evans. In 1966, Benson assigned six species to the *Sclerocactus* genus and noted that *Sclerocactus glaucus* was distinguished from others in the genus by a large unhooked central spine and noticeably smaller seeds (Benson 1966). In 1972, Arp changed the genus to *Pediocactus*, leading to an assignment of *Pediocactus glaucus* (Arp

1972). Finally, in 1981, the species was restored to Benson's concept of *Sclerocactus* (Heil et al. 1981)and reestablished *Sclerocactus glaucus* in the taxonomic literature (FWS 1990a).

Sclerocactus glaucus remained the accepted name until revisions to the taxonomy of the Uinta Basin hookless cactus in 1989 resulted in three distinct species, once part of the *Sclerocactus* complex. This reclassification was based on genetic studies, common garden experiments (Welsh et al. 2003), distribution, and a reevaluation of the morphological characteristics. The recently published Flora of North America now recognizes *Sclerocactus glaucus*, *Sclerocactus wetlandicus*, and *Sclerocactus brevispinus,* which collectively were recognized as *Sclerocactus glaucus* at the time of listing (72 FR 53211). The FWS officially recognized the taxonomic revision in September 2009 (74 FR 47112–47117).

Uinta Basin and Colorado hookless cacti (*Sclerocactus wetlandicus* and *Sclerocactus glaucus)* are morphologically similar. They are low growing, leafless succulent plants that are oval to globular in shape. The stems are generally solitary, but sometime grow in clusters of two or three. Individuals can reach heights of 1.5 to 7 inches and 1 to 4.5 inches in diameter. Stems are covered with protuberances arising from the twelve ribs. The cacti have numerous 1- to 2-inch pinkish flowers that have pronounced ultra-violet reflectance, unique to the genus (FWS 1990a). Flowers bloom in late April to May and produce green, thin-walled fruits that turn red at maturity. The seeds are small, black, and asymmetrical. It appears that small bees (families *Halictidae* and *Anthophoridae*), ants, and gravity are the primary dispersal mechanisms that may be a limiting factor to the distribution (NatureServe 2008b).

Although no long-term demographic data is available, it is believed that the species may live for 10 to 20 years in good conditions. Populations range from 1 to more than 1,000 individuals with a wide range of ages. Known predators include the cactus borer beetle and rodents (FWS 1990a).

Distribution and Habitat Requirements

The known distribution of the *Sclerocactus* complex includes federal, state, tribal, and private lands in Utah (Uintah, Duchesne, and Carbon counties) and Colorado (Mesa, Delta, Garfield, and Montrose counties). At the time of listing, eight populations of the *Sclerocactus* complex were known to occur in five counties in western Colorado and eastern Utah. Since that time, two small outlier populations near Gateway, Colorado and Bonanza, Utah have been identified. Ninety percent of the total population of the three species occurs on BLM-managed lands (FWS 1990a). Because the specific distribution and habitat requirements vary for the three species, they are described separately.

Uinta Basin hookless cactus (*Sclerocactus wetlandicus*) is endemic to northeast Utah (Duchesne and Uintah counties) where it occurs entirely within the BLM Diamond Mountain planning area. Current population estimates are at about 30,000 individuals over a range that is approximately 60 miles long and 25 miles wide. Individuals are patchily to densely distributed near the confluence of the Green, White, and Duchesne rivers near Ouray National Wildlife Refuge and the town of Ouray, Utah south along the Green River to the vicinity of Sand Wash including concentrations near the mouth of the Pariette Draw (FWS 1990a).

Sclerocactus wetlandicus and *Sclerocactus glaucus* occur in salt desert shrub communities and pinyon-juniper woodlands on river benches, valley slopes, and rolling hills. Both species occur on Quaternary and Tertiary alluvial soils that are fine textured, dry, and overlain with cobble and pebble (BLM 2008d). The soil is weathered from the Uinta and Green River formations. Most of the range is within existing oil and gas fields or within undeveloped oil and gas lease areas. The cactus is more abundant on south facing slopes with up to a 30 percent grade at an elevation of 4500 to 5900 feet. Associated vegetation includes shadscale, galleta, black sage, and Indian rice grass (FWS 1990a).

Primary Threats to Survival

The primary threats to the survival of Uinta Basin hookless cactus stem from mineral and energy development, water development, and collection. Most of the range of the species is within existing oil and gas fields or undeveloped oil and gas lease areas (BLM 2008d). This activity has the potential to devastate local populations. The cactus is also sought out by professional and amateur cactus growers for its beautiful flowers. Because of its natural scarcity, it is a prized species for collectors and therefore could be highly threatened by the unregulated commercial trade of those plants collected from the wild (FWS 1990a).

Occurrence in the Project Area

The Uinta Basin hookless cactus is known to occur in the central portions of the Project area in Utah (Uintah, Duchesne, and Carbon counties) and Colorado (Mesa and Garfield counties). Most of the populations are located on BLM-administered lands, but also occur on the Ouray National Wildlife Refuge, the Uintah and Ouray Reservation, and private lands. In the Utah portion of the range, Uinta Basin hookless cactus occurs on alluvial river terraces near the confluence of the Green, White, and Duchesne rivers south along the Green River to the vicinity of Sand Wash and the mouth of the Pariette Draw, the Badland Cliffs, and the clay badlands of the Pariette Draw drainage south of Myton, Utah (FWS 1990a). Populations are known to occur along Links U400 and U402 along Pariette Draw, Nine Mile Canyon, and the Green River.

Ute Ladies'-tresses (*Spiranthes diluvialis*) – FWS: Threatened

Regulatory Status

On September 27, 1985, the FWS published a notice that included Ute ladies'-tresses as a Category 2 species candidate for listing (50 FR 39526). Category 2 comprised taxa for which the FWS had information indicating the appropriateness of a proposal to list as endangered or threatened but for which more substantial data was needed on biological vulnerability and threats. After a review of status information acquired after the 1985 notice, the FWS upgraded Ute ladies'-tresses to a Category 1 species in the February 21, 1990, Notice of Review (55 FR 6184), which meant the FWS had in possession enough data to support listing. The final decision to list the species as threatened was published on January 17, 1992 (57 FR 2048). Critical habitat was not designated for the species. On May 10, 1996, the FWS received a petition from the Central Utah Water Conservancy District to delist Ute ladies'-tresses. Due to the low priority assigned to delisting petitions, the FWS postponed immediate action. On October 12, 2004, the FWS initiated a 5-year review that would be used to determine the outcome of the petition to delist (69 FR 60605). The recovery plan for Ute ladies'-tresses was published in 1995(FWS 1995b).

The recovery plan for Ute ladies'-tresses was published in 1995 (FWS 1995b). The objective of the plan is the continued existence of Ute ladies'-tresses, but no specific delisting criteria are given. The species will be considered for delisting when sites that include occupied habitat harboring 90 percent of the plants in each ecoregion are protected at public ownership or higher levels of protection and managed in accordance with a FWS-approved management plan. The plan must assure implementation of management practices that provide the range and spatial distribution of successional and hydrologic regimes required to maintain the species and its pollinators in self-sustaining, naturally occurring populations that will remain in effect after delisting occurs.

Taxonomy and Life History

The Ute ladies'-tresses, also known as flood ladies'-tresses, is a member of the family *Orchidaceae* (UDWR 2005b). Prior to 1984, only three species of white-flowered Ladies'-tresses were known to exist – *Spiranthes cernua, Spiranthes romanzoffiana,* and *Spiranthes porrifolia.* In 1980, a specimen was

collected near Golden, Colorado that was first thought to be *Spiranthes cernua* and sent to Dr. Charles Sheviak who was conducting studies on the genus *Spiranthes*. In 1984, after visiting sites in both Colorado and Utah, Sheviak described the new species *Spiranthes diluvialis*. In the description, *Spiranthes diluvialis* is believed to have resulted from the hybridization of *Spiranthes magnicamporum* and *Spiranthes romanzoffiana* during a Pleistocene pluvial period, at a time when the two species would have occurred sympatricly (FWS 1995b).

Ute ladies'-tresses is a long-lived perennial orchid with a flowering stalk arising from clusters of basal leaves and short thickened roots. It reproduces only by seeds and can produce as many as 7300 seeds per fruit that can persist for up to 8 years as subterranean saprophytes dependent on mycorrhizal fungi. Leaf rosettes may emerge at the end of the growing season and overwinter. In any given year, mature plants can be found in stages – flowering, non-flowering (vegetative), and seasonally dormant stages. Under adverse conditions, individual plants may not flower and can persist underground for an unknown period of time until conditions are amenable to survival above ground. This can make locating the plant difficult and the species can only reliably be identified when flowering (FWS 1995b).

Distribution and Habitat Requirements

Ute ladies'-tresses is known to occur in three general areas: near the base of the eastern slope of the Rocky Mountains, the Uinta Basin, and near the western base of the Wasatch Mountains. Near the Rocky Mountains, the species is found in north-central and central Colorado (Clear Creek, Jefferson, Boulder, Larimer, and possibly Moffat counties), east-central Idaho (Bonneville and Jefferson counties), southwestern Montana (Beaverhead, Broadwater, Gallatin, Jefferson, and Madison counties) and east-central and southeastern corner of Wyoming (Converse, Goshen, Laramie, and Niobrara counties), and downstream in western Nebraska (Sioux, Washington, and Okanogan counties). In the Uinta Basin, the species is generally associated with the upper Colorado River drainage. Near the Wasatch Mountains, the species is generally found in the eastern Great Basin of western Utah in Daggett, Garfield, Wayne, Utah, Salt Lake, Weber, and Tooele counties (FWS 1995b).

The Ute ladies'-tresses is endemic to moist or very wet meadows near springs, lakes, or perennial streams. It is also found in abandoned stream meanders that retain ample groundwater. It is found at elevations ranging from 4,300 to 7,000 feet. The species is generally found in areas with relatively open vegetation, although some individuals have been observed in the riparian woodlands of eastern Utah and Colorado. Populations are generally small and located in scattered groups occupying small areas within the riparian system (FWS 1995b).

Primary Threats to Survival

Riparian habitat and the nomadic grazing typical of native ungulates are vital to Ute ladies'-tresses to create and maintain habitat, both of which have been altered since settlement of the west. Orchid habitat is now grazed by cows, sheep, or horses, all of whose grazing habits differ from native ungulates in timing and intensity. Season-long grazing where the plants are destroyed after flower stem formation can be detrimental to the already low reproductive success of the species. Water developments, urbanization, and dams interrupt flooding cycles causing fragmentation and destruction of vital habitat (57 FR 2048). Reservoirs, dams, and diversions have drastically altered some stream systems by completely dewatering some reaches and changing their magnitude and timing of flow. In addition, invasion by noxious weeds such as the leafy spurge (*Euphorbia esula*), spotted knapweed (*Centaurea maculosa*), and Russian knapweed (*Centaurea repens)* can outcompete the species in already limited habitat (FWS 1995b). Degradation of habitat for pollinator species in the surrounding area has also been proposed as a threat to the species (Sipes and Tepedino 1995).

Occurrence in the Project Area

Ute ladies'-tresses is known to occur along Links U420 and U430. One location is near the junction of Benson Draw and the Duchesne River along Link U420. Another location is along the Lake Fork Canal west of Upalca along Link U420. Another location is along Currant Creek west of Fruitland along Link U420. Two occurrences are located along the Lake Fork River west of Ioka along Link U430. A known population is crossed by the centerline of Link U430 at Lake Fork River.

At the request of the BLM and FWS, EPG identified potentially suitable habitat for Ute ladies'-tresses within 6th level hydrologic unit code (subwatersheds) crossed by Project alternative routes using GIS desktop analysis. Modeled potentially suitable habitat was visually refined for an area within a 1-mile buffer around all reference centerlines as defined in April 2012, October 2012, and again in April 2013 based upon revised centerlines in Wyoming, Colorado and Utah.

Western Prairie Fringed Orchid (*Platanthera praeclara*) – FWS: Threatened

Regulatory Status

On October 11, 1988, the FWS published a proposal to list western prairie fringed orchid as threatened (53 FR 39621-39626). This rule was finalized on September 28, 1989 (54 FR 39857-39863). Critical habitat has not been designated for the species.

The recovery plan for western prairie fringed orchid was published in 1996 (FWS 1996). The objective of the plan is to delist the species. The species will be considered for delisting when sites that include occupied habitat harboring 90 percent of the plants in each ecoregion are protected at public ownership or higher levels of protection and managed in accordance with a FWS-approved management plan. The plan must assure implementation of management practices that provide the range and spatial distribution of successional and hydrologic regimes required to maintain the species and its pollinators in self-sustaining, naturally occurring populations that will remain in effect after delisting occurs.

Taxonomy and Life History

The western prairie fringed orchid, also known as Great Plains white fringed orchid, is a member of the family *Orchidaceae*. The species was previously included as a single species with the eastern prairie fringed orchid (*Platanthera leucophaea*) but was described separately in 1986 by Dr. Bowles on the Sheyenne National Grassland in Ransom County, North Dakota (FWS 1996).

The western prairie fringed orchid is a smooth, erect perennial herb with two to five fairly thick elongated hairless leaves. Flowers are wide and white in color with the lower petal deeply three-lobed and fringed. Plants typically grow to approximately 4 feet in height (FWS 1996). Like many orchids, western prairie fringed orchid may experience periods of dormancy. Research estimates 4 to 12 percent of plants may be dormant each year and dormancy may be as short as 1 year but could last as long as 8 years (FWS 2009a). This can inhibit the ability of surveyors to detect the species presence.

Distribution and Habitat Requirements

The species is historically known to occur throughout the Great Plains of North America. In 1996, populations of western prairie fringed orchid were known to occur in 41 counties across six states (Iowa, Kansas, Minnesota, Missouri, Nebraska, North Dakota) and Manitoba, Canada (FWS 1996). Populations in Nebraska are located within the Platte River watershed.

The species inhabits tallgrass prairies and is found most often on unplowed, calcareous prairies and sedge meadows. It has also been known to occur at disturbed sites in successional communities such as borrow pits, old fields, and roadside ditches. Most locations are similar in that they are subirrigated by near-surface groundwater that provides a reliable source of water. Species likely to occur with the orchid are big bluestem (*Andropogon gerardii*), little bluestem (*Schizachyrium scoparium*), and Indiangrass (*Sorghastrum nutans*) in tallgrass prairies and sedge and spikerush (*Eleocharis* spp.) species in sedge meadows (FWS 1996).

Primary Threats to Survival

Historically, the major cause for decline of the species was conversion of habitat to cropland. Hydrologic changes that draw down or contaminate the water table may also adversely affect the species. Additional practices may also affect the species depending on their timing, frequency, and intensity. These include burning, grazing, and mowing (FWS 1996). However, the species is dependent on periodic disturbance, but these management practices must be carefully implemented (FWS 2009a).

In addition to these threats, non-native species may out-compete western prairie fringed orchid. Inter-seeding of non-native species to increase livestock forage is promoted in some states inhabited by western prairie fringed orchid, such as Nebraska (FWS 2009a).

Occurrence in the Project Area

The western prairie fringed orchid is not known to occur in the Project area. However, populations in Nebraska occur in the Platte River watershed. Therefore, the populations may be affected should the project draw water from the Platte River.

White River Beardtongue (*Penstemon scariosus* var. *albifluvis*) – FWS: Proposed Threatened; BLM: Colorado, Utah

Regulatory Status

White River beardtongue was first recognized as a candidate species on November 28, 1983 (48 FR 53640) but immediate issuance of a proposed rule and timely promulgation of a final rule for the species was precluded by higher priority listing actions. The species received a listing priority number of 9 due to ongoing and imminent threats of a moderate magnitude for the subspecies population in a species assessment published in October 2011 (76 FR 66370–66439). White River beardtongue was proposed for listing as a Threatened species on August 6, 2013 (78 FR 47590-47611) and proposed critical habitat was established (78 FR 47532-47858).

Taxonomy and Life History

White River beardtongue is a member of the figwort family (UDWR 2005b). It was first described as a unique species, *Penstemon albifluvis* in 1982 by J.L. England. However, in 1984 Arthur Cronquist and others redefined it as a variety of Garrett's penstemon (*Penstemon scariosus*), and changed the name to *Penstemon scariosus* var. *albifluvis. Penstemon scariosus* var. *albifluvis* differs from a typical *Penstemon scariosus* by exhibiting a shorter corolla and anther hairs and has a reduced basal leaf rosette. In addition, *Penstemon scariosus* var. *albifluvis* occurs at lower elevation oil shale barrens near the White River along the Utah-Colorado state-line (FWS 2007b).

White River beardtongue is an herbaceous perennial, about 6 to 20 inches tall. It has multiple clusters of upright stems with opposite leaves that are linear to linear-lanceolate. The flowers bloom in late May to June, when the woody caudex reaches more than 4 centimeters. The flowers are light blue to lavender in

color with seeds produced by late June. Due to the presence of the woody caudex, the plant is believed to be long-lived (FWS 2007b).

Distribution and Habitat Requirements

Known populations of White River beardtongue are limited to a 20-mile arc that extends from Raven Ridge west of Rangely in Rio Blanco County, Colorado, to the vicinity of Willow Creek in Uintah County, Utah (78 FR 47595)

White River beardtongue is endemic to the oil shale barrens found in semi-barren openings in Pinyon-juniper-desert shrub or desert shrub communities on substrates composed of fine textured soils and shale fragments weathered from the Green River Formation of the Uinta Basin of northeastern Utah and adjacent Colorado. This geologic formation covers more than 100 square miles of area in Utah and Colorado; however, the species currently occupies less than 1 percent of the extent of oil shale barrens available in Colorado and Utah. It is frequently found on white or red soil at an elevation of 5,000 to 6,680 feet. Associated vegetation includes shadscale, rabbitbrush, Indian ricegrass, saline wildrye, sagebrush, and Barneby's thistle (*Cirsium barnebyi*) (FWS 2007b).

Primary Threats to Survival

The 2013 proposed rule to list Graham's beardtongue and White River beardtongue as Threatened identified present and potential energy exploration and development as the predominant threat to the continued existence of these species (78 FR 47590). Additional threats are invasive weeds and climate change. Livestock grazing, unauthorized collection, road maintenance and construction, wildfire, and small population size were determined not to be threats to these species at present (78 FR 47602-47605).

Occurrence in the Project Area

White River beardtongue is located in Uintah County, Utah, and western Rio Blanco County, Colorado, near the White River to the vicinity of Evacuation Creek and in the vicinity of Willow Creek (FWS 2011g). Populations located along the White River near the Utah-Colorado border are located near Links U240 and C220. Nearest proposed critical habitat for White River beardtongue is approximately 5 miles from Link U242 in Utah.

E.6.1.2 Bureau of Land Management, U.S. Forest Service, and State-Sensitive Plant Species

Argyle Canyon Phacelia (*Phacelia argylensis*) – BLM: Utah

Argyle Canyon phacelia is found only in Argyle Canyon on the West Tavaputs Plateau in Uintah County, Utah (Welsh et al. 2008). It grows on sandy-silty soil in wash bottoms on the Green River Shale Formation in pinyon-juniper serviceberry, and Douglas fir communities at 7,595 feet (Welsh et al. 2008). Occurrences of the species are located within 5 miles of transmission line alternative routes in the BLM Vernal Field Office.

Barneby's Cat's-eye (*Cryptantha barnabyi*) – BLM: Utah

Barneby's cat's-eye is a perennial forb that is locally abundant on the domed or gently sloping white shale knolls of the Green River Formation in the Uinta Basin, mostly in shadscale and pinyon-juniper communities from 6,070 to 7,870 feet (NatureServe 2013). Occurrences of the species are located within 1 mile of transmission line alternative routes in the BLM Vernal Field Office.

Beaver Rim Phlox (*Phlox pungens*) – BLM: Wyoming

Beaver Rim phlox is a perennial forb endemic to the Wind River and Green River basins and the southeastern foothills of the Wind River Range. The species grows on sparsely vegetated clay and shale slopes in the Green River Basin at elevations from 6,000 to 7,400 feet (NatureServe 2013). WYNDD-modeled habitat for the species occurs in the Project area in Wyoming (WYNDD 2011).

Bolander's Camissonia (*Camissonia bolanderi*) – BLM: Utah

Bolander's camissonia was first located and described as a species in 2005. It is known only from a single location in the upper Tidwell Draw approximately 15 miles northwest of the town of Green River. This location is on the Triassic Moenkopi Formation in association with saltbush and ephedra at 4,780 feet in elevation (Atwood and Welsh 2007). This sole occurrence is located along Link U730.

Caespitose Cat's-eye (*Cryptantha caespitosa*) – BLM: Colorado

Caespitose cat's-eye occurs on sparsely vegetated shale knolls at 6,200 to 8,100 feet. Habitat includes pinyon-juniper or sagebrush and is typically found with other cushion plants (CNHP 1997). Current known locations are in Daggett, Uintah, Duchesne, and Carbon counties of Utah and Moffat County, Colorado (UDWR 1998). There is one known occurrence of the species within 0.5 mile of centerline of Link U401 near the Bad Land Cliffs in Duchesne County. Two occurrences are located between 1.0 and 1.5 miles of the centerline for Link U20 in Daggett County. Three known occurrences are located in Rio Blanco and Moffat counties are located along transmission line alternative routes for Links C61 and C220.

Canyon Sweet-vetch (*Hedysarum occidentale* var. *canone*) – USFS: Manti-La Sal National Forest

Canyon sweet-vetch is endemic to Carbon, Duchesne, and Emery counties, Utah, and occurs on or below the coal measures of the Mesa Verde group (Welsh et al. 2008). It is found in pinyon-juniper, serviceberry (*Amelanchier* spp.), maple (*Acer* spp.), alderleaf mountain mahogany, and sagebrush communities between 6,400 and 8,300 feet (UNPS 2012). The species is known to occur along several Links in Carbon and Emery counties in Utah.

Carrington Daisy (*Erigeron carringtoniae*) – USFS: Manti-La Sal National Forest

Carrington daisy is endemic to Emery, Sanpete, and Sevier counties, Utah. It is found on Flagstaff Limestone in meadows and escarpment margins between 10,000 and 11,000 feet in elevation (UNPS 2012). The species is known from two occurrences within the Project area along Link U630. Both occurrences are located within 2.5 miles of Trail Mountain in the Manti-La Sal National Forest.

Cedar Rim Thistle (*Cirsium aridum*) – BLM: Wyoming

Cedar Rim thistle occurs on barren slopes, fans, and draws on whitish-gray sandstone, chalk, tufaceous colluviums, or clay substrates in bunchgrass or cushion plant communities in openings within Wyoming big sagebrush grasslands. The species is endemic to central Wyoming (Fertig and Thurston 2003). There are no known occurrences within the vicinity of the Project area; however, there is predicted suitable habitat that occurs in the Project area. Specifically, there is suitable habitat within the 1-mile buffer along Link W21 and W491. There is high and medium likelihood suitable habitat along the centerlines of Links W126, W127, and W128 southwest of Wamsutter.

Creutzfeldt's Cat's-eye (*Cryptantha creutzfeldtii*) – BLM: Utah; USFS: Manti-La Sal National Forest

Creutzfeldt's cat's-eye occurs in scattered pinyon-juniper communities with an understory of black sagebrush and mat *Atriplex* communities on a silty-clay substrate of the Mancos Shale Formation overlain with Emery Sandstone at elevations from 5,250 to 6,500 feet. It is endemic to central Utah (Carbon, Emery, and Sevier counties) (UNPS 2012). It is currently known from scattered locations along the base of the Book Cliffs and Wasatch Plateau escarpments as they flank Castle Valley on the north and west edges (Franklin 2005) including the Manti-La Sal National Forest, BLM, and privately-owned lands (UNPS 2012). A study in 1997 reported six occurrences at Rowley Flat near the junction of Link U590, U630, and U765 west of Huntington, Utah. All six occurrences are located within 0.6 mile of the centerlines with three occurrences being crossed by the centerlines.

Debris Milkvetch (*Astragalus detritalis*) – BLM: Colorado, Utah

Debris milkvetch occurs on rocky soils ranging from sandy clays to sandy loams on alluvial terraces with cobbles at 5,400 to 7,200 feet. Habitat includes pinyon-juniper and mixed desert shrub communities (CNHP 1999). The species is endemic to the Uinta Basin where it is locally common across the Tavaputs Plateau; also known to occur near Starvation Reservoir to the White River drainage and Vermillion Bluffs in Colorado. Known occurrences are located along centerlines of numerous links in Duchesne and Uintah counties, Utah, and Rio Blanco County, Colorado.

Dense Twinpod (*Physaria condensata*) – BLM: Wyoming

Dense twinpod is a perennial forb endemic to the southern Overthrust Belt and lower Green River Basin in southwest Wyoming. It grows on sparsely vegetated shaley slopes and ridges from 6,500 to 7,000 feet (NatureServe 2013). WYNDD-modeled habitat for the species occurs in the Project area in Wyoming (WYNDD 2011).

Dolores River Skeletonplant (*Lygodesmia grandiflora* var. *doloresensis*) – BLM: Colorado, Utah

Dolores River skeletonplant grows between canyon walls on reddish purple alluvial and colluvial soils of the Cutler Formation at 4,000 to 5,500 feet (CNHP 2002). It occurs in juniper, sagebrush, rabbitbrush, and blackbrush communities (UNPS 2012). It has the most restricted distribution of any plant in the genus and is found only in Grand County, Utah, and Mesa County, Colorado. No known occurrences are located in the Project area. The closest known occurrence is located in very northwestern Mesa County, Colorado, between Prairie Canyon and the Colorado-Utah border. This occurrence is approximately 2 miles west of Link C196.

Duchesne Milkvetch (*Astragalus duchesnensis*) – BLM: Colorado

Duchesne milkvetch occurs on sandstone or shale outcrops at 4,600 to 6,400 feet in pinyon-juniper woodland and desert shrub communities. Current known distribution includes Utah (Uintah and Duchesne counties) and Colorado (Moffat and Rio Blanco counties) (CNHP 1997). Known occurrences are located in the Project area along links in Duchesne, Uintah, and Daggett counties in Utah and a single occurrence along Link C195 in Rio Blanco County, Colorado, near Rabbit Mountain.

Ephedra Buckwheat (*Eriogonum ephredoides*) – BLM: Colorado

Ephedra buckwheat grows on white shales and soils derived from the Green River Formation. The habitat is sparsely vegetated white shale slopes at 5,600 to 6,030 feet (CNHP 2002). The current known distribution is limited to Colorado (Rio Blanco County) and Utah (Uintah County). There are four known

occurrences within 4 miles of the transmission line alternative routes in Utah (Links U240 and U400). Only one of these occurrences is less than 30 years old. It is located in southeastern Duchesne County, Utah, near Twin Knolls approximately 3 miles south of Link U400. There is one occurrence within the 1-mile buffer in Colorado near Shavetail Park along Link C220.

Ferron's Milkvetch (*Astragalus musiniensis*) – BLM: Colorado

Ferron's milkvetch occurs on shale and sandstone or the alluvium derived from them at 4,700 to 7,000 feet. Habitat includes gullied bluffs, knolls, benches, and open hillsides in pinyon-juniper woodlands or desert shrub communities. Current known distribution includes Utah and Colorado (Garfield and Mesa counties) (CNHP 1997). Know occurrences of Ferron's milkvetch are located along transmission line alternative routes in Carbon, Emery, and Grand counties in Utah and at a single occurrence in Rio Blanco County, Colorado. Numerous additional occurrences are located within 5 miles of transmission line alternative routes in those counties named above as well as Mesa County, Colorado.

Gibben's Beardtongue (*Penstemon gibbensii*) – BLM: Wyoming, Colorado

Gibben's beardtongue is known to occur in Utah, Wyoming, and Colorado, but in relatively close proximity to the junction of these three states. The species inhabits shaley slopes and bluffs along the Green River at elevations of 5,500 to 7,700 feet. Studies in Wyoming of soils have revealed that a common component of all sites in Wyoming have volcanic ash associated with the shale/chalk substrate. In the Project area there are three highly studied populations encompassing several hundred plants each in Sweetwater and Carbon counties, Wyoming. Two populations are located along Link W301 and the remaining population is along Link W410. In Daggett County, Utah, another large population estimated in 1989 at more than 700 plants, but only a single individual was detected in 2010 (UNHP 2012). This population is located along the Green River approximately 3 miles east of Link U20. Predicted suitable habitat is located within the 1-mile buffer of Links W110, W111, W113, W300, W301, W302, W321, W370, W410, and W411. All links except W111 and W370 have habitat along the centerlines.

Goodrich's Blazingstar (*Mentzelia goodrichii*) – BLM: Utah; USFS: Ashley National Forest

Goodrich's blazingstar grows on steep, white, marly, calciferous shale outcrops of the Green River Formation at 8,100 to 8,800 feet. Associated vegetation includes limber pine, pinyon pine, Douglas fir, mountain mahogany, and rabbitbrush. It is endemic to southern Duchesne County where it is known to occur along the Bad Land Cliffs above Argyle Canyon and west into Avintaquin Canyon (Franklin 2005) and along the escarpment of Willow Canyon and the Anthro Mountain area of the West Tavaputs Plateau (UDWR 1998). There are three known occurrences located along the centerlines of Links U401 and U431.

Goodrich's Columbine (*Aquilegia scopulorum* var. *goodrichii*) – BLM: Utah

Goodrich's columbine is endemic to Duchesne County, Utah, and occurs in bristlecone pine, limber pine, Salina wildrye, mountain mahogany, pinyon, and Douglas fir communities in Green River Shale bluffs and ridge crests from 7,400 to 9,400 feet (Welsh et al. 2008). Occurrences of the species are located within 1 mile of transmission line alternative routes in the BLM Vernal Field Office.

Graham's Cat's-eye (*Cryptantha grahamii*) – BLM: Utah

Graham's catseye is a long-lived perennial that grows in mixed desert shrub, sagebrush, pinyon-juniper, and mountain brush communities on Green River Shale at 5,000 to 7,400 feet elevation within the Uinta Basin in Duchesne and Uintah counties (UNPS 2012) and San Juan County (NatureServe 2013) in Utah.

Occurrences of the species are located within 5 miles of transmission line alternative routes in the BLM Vernal Field Office.

Grand Junction Suncup (*Camissonia eastwoodiae*) – BLM: Colorado

Grand Junction suncup inhabits mat-saltbush, shadscale, blackbrush, and juniper communities at elevations of 3,900 to 5,900 feet. The species is only known from Delta and Mesa counties, Colorado and Grand County in Utah (NatureServe 2011). There are three known occurrences within 2.5 miles of the centerline of Link C270 west of Mack, Colorado. One of these occurrences is along the centerline at the Colorado-Utah border.

Green River Greenthread (*Thelesperma caespitosum*) – BLM: Wyoming, Utah

Green River greenthread occurs on white shale slopes and ridges of the Green River Formation at approximately 5,900 feet. It is endemic to Duchesne and Uintah counties in Utah and Sweetwater County, Wyoming where the current known distribution includes Ashley National Forest, BLM, state, and private lands (UNPS 2012). Two known occurrences of Green River Greenthread are located within 0.5 mile of Link U401 near Antelope Canyon in Duchesne County. Two occurrences from BLM Vernal Field Office are located along the centerline in this same area. Three additional occurrences are located within 3 miles of transmission line alternative routes in the same Bad Land Cliffs area of Duchesne County.

Hairy Townsend-daisy (*Townsendia strigosa* var. *prolixa*) – BLM: Utah

Hairy Townsend-daisy is an unrecognized variety of *T. strigosa* that was first collected at Chepeta Wells in the Uinta Basin (Welsh et al. 2008). The species inhabits salt desert shrub, mixed desert shrub, and pinyon-juniper communities between 4,790 and 6,220 feet (Welsh et al. 2008). Occurrences of the species are located within 5 miles of reference centerlines in the Uinta Basin in the BLM Vernal Field Office.

Hamilton's Milkvetch (*Astragalus hamiltonii*) – BLM: Utah

Hamilton's milkvetch is endemic to the Uinta Basin in Uintah County, Utah. The species inhabits pinyon-juniper and desert shrub communities in the Duchesne River, Wasatch, Mowry Shale, Dakota, and other formations between 5,250 and 6,200 feet (UNPS 2012). BLM-mapped potential habitat for the species is crossed by Links U410, U391, and U390.

Horseshoe Milkvetch (*Astragalus equisolensis*) – BLM: Colorado, Utah

Horseshoe milkvetch is only known from Uintah County, Utah, and Mesa County, Colorado. The species inhabits sagebrush, shadscale, horsebrush, and other mixed desert shrub communities on the Duchesne River Formation at elevations of 4,800 to 5,200 feet (UNPS 2012). There is a large population that is crossed by the centerline of Link U321 and is within the 1-mile buffer of Link U380. The population is located in the area of Horseshoe Bend along the Green River southwest of Jensen. It extends into the area within a triangle formed by Links U321, U322, U380, and U390. BLM-mapped potential habitat for the species is crossed by Links U390 and U310.

Huber's Pepperwort (*Lepidium huberi*) – BLM: Utah

Huber's pepperwort is a subshrub endemic to eastern Utah and western Colorado in the Uinta Mountains and on the East Tavaputs Plateau (Natureserve 2013b). It grows in blackbrush, mountain brush, ponderosa pine, and spruce-fir communities, in sand or silty sands derived from the Shiarump Member of the Chinle, Moenkopi, Park City, and Weber Sandstone formations (NatureServe 2013; UNPS 2012; Welsh et al. 2008). Occurrences of the species are located within 5 miles of transmission line alternative routes in the Uinta Basin in the BLM Vernal Field Office.

Jones' Bluestar (*Amsonia jonesii*) – BLM: Colorado

Jones' bluestar occurs on clay, sandy, gravelly soils of dry open areas. The habitat is typically desert-steppe, rock gorges, or canyons at 4,500 to 5,000 feet (CNHP 2002; Spackman and Anderson 2002). A single occurrence in Colorado is located within 1 mile of the centerline of Link C270 northwest of Mack, Colorado. The closest known occurrence in Utah is located within 1.5 miles of Link U90 north of Jensen. There are no known occurrences on Jones' bluestar within 3 miles of any transmission line alternative routes more recent than 1965.

Laramie False Sagebrush (*Sphaeromeria simplex*) – BLM: Wyoming

Laramie false sagebrush occurs on gentle slopes or rims of dry, rocky limestone-sandstone plains in openings dominated by cushion plant communities within areas of more densely vegetated juniper, limber pine, big sagebrush, or mountain mahogany at elevations of 7,200 to 8,760 feet. The species is endemic to southeast Wyoming in the western foothills of the Laramie Range, Shirley Basin, and Shirley Mountains (Fertig and Thurston 2003). There are no known occurrences of the species in the Project area; however, there is modeled suitable habitat in the Project area. There is one area of medium likelihood suitable habitat within the 1-mile buffer of Link W370 northeast of Baggs, Wyoming. Other areas of suitable habitat are located within 5 miles of the centerlines of Links W15, W21, and W30.

Large-fruited Bladderpod (*Lesquerella macrocarpa*) – BLM: Wyoming

Large-fruited bladderpod is a perennial forb endemic to a small area in the western rim of the Great Divide Basin and the Green River Basin. The species grows on barren or sparsely vegetated gypsum-clay hills and benches and clay flats from 7,200 to 7,700 feet (NatureServe 2013). WYNDD-modeled habitat for the species occurs in the Project area in Wyoming (WYNDD 2011).

Ligulate Feverfew (*Parthenium ligulatum*) – BLM: Colorado

Ligulate feverfew occurs on barren shale knolls at 5,400 to 6,500 feet in elevation in Utah and Colorado (Rio Blanco and Moffat counties) (CNHP 1997). Within the vicinity of the Project area, the ligulate feverfew is known to occur in Rio Blanco County, Colorado. Only one known occurrence is located in the Project area. It is along the centerline of Link C220 where this link crosses the White River. Two other occurrences are located on the western edge of Raven Ridge approximately 2.5 miles southeast of Link U242.

Meadow Pussytoes (*Antennaria arcuata*) – BLM: Wyoming

Meadow pussytoes is a perennial forb endemic to the Great Basin in south-central Idaho, northeastern Nevada, and central and southwestern Wyoming. The species occurs on the edges and hummocks of moist meadows surrounded by sagebrush grassland communities from 4,900 to 7,900 feet (NatureServe 2013). WYNDD-modeled habitat for the species occurs in the Project area in Wyoming (WYNDD 2011). The species is also a USFS sensitive species, though it does not occur on national forests within the Project area.

Narrowleaf Evening Primrose (*Oenothera acutissima*) – BLM: Colorado

Narrowleaf evening primrose grows in sandy, gravelly, and rock soils along drainage bottoms and in seasonally wet areas (CNHP 1997) associated with lodgepole pine, ponderosa pine, and Rocky Mountain juniper-mountain sagebrush communities (UDWR 1998). It is endemic to Utah (Uintah, Duchesne, and Daggett counties) and Colorado (Moffat County). In Utah, the species located within and nearby Link U30. Data from BLM Vernal Field Office shows one known occurrence along the centerline of Link U30.

The transmission line alternative routes are located outside the known range of the Flaming Gorge evening primrose in Colorado.

Narrow-stem Gillia (*Gilia stenothrysa*) – BLM: Colorado

Narrow-stem gilia occurs on silty to gravelly loam soils derived from the Green River or Uinta Formations in grassland, sagebrush, mountain mahogany, or pinyon-juniper communities between 5,000 and 6,000 feet (CNHP 1997). Current known distribution is Mesa and Rio Blanco counties in Colorado (CNHP 1997) and in Uintah, Duchesne, Carbon, and Emery counties in Utah (NRCS 2013c). Occupied habitat and occurrences of the species are located within a mile of Links C186 and C196 in the BLM White River Field Office in Colorado.

Ownbey's Thistle (*Cirsium ownbeyi*) – BLM: Wyoming

Ownbey's thistle primarily occurs on rocky, gravelly, sandy soils in alcoves and side canyons at cliff bases, bedrock seeps, or riparian areas at elevations from 5,100 to 7,280 feet (UDWR 1998). Habitat includes sagebrush, juniper, and riparian communities (UNPS 2012). Current known distribution is Daggett and Uintah counties, Utah and Moffat County, Colorado; however, the species is not listed as sensitive by the BLM Colorado or Utah. A single occurrence is known from in the Project area near Massadona, Colorado at the junction of Links C175, C177, and C186. Three occurrences are located between 1 and 1.5 miles of the centerline of Link U20 near Swallow Canyon along the Green River in Daggett County.

Persistent-sepal Yellowcress (*Rorippa calycina*) – BLM: Wyoming

Persistent-sepal yellowcress occurs on sandy soils near the high water lane of riverbanks and shorelines at 4,300 to 6,800 feet. Current known distribution includes Carbon and Sweetwater counties in Wyoming (Fertig et al. 1994). A single known occurrence is located in the Project area along Link W30 southwest of Sinclair, Wyoming. Predicted suitable habitat is located within the 1-mile buffer of many links within Wyoming. Low likelihood suitable habitat is present along the centerlines of Links W22, W26, W101, W102, W108, W125, W126, W128, W129, W490, and W491. High likelihood suitable habitat is present on the reference centerline of Link W30.

Piceance Bladderpod (*Lesquerella parviflora*) – BLM: Colorado

Piceance bladderpod occurs on shale outcrops of Green River Formation on ledges and slopes of canyons in open areas at 6,200 to 8,600 feet. It is a Colorado endemic that occurs in the Piceance Basin in Garfield, Rio Blanco, and Mesa counties (CNHP 1997). Only one known occurrence is located in the Project area. It is located in Hay Gulch along Link C104 approximately 10 miles west of Meeker. No other known occurrences are located within 10 miles of alternative routes.

Psoralea Globemallow (*Sphaeralcea psoraloides*) – BLM: Utah

Psoralea globemallow occurs on the Tununk Member of the Mancos Shale, Buckhorn Conglomerate, Curtis Sandstone, Entrada Siltstone, Carmel, and Kaibab Limestone from 4,000 to 6,300 feet. Typical habitat is saline, gypsiferous soils in Zuckia-Ephedra, shadscale, eriogonum, lepidum, and pinyon-juniper communities (UNPS 2011, 2012). It is endemic to the San Rafael Swell of the Colorado Plateau on BLM and state lands (UDWR 1998). A single occurrence is known to occur in the Project area. This occurrence is located approximately 0.7 mile from Link U730 west of the town of Green River.

Racemose Milkvetch (*Astragalus racemosus* var. *treleasei*) – BLM: Wyoming

Racemose milkvetch is a perennial forb found throughout the central United States (NatureServe 2013). In Wyoming, the species is endemic to the Green River Basin and eastern foothills of the Wyoming Range in Sublette and Uinta counties (Heidel and Fertig 2003). The species occurs on sparsely vegetated, shale-derived outwash flats and fluted Badland slopes (Heidel and Fertig 2003). WYNDD-modeled habitat for the species occurs in the Project area (WYNDD 2011).

Rock Hymenoxis (*Hymenoxys lapidicola*) – BLM: Utah

Rock hymenoxys is endemic to Uintah County in northeastern Utah and occurs in rock crevices in ponderosa pine-manzanita and pinyon-juniper communities between 6,000 and 8,100 feet (UNPS 2012). Occurrences of the species are located within 5 miles of transmission line alternative routes in the Uinta Basin in the BLM Vernal Field Office.

Rollins' Cat's-eye (*Cryptantha rollinsii*) – BLM: Colorado

Rollins' cat's-eye occurs on white shale slopes of the Green River Formation from 5,300 to 5,800 feet. Habitat includes pinyon-juniper or cold desert shrubland communities. Current known distribution includes Wyoming, Utah, and Colorado (Moffat and Rio Blanco counties) (CNHP 1997). There are numerous known occurrences in the Project area in Rio Blanco County, Colorado. Along Link C196 there are nine known occurrences near the Rio Blanco-Garfield County border. In Wyoming, there is a single occurrence in the Project area. This occurrence is located approximately 0.8 mile from Link W492 approximately 6 miles north of the Utah border.

Spanish Bayonet (*Yucca sterilis*) – BLM: Utah

Spanish bayonet is endemic to the Uinta Basin in Duchesne and Uintah counties, Utah. The species inhabits sandy soils in salt desert shrub, juniper, sagebrush, and shadscale communities at elevations from 4,790 to 5,800 feet (UNPS 2012). Five known occurrences are located within 5 miles of transmission line alternative routes in Uintah County, Utah. There is a single known occurrence in the Project area located along Link U321 at the mouth of Walker Hollow near the Green River southwest of Jensen. Additional occurrences are located within 2 miles of Link U400 south and east of the White River.

Stemless Beardtongue (*Penstemon acaulis* var. *acaulis*) – BLM: Wyoming; USFS: Ashley National Forest

Stemless beardtongue is a long-lived perennial forb endemic to southwestern Wyoming and northeastern Utah. It inhabits semi-barren substrates in pinyon-juniper and sagebrush-grass communities from 5,900 to 8,200 feet (NatureServe 2013). WYNDD-modeled habitat for the species occurs in the Project area in Wyoming (WYNDD 2011). The species is also a USFS sensitive species in the Ashley National Forest; however, no known occurrences of the species are found within 20 miles of the Project area in Utah (UNHP 2012).

Thompson's Talinum (*Talinum thompsonii*) – BLM: Utah

Thompson's talinum occurs on shallow, gravelly soils weathered from the Buckhorn Conglomerate (UDWR 1998), mainly composed of siliceous pebbles at 7,500 feet. Habitat includes pinyon-juniper and ponderosa pine communities. It is endemic to the Colorado Plateau in Emery County where it is known to occur on BLM and state lands (UNPS 2012). There are no known occurrences located in the Project area; however, all known occurrences of Thompson's talinum are located on Cedar Mountain in Emery County within 5 miles of the transmission line alternative routes for Link U730.

Twisted Buckwheat (*Eriogonum contortum*) – BLM: Colorado

Twisted buckwheat occurs on the Mancos Shale Badlands at 4,500 to 5,100 feet in shadscale and other salt desert shrub communities. It occurs in Utah and Colorado (Garfield and Mesa counties) (CNHP 1997). Twisted buckwheat is known to occur within the 1-mile buffer of the Project area along links in Grand and Mesa counties.

Uinta Basin Spring-parsley (*Cymopterus duchesnensis*) – BLM: Colorado

Uinta Basin spring-parsley occurs on sandy clay and clay semi-barrens of Mancos and Morrison Shales derived from the Morrison, Uinta, Wasatch, and Green River Formations from 4,700 to 6,800 feet elevation. The habitat is cold desert shrub, sagebrush, and juniper communities. The species is found in Utah (Uintah and Duchesne counties) and Colorado (Moffat and Rio Blanco counties) (CNHP 1997). The Uinta Basin spring-parsley is located within transmission line alternative routes in Duchesne and Uintah counties, Utah. In Colorado, only one occurrence is located within the 1-mile buffer of Link C196 along Salt Creek south of the Garfield-Mesa county line.

Untermann's Daisy (*Erigeron untermannii*) – BLM: Utah; USFS: Ashley National Forest

Untermann's daisy is endemic to the Tavaputs Plateau in Duchesne County, Utah (Welsh et al. 2008). It is found on calcareous shales and sandstones of the Uinta and Green River Formations in pinyon-juniper, mountain mahogany, limber pine, bristlecone pine (*Pinus longaeva*), and sagebrush communities between 7,000 and 9,400 feet in elevation (UNPS 2012). There are numerous known occurrences for the species along Link U432 within Ashley National Forest.

Wheeler's Angelica (*Angelica wheeleri*) – USFS: Uinta National Forest

Wheeler's angelica is endemic to Utah primarily along the Wasatch Front. It inhabits areas that are boggy or very wet typically in riparian communities, seeps, and springs from 5,380 to 10,000 feet in elevation (UNPS 2012) in Cache, Juab, Piute, Salt Lake, Sevier, and Utah counties (Welsh et al. 2008). Two occurrences are known from the junction of Salt Creek Canyon and McCune Canyon in Uinta National Forest approximately 5 miles from the transmission line alternative routes of Link U650.

E.6.2 Special Status Fish and Wildlife

E.6.2.1 Federally Listed Threatened, Endangered, Candidate, and Proposed Fish and Wildlife Species

Black-footed Ferret (*Mustela nigripes*) – FWS: Endangered, Experimental/Non-essential; State: Wyoming, Colorado, Utah

Regulatory Status

The black-footed ferret was designated as endangered by the Bureau of Sport Fisheries and Wildlife in 1966. The species was subsequently listed as threatened with extinction under the Endangered Species Preservation Act on March 11, 1967 (32 FR 4001) and as endangered under the ESA on June 2, 1970 (35 FR 8491–8498). No critical habitat has been designated for the species. Eight reintroduced black-footed ferret populations have been designated as Nonessential Experimental under Section 10(j) of the ESA. The FWS initiated a 5-year species status review for the black-footed ferret on July 7, 2005 (70 FR 39326–39327). In the 2008 status review summary, the FWS recommended no change in status and a Recovery Priority Number of 2C (FWS 2008b).

On December 17, 2012, FWS announced the availability of the *Draft Black-footed Ferret Programmatic Safe Harbor Agreement and Environmental Assessment* for comment by the public and federal, state,

tribal, and local agencies. The safe harbor agreement is part of a larger new multi-agency partnership to expand black-footed ferret recovery efforts. The comment periods for the safe harbor agreement closed on February 22, 2013.

The current Black-footed Ferret Recovery Plan was approved in 1988 (FWS 1988). This plan replaced the 1978 recovery plan, which was drafted when no extant, wild black-footed ferrets were thought to exist (Linder et al. 1978). The 1988 recovery plan does not include any delisting criteria for the species (FWS 1988). FWS published the Black Footed Ferret Spotlight Species Action Plan on August 19, 2009. The action plan provided some interim guidance for the recovery of the species. An updated recovery plan is expected to be available in 2014.

Taxonomy and Life History

The black-footed ferret was first formally described by John Audubon and James Bachman in 1851 (Clark 1986). The species is 1 of 14 members of the genus *Mustela* and 1 of 3 species in the Subgenus *Putorius*, which also includes the Siberian polecat (*Mustela eversmanni*) and the European polecat (*M. putorius*) (Hillman and Clark 1980). The black-footed ferret is endemic to North America and is the only ferret species native to the Americas (FWS 2008b). There are no recognized subspecies.

The black-footed ferret co-evolved with prairie dogs (*Cynomys* spp.) in North America and is considered to be a prairie dog obligate. The ferret is entirely dependent on prairie dog colonies, utilizing prairie dog burrows for shelter and den sites and preying almost exclusively on prairie dogs (Biggins 2006). Female black-footed ferrets become sexually mature at 9 months with prime breeding age occurring from 1 to 3 years old (Clark 1989). Ferrets breed between March and May and females can have multiple estrus cycles. Gestation lasts 42 to 45 days and kits are born between April and June (Hillman and Clark 1980). Average litter size is 3 kits (Forrest et al. 1988). Kits generally disperse in late September and early October, with males typically dispersing to different prairie dog towns and females remaining near their mother's home range (Clark 1989).

Black-footed ferrets are solitary except during the breeding season and when mothers are caring for kits. Ferrets are strongly nocturnal and spend much of the day below ground among several burrows (Clark 1989). The average lifespan of wild black-footed ferrets is 3 to 4 years.

Distribution and Habitat Requirements

As a prairie dog-obligate, the black-footed ferret is associated exclusively with prairie dog colonies in the grasslands and semi-desert shrublands of North America. The historical distribution of the black-footed ferret was closely associated with the ranges of the black-tailed prairie dog (*Cynomys ludovicianus*), the white-tailed prairie dog (*C. leucurus*), and the Gunnison's prairie dog (*C. gunnisoni*). The species historical range has been estimated at nearly 250 million acres across Arizona, Colorado, Kansas, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, Utah, and Wyoming as well as Alberta and Saskatchewan (Clark 1989).

The significant reduction in the distribution and abundance of prairie dogs throughout North America during the 20th century resulted in the near extirpation of the black-footed ferret (Esch et al. 2005). The species was thought to be extinct until the discovery of a small population near Meeteetse, Wyoming in 1981. After declining to 18 individuals, all members of the Meeteetse population were captured and placed in a captive breeding program in 1987 (FWS 1988). Since 1991, a total of 18 black-footed ferret reintroduction projects have been conducted in eight states and Mexico (FWS 2008b). Experimental, non-essential populations have been established at eight reintroduction sites in the United States including:

- Shirley Basin, Wyoming (56 FR 41473)
- Conata Basin/Badlands, South Dakota (59 FR 42682)
- Charles M. Russell National Wildlife Refuge, Montana (59 FR 42696)
- Aubrey Valley, Arizona (61 FR 11320)
- Coyote Basin, Colorado/Utah (63 FR 52823)
- Cheyenne River Sioux Reservation, South Dakota (65 FR 60879)
- Rosebud Sioux Reservation, South Dakota (68 FR 26498)

Reintroduction projects not utilizing the experimental, non-essential designation have been completed in Chihuahua, Mexico (2001), Lower Brule Indian Reservation, South Dakota (2006), Wind Cave National Park, South Dakota (2007), Espee Ranch, Arizona (2007), Logan County, Kansas (2007), Northern Cheyenne Indian Reservation, Montana (2008), and Vermejo Ranch, New Mexico (2008)(FWS 2008b).

Four reintroduction sites (Aubrey Valley, Cheyenne River Indian Reservation, Conata Basin, and Shirley Basin) currently meet the population objectives for reintroduced populations outlined in the 1988 Recovery Plan and are considered "successful" by the (FWS 2008b). Two populations (Badlands and Rosebud Sioux Reservation in South Dakota) are "improving"; four (Charles M. Russell National Wildlife Refuge, Coyote Basin, Wolf Creek, and Janos, Mexico) are "marginal"; and the remaining populations are either "unsuccessful" or too recent to categorize. The FWS currently estimates there are 422 breeding adult black-footed ferrets across all reintroduced populations (FWS 2008b).

Primary Threats to Survival

The historical decline in the black-footed ferret occurred concurrently with the reduction in the distribution and abundance of prairie dogs in North America. The primary causes of the species decline included conversion of native grassland habitats to agriculture, large scale eradication of prairie dogs, and disease (Esch et al. 2005). Despite several successful reintroductions, the black-footed ferret remains one of the most endangered mammals in the North America.

The current threats to species recovery include habitat loss and modification, disease, and the lack of adequate regulatory mechanisms (FWS 2008b). The FWS estimates that approximately 97 percent of suitable habitat from pre-European times has been lost, and the fragmentation/loss of large prairie dog colonies currently limits the ability of the remaining habitat to support ferrets. Sylvatic plague affects both ferrets and prairie dogs, and the disease continues to be a primary threat to the black-footed ferret. Plague has caused the suspension of reintroduction efforts at three sites and limited recovery at two other sites (FWS 2008b). In 2008, plague was documented in prairie dogs at Conata Basin, which supports the most successful reintroduced ferret population. Finally, the lack of regulatory mechanisms to protect prairie dog colonies from control and eradication efforts as well as recreational shooting currently represents a significant threat to the recovery of the black-footed ferret.

Occurrence in the Project Area

No known remnant black-footed ferret populations are known to occur in the study area. However, there are two reintroduction sites within the study area: the Shirley Basin/Medicine Bow Management Area (Shirley Basin) and the Northwestern Colorado/Northeastern Utah Black-footed Ferret Experimental Population Area (ExPA).The Shirley Basin site encompasses approximately 2,068 square miles in Carbon, Albany, and Natrona counties. This area is located approximately 20 miles northeast of Rawlins, Wyoming. The first release of captive-raised black-footed ferrets occurred in the Shirley Basin in 1991. Since that date, a total of 277 individuals have been released at this site that currently supports an estimated 196 individuals and represents the second largest black-footed ferret population in North America (FWS 2008b). Although the Shirley Basin supports the only known extant population of wild black-footed ferrets in Wyoming, there are numerous white-tailed prairie dog complexes within the

planning areas for both the BLM Rawlins and Rock Springs Field Offices that represent suitable habitat for the black-footed ferret.

The ExPA encompasses portions of Rio Blanco and Moffat counties in Colorado, Sweetwater County in Wyoming, and Uintah and Duchesne counties in Utah. The ExPA has been separated into the Northwestern Colorado Experimental Population Sub-Area and the Northeastern Utah Experimental Population Sub-Area. Within the Northwestern Colorado Sub-Area, the Little Snake Black-footed Ferret Management Area was established as a specific reintroduction site. The Little Snake area is located in northwest Moffat County, Colorado along the Colorado-Wyoming border. Within the Northeastern Utah Sub-Area, the Coyote Basin Black-footed Ferret Management Area was established as the specific reintroduction site. The Coyote Basin area is located in Uintah County, Utah, along the Utah-Colorado border.

A total of 255 black-footed ferrets have been released into the Coyote Basin Area since 1999. Reproduction was confirmed in Coyote Basin in 2000, and the population is currently estimated at 25 individuals (FWS 2008b). Ferret releases at the Wolf Creek site northeast of Rangely, Colorado, were initiated in 2001, and to date a total of 189 individuals have been released at this site. The Wolf Creek population is currently estimated at 16 individuals (FWS 2008b). The FWS classifies both populations as "marginal" (FWS 2008b).

Bonytail (*Gila elegans*) – FWS: Endangered; State: Colorado, Utah

Regulatory Status

The bonytail was first proposed for listing as an endangered species under the ESA on April 24, 1978, because of alteration and destruction of habitat that had greatly reduced populations and would continue to threaten their existence (43 FR 17375). The FWS determined the species to be endangered and released the final rule on April 23, 1980 (45 FR 27710). On March 21, 1994, FWS designated seven reaches of the Colorado River system, including portions of the Colorado, Green, and Yampa rivers in the Upper Basin and the Colorado River in the Lower Basin, totaling 312 miles of critical habitat for the species (59 FR 13374). On April 18, 2007, the FWS initiated a 5-year species status review (72 FR 19549). The bonytail is also included in the Lower Colorado River Multi-Species Conservation Program (2004).

A recovery plan for the bonytail was published on August 1, 2002. To address unique threats and site-specific management actions, the entire population of the bonytail has been reduced to upper and lower basin recovery units. The upper basin recovery subunit is composed of the Green River and upper Colorado basin and the lower basin recovery unit includes the mainstem and tributaries of the Colorado River from Lake Mead downstream to the southerly International Boundary with Mexico. The species may be downlisted from endangered to threatened, if during a 5-year period: (1) one (upper basin recovery subunit) and two (lower basin recovery subunit) genetically and demographically viable, self-sustaining populations of more than 4,400 adults are maintained; (2) a genetic refuge is maintained in a suitable location in the lower basin recovery unit such as Lake Mohave or Havasu; and (3) site-specific management tasks to minimize or remove threats have been identified, developed and implemented. Delisting can occur if all three goals listed above are maintained for an additional 3 years past downlisting and a necessary level of protection is attained (FWS 2002c).

Taxonomy and Life History

The bonytail was originally collected and described from the Zuni River, New Mexico, in 1853 by Baird and Girard of the Sitgreaves Expedition. It is commonly referred to as the bonytail chub and is a member of a unique assemblage of fishes native to the Colorado River Basin consisting of 35 species. It was once

considered a subspecies of the roundtail chub (*Gila robusta*) but has since been accorded full species status (FWS 2002c).

The bonytail is a relatively large cyprinid or minnow endemic to the Colorado River Basin. It is closely related to the roundtail chub and other endemic *Gila* species. It has unique morphological characteristics making it more adapted to the flow regimes of the historic Colorado River mainstem and tributaries. Adults are characterized by a small head and an elongated, laterally compressed body with a long, thin caudal peduncle and a slightly humped back (Nevada Department of Wildlife 2007). Adult bonytails can reach a maximum size of 22 inches (Bozek et al. 1984). The scales are small, reduced, or embedded and it has relatively small eyes, all thought to be adaptations to high silt loads that characterized the erosive, turbid Colorado River System prior to the construction of dams (Arizona Game and Fish Department [AZGFD] 2001). The narrow tail terminates in a V-shaped caudal fin (FWS 2002c).

Natural reproduction of the bonytail was last documented in the Green River in Dinosaur National Monument in the early 1960s (Vanicek and Kramer 1969). The species is a broadcast spawner, in the wild females released an estimated 10,000 adhesive eggs while hatchery females yield an average of 25,000 eggs (Hamman 1982). In Lake Mohave and the lower basin spawning occurs in May, whereas the upper basin spawning occurs in June and July. By 2002, more than 83,000 hatchery-reared bonytails had been released into Lake Mohave (Valdez and Clemmer 1982). In rivers, adults eat primarily terrestrial insects, plant debris, and algae while the young eat aquatic insects. In lakes, the bonytail has been observed feeding on algae and plankton (AZGFD 2001).

Distribution and Habitat Requirements

Formerly abundant throughout the Colorado River and its larger tributaries, the bonytail has been found from the Green River in Wyoming and Utah; the Yampa and Gunnison rivers in Colorado; the Colorado River in Arizona, Colorado, Nevada, and California; San Juan River in New Mexico; and the Gila and Salt rivers in Arizona (FWS 2002c). Presently, the bonytail is one of the most critically imperiled North American freshwater fishes. The only known wild bonytails are an unknown number of large, old adults in Lake Mohave on the lower Colorado River and scattered individuals in the upper Colorado River basin (AZGFD 2001). Known locations include the Yampa River in Dinosaur National Monument, the Green River in Gray and Desolation canyons, the Colorado River near Black Rocks (Kaeding et al. 1986) and Cataract Canyon (59 FR 13374), Lake Mohave near the Arizona-Nevada border, and Lake Havasu in Arizona and California (FWS 2002c).

The bonytail was historically common in warm-water reaches of larger rivers from Mexico to Wyoming. Little is known, however, about the specific habitat requirements of bonytails because the species was extirpated from most of its historic range prior to extensive fishery surveys (FWS 2002c). Current habitat is found in mid-sized to large rivers, usually near deep swift water, in flowing pools and backwaters, over mud or rocks (Valdez et al. 1990). It is hypothesized, based on available distribution data, that flooded bottomland habitats are important growth and conditioning areas for bonytails, particularly as nursery habitats for young (FWS 2002c).

Primary Threats to Survival

Threats to the species include streamflow regulation, habitat modification or destruction, and competition with, and predation by, nonnative fish species. Historically, the species inhabited the large turbid mainstream rivers of the Colorado River Basin that alternated between swift water canyons characterized by torrential rapids and slow, meandering, sand bottomed stretches. The Colorado River has been greatly altered by dams and diversions eliminating much of the bonytail's original habitat. Currently, the lower Colorado River basin is an alternating series of reservoirs and cold tailwaters that do not provide the warm water temperature needed for bonytails to spawn. Predation by introduced species is also likely to

have been an important factor in the decline of the species. Species such as bass, sunfish, catfish, red shiner, and the redside shiner have been suggested to be the main problem (45 FR 27710).

Occurrence in the Project Area

The bonytail is endemic to the Colorado River Basin, but no reproducing populations are thought to persist in the wild (FWS 2002c). The last documented capture of a bonytail in the Project area was during the late 1980s in Desolation/Gray Canyon (Carbon and Uintah counties, Utah). Designated critical habitat for the bonytail in the Project area includes portions of the upper Colorado River (northeast of Wayne County, Utah), portions of the Green River (north of Wayne County, Utah), and the Yampa River. Water depletions within the upper Colorado River system in Wyoming, Colorado, and Utah could affect bonytail or its habitat.

Boreal Toad (*Bufo boreas boreas*) – FWS: Petitioned; BLM: Wyoming, Colorado, Utah; USFS: Ashley, Manti-La Sal, and Uinta National Forests; State: Wyoming, Colorado, Utah

Regulatory Status

On April 12, 2012, the FWS announced a 90-day finding on a petition to list either the Eastern population or the Southern Rocky Mountain population of the boreal toad as a distinct population segment (DPS) that is endangered or threatened under the ESA and to designate critical habitat. Based on the review, FWS found that the petition presented substantial scientific or commercial information indicating that listing the as a DPS may be warranted. FWS initiated a 12-month review of the status of the eastern population to determine if listing it as a DPS is warranted.

Distribution and Habitat Requirements

The western (boreal) toad occurs in the montane areas associated with permanent water bodies in a variety of habitats including riparian, mountain shrub, mixed conifer, and aspen-conifer assemblages. It breeds in small pools, beaver ponds, reservoirs, and the backwaters and side channels of creeks and rivers. The Project area is located outside the known range and distribution of the species in Wyoming and Colorado (Keinath and McGee 2005), but is within the known range of the species in Utah (Hogrefe et al. 2005).

Primary Threats to Survival

The species is threated by pollution, pesticide use, habitat loss, fragmentation, degradation, and disease. Populations in Utah have declined and extant populations are irregularly distributed within historic range (Hogrefe et al. 2005).

Occurrence in the Project Area

Three known occurrences are located within 1 mile of transmission line alternative routes in Utah. One is located south of Helper along Link U522; another is at Kyune along Link U524; and the third is located 4 miles north of Nephi along Link U650. The species is known to occur in Strawberry Reservoir, which lies within 3 miles of Link U420. The boreal toad may be present in the Project area in the Book Cliffs and San Pitch, Uinta, and Wasatch mountains and valleys.

Colorado Pikeminnow (*Ptychocheilus lucius*) – FWS: Endangered; State: Colorado, Utah

Regulatory Status

The Colorado pikeminnow was listed as endangered (as the Colorado River squawfish) under the Endangered Species Preservation Act on March 11, 1957 (32 FR 4001). With the 1973 passage of the

ESA, the fish retained its endangered status. On March 21, 1994 the FWS designated six reaches of the Colorado River System, including portions of the Colorado, Green, Yampa, White, and San Juan rivers, totaling 1,148 miles of critical habitat for the species (59 FR 13374). Two reintroduced Colorado pikeminnow populations have been designated as Nonessential Experimental under Section 10(j) of the ESA (50 FR 30188). An additional reintroduced population has been proposed for designation as a Nonessential Experimental (52 FR 32143), but the ruling has never been finalized. A 5-year review was initiated on April 18, 2007 (72 FR 19549).

The current Colorado Pikeminnow Recovery Plan was approved August 28, 2002. To address unique threats and site-specific management actions, the entire population of the Colorado pikeminnow has been reduced to three recovery subunits of the upper Colorado River Basin: the Green River, the upper Colorado River, and the San Juan River subbasins. The species may be downlisted from endangered to threatened, if during a 5-year period: (1) one genetically and demographically viable, self-sustaining population of more than 2,600 adults is maintained in the Green River subbasin recovery unit; (2) a self-sustaining population of at least 700 adults is maintained in the upper Colorado River subbasin recovery unit; (3) a target number of 1,000 age 5+ fish is established in the San Juan River subbasin recovery unit; and (4) site-specific management tasks to minimize or remove threats have been identified, developed and implemented. Delisting can occur if the three goals listed above are maintained for an additional 7 years past downlisting and a necessary level of protection is attained (FWS 2002a).

Taxonomy and Life History

The Colorado pikeminnow is the largest North American member of the minnow family (*Cyprinidae*). The estimated maximum total size is 6 feet and 80 pounds, although averages are believed to be less than 3 feet and between 4 to 9 pounds (Miller 1961). It is one of three large cyprinids of the genus *Ptychocheilus* native to the western United States. The species has a flattened head and elongated body. They are adapted to life in rivers with seasonally variable flow and high silt loads. The mouth is large and nearly horizontal with slender teeth adapted for grasping and holding prey. It is the top native carnivore of the Colorado River system. Small individuals feed primarily on waterfleas, copepods, and chironamids. Large adults prey mainly on other fish (FWS 2002a).

The Colorado pikeminnow spawns under decreasing flow regimen with increasing temperatures in summer when the water temperature is at least 68 to 72 degrees Fahrenheit (°F), generally after June. The pikeminnow makes an extensive spawning migration, with one recorded individual traveling 127 miles. They are broadcast spawners that deposit their eggs on cobble substrates in riffles and runs. Eggs hatch in less than 1 week when larvae then enter stream drift and are transported downstream for about 6 days, traveling an average distance of 99 miles to reach low gradient nursery areas. The Colorado pikeminnow becomes mature in 5 to 7 years and may live 30 years or more. Natural reproduction has been recently observed in the Green, Yampa, upper Colorado, Gunnison, and San Juan rivers (FWS 2002a).

Distribution and Habitat Requirements

The Colorado pikeminnow was once widespread in the large rivers of the Colorado River and major tributaries, but present distribution is drastically reduced from the original. The pikeminnow has not been seen below Glen Canyon Dam since 1968. The three remaining wild populations are found in the Green, upper Colorado, and San Juan River Subbasins. In the Green River Subbasin, the species is seen in the Green River (from Lodore Canyon to the Colorado River Confluence), Yampa River (from Craig, Colorado, to the Green River Confluence) (FWS 2002a), Little Snake River (Wyoming to the Yampa River Confluence) (Marsh et al. 1991), White River (Taylor Draw Dam to the Green River Confluence), Price River (lower 89 miles above Green River confluence), and the Duchesne River (lower 6.2 miles above the Green River confluence). In the Upper Colorado River Subbasin, Colorado pikeminnow are known to inhabit the Upper Colorado River (from Palisade, Colorado, to Lake Powell inflow), the

Gunnison River (lower 33 miles above Colorado River confluence), and the Dolores River (lower 1.2 miles above Green River confluence). And in the San Juan River Subbasin, the species is seen only in the San Juan River (from Shiprock, New Mexico, to Lake Powell Inflow) (FWS 2002a). The last wild Colorado pikeminnow was caught in 1975 in the lower Colorado River (Minckley et al. 2003).

A refuge population was successfully established at the Dexter National Fish Hatchery in Dexter, New Mexico. From 1981 to 1990, as many as 623,000 Colorado pikeminnow from the refuge population were reintroduced to two designated non-essential experimental population locations in the Gila River drainage of Arizona:

- Salt River (Gila County) – from Roosevelt Dam upstream to U.S. Highway 60 Bridge
- Verde River (Gila and Yavapai counties) – from Horseshoe Dam upstream to Perkinsville (50 FR 30188)

A rule was proposed in 1987 to designate an additional non-essential experimental population in the Colorado River Basin, but has never been finalized:

- Lower Colorado River (Yuma and LaPaz counties, Arizona and Imperial, Riverside, and San Bernadino counties, California) – between Imperial and Parker Dams (52 FR 32143)

The Colorado pikeminnow is found in warm-water reaches of the Colorado River mainstem and larger tributaries. Adults have been found in various habitats including deep, turbid strongly flowing water; eddies; runs; flooded bottoms; and backwaters. Lowlands inundated during spring high flow appear to be important habitats for health and reproductive conditioning as the fish use these habitats to offset winter stress and replenish energy stores needed for long migrations and spawning. In winter, adults are most commonly found in shallow, ice-covered shoreline areas (FWS 2002a).

Adults migrate long distances (Tyus and McAda 1984) and seek white-water canyons as breeding grounds. They appear to select river canyons receiving groundwater discharge from sandstone/limestone seeps and return to the same spawning site every year. Only two principal spawning sites have been identified, both in the Green River Subbasin. One site is near Three Fords Canyon in Gray Canyon of the Lower Green River and the other is in the lower 20 miles of the Yampa River (FWS 2002a). After hatching, the larvae drift downstream, and then move to shoreline areas and backwaters. Postlarval pikeminnow occupy shallow, ephemeral backwaters formed in late summer by receding water levels (UDWR 1997).

Primary Threats to Survival

Threats to the Colorado River Basin endangered fishes include streamflow regulation, habitat modification or destruction, and competition/predation from nonnative fish species. Historically, the species inhabited the large turbid mainstream rivers of the Colorado River Basin that alternated between swift water canyons characterized by torrential rapids and slow, meandering, sand bottomed stretches. The Colorado River has been greatly altered by dams and diversions eliminating much of the Colorado pikeminnow original habitat. Currently, the lower Colorado River basin is an alternating series of reservoirs and cold tailwaters that do not provide the warm water temperature needed for the pikeminnow to spawn. Predation by introduced species is also likely to have been an important factor in the decline of the species. Species such as bass, sunfish, catfish, red shiner, and the redside shiner have been suggested to be the main problem as they are efficient predators that prey on the eggs and young (45 FR 27710).

Occurrence in the Project Area

The Colorado pikeminnow is endemic to the Colorado River Basin. In the Project area, there are two remaining populations of the Colorado pikeminnow located in the Green and upper Colorado River Basins. Designated habitat in the Project area includes portions of the upper Colorado and Green rivers north of Wayne County, Utah and the Price, Gunnison, White, Little Snake, Duchesne, and Dolores rivers. The only two known spawning sites of the species are also in the Project area near Three Fords Canyon in the Gray Canyon area of the Green River (Carbon and Uintah counties) and the lower 20 miles of the Yampa River (Moffat County, Colorado). Water depletions within the upper Colorado River system in Wyoming, Colorado, and Utah could affect Colorado pikeminnow or its habitat.

Greater Sage-grouse (*Centrocercus urophasianus*) – FWS: Candidate; BLM: Wyoming, Colorado, Utah; State: Wyoming, Colorado, Utah

Regulatory Status

The greater sage-grouse is regulated by a complex and evolving array of federal and state regulations.

Federal Regulations and Policies

On March 4, 2010, the greater sage-grouse became a candidate species for listing as threatened or endangered under the ESA of 1973 (75 FR 13909). Prior to this rule, the FWS had listed the Washington state population of sage-grouse as a candidate for federal listing in 2001 (66 FR 22984). In both rules, the FWS stated that formal listing for the species is warranted, but is precluded by other higher priority listing actions. As a condition of a court approved settlement agreement, the FWS must make a final listing determination by the end of fiscal year 2015.

In addition to its candidate status, the greater sage-grouse is listed as a sensitive species by the BLM in all three states crossed by the Project and by the states of Wyoming, Colorado, and Utah. The USFS lists the greater sage-grouse as a sensitive species on all Forests crossed by the Project and as a Management Indicator Species (MIS) on the Ashley National Forest.

BLM Regulations and Policies

Current BLM sage-grouse management is guided by the documents listed below.

- BLM sensitive species are managed according to guidance provided by *BLM Manual 6840*. In addition to *BLM Manual 6840*, the BLM has issued national-level and state-level Instructional Memorandums that provide additional guidance for the management of sage-grouse. The BLM is currently revising applicable Land Use Plans to incorporate sage-grouse conservation measures. These amendments may lead to some changes sage-grouse regulations and policies in the reasonably foreseeable future.

- In November 2004, the BLM Washington Office released its *National Sage-Grouse Habitat Conservation Strategy* (BLM 2004), which provides a framework for future conservation efforts by setting out broad goals and specific actions to meet those goals.

- In March 2010, the BLM Washington Office issued WO IM 2010-071 *Gunnison and Greater Sage-grouse Management Considerations for Energy Development* (BLM 2010b). These management considerations supplement the *National Sage-Grouse Habitat Conservation Strategy*. This IM identifies management actions necessary at some sites to ensure environmentally responsible exploration, authorization, leasing, and development of renewable

and non-renewable energy resources within the ranges of the Gunnison sage-grouse and greater sage-grouse.

- In December 2011, the BLM Washington Office issued WO IM 2012-043 *Greater Sage-Grouse Interim Management Policies and Procedures* (BLM 2011c), which provides interim conservation measures that are applied to sage-grouse and sage-grouse habitats while BLM land use plan revisions are occurring.

- In February 2012, the BLM Wyoming State Office issued WY IM 2012-019 *Greater Sage-Grouse Habitat Management Policy on Wyoming Bureau of Land Management Administered Public Lands* including the Federal Mineral Estate (BLM 2012c). This IM provides guidance to BLM Wyoming Field Offices on sage-grouse habitat management for proposed activities and resource management planning.

USFS Regulations and Policies

USFS Manual 2670 contains legal authorities, objectives, policies, responsibilities, instructions, and guidance that direct the USFS when planning and executing assigned programs and activities. In October 2012, the USFS published *Interim Conservation Recommendations for Greater Sage-grouse and Greater Sage-grouse Habitat for Regions 1, 2, and 4*. These recommendations supplement the recommendations for sage-grouse contained in the *Chief's Letter to Regional Foresters in Regions 1, 2, 4, 5 and 6 for Sage-grouse and Sagebrush Conservation* (July 2010). These recommendations also promote consistency in management of activities on USFS land with BLM IM 2012-043. Additionally, the USFS is currently revising applicable Land and Resource Management Plans (LRMP) to incorporate sage-grouse conservation measures.

State Regulations and Policies

In June 2003, Wyoming issued a statewide *Greater Sage-Grouse Conservation Plan* (State of Wyoming 2003). The plan was developed by the Wyoming Sage-Grouse Working Group and provides goals, tasks, and recommended management practices to guide sage-grouse planning and management efforts. In June 2011, the Governor of State of Wyoming issued Executive Order 2011-5, *Greater Sage Grouse Core Area Protection* (State of Wyoming: Office of the Governor 2011), which revised previous designations of sage-grouse core population areas, provided guidance specific to the siting and permitting of projects in core areas and established utility corridors within core areas.

In January 2008, the CPW issued the *Colorado Greater Sage-grouse Conservation Plan* (Colorado Greater Sage-grouse Steering Committee 2008). The purpose of the plan is to facilitate the conservation of greater sage-grouse and their habitats in Colorado. It identifies conservation measures and strategies to achieve this purpose. The plan is guided by local sage-grouse working groups. The *Conservation Plan for Greater Sage-grouse in Utah* was approved by the Governor in April 2013. The plan establishes incentive-based conservation programs for conservation of sage-grouse on private, local government, and School and Institutional Trust Lands Administration lands and regulatory programs on other state- and federally managed lands. The Conservation Plan also establishes sage-grouse management areas and implements specific management protocols within these areas. In addition to the conservation plan, UDWR published a *Greater Sage-Grouse Management Plan* in 2009 (UDWR 2009b). The management plan guides management of sage-grouse in Utah and seeks to protect, maintain and improve sage-grouse populations and habitats.

Wyoming Sage-grouse Local Working Groups

The Project would affect two conservation areas overseen by local sage-grouse working groups in Wyoming (from east to west): Bates Hole/Shirley Basin and South-central. These working groups have developed a non-binding conservation plan for sage-grouse management. All of the Wyoming working groups are in the process of updating their plans to bring them into compliance with Executive Order 2011-5 and WY IM 2012-019. The Wyoming working groups are also updating their plans with any other new information, changes, and/or occurrences.

Colorado Sage-grouse Local Working Groups

The Project would affect three conservation areas overseen by local sage-grouse working groups in Colorado (from east to west): Northwest Colorado, Piceance/Parachute/Roan Creek, and Pinon Mesa. These working groups have developed a non-binding conservation plan for sage-grouse management.

Utah Sage-grouse Local Working Groups

The Project would affect three conservation areas overseen by local sage-grouse working groups in Utah: Uinta Basin, Strawberry Valley and Castle County. These working groups have developed a non-binding conservation plan for sage-grouse management.

Taxonomy and Life History

Greater sage-grouse are the largest grouse found in North America, and are uniquely adapted to and dependent on sagebrush (*Artemisia* spp.) for survival. In the 1990s, researchers documented morphological, behavioral and genetic evidence suggesting that sage-grouse in southwestern Colorado and southeastern Utah were distinct from sage-grouse elsewhere across their range (Hupp and Braun 1991; Kahn et al. 1999; Oyler-McCance et al. 1999; Young et al. 1994). In 2000 the Gunnison sage-grouse (*C. minimus*) was formally recognized by the American Ornithologist's Union (AOU) as a distinct species with sage-grouse across the remainder of the range being renamed greater sage-grouse (*C. urophansianus*). Although as far back as the 1940s researchers have argued for subspecies classification between sage-grouse in eastern (*C. u. urophasianus*) and western (*C. u. phaios*) portions of the species' range (Aldrich 1946; Aldrich 1963; Aldrich and Duvall 1955), and morphological, behavoral and genetic differences among some populations have been documented (Aldridge et al. 2008; Oyler-McCance et al. 2005; Taylor and Young 2006), individuals are not differentiated at a distinct geographic boundary and the FWS is currently not considering listing at the level of subspecies.

Sage-grouse are polygamous and exhibit consistent breeding behavior on ancestral strutting grounds (leks) annually (Patterson 1952). During the breeding season, males display in early morning and evening hours, traveling up to 2.1 kilometers (Ellis et al. 1987) from the lek to day-use feeding and resting areas. Sage-grouse females retire into the vicinity of their nest location within a few days of being bred, and remain relatively sedentary until they nest (Patterson 1952). A majority of sage-grouse females nest within 4 miles of the lek where bred (Colorado Greater Sage-grouse Steering Committee 2008). No concealment strategies are attempted at the nest except that afforded by natural cover and the female's cryptic plumage coloration pattern (Rassmussen and Griner 1938). Egg laying takes 7 to 10 days, incubation lasts 25 to 29 days, and average clutch sizes are between 6.5 and 9.1 eggs (Patterson 1952; Schroeder et al. 1999). Reproductive effort (nesting propensity) estimates in sage-grouse range from 63 to 100 percent (Connelly et al. 2011); however, research on follicular development indicates that between 91 and 98 percent of females breed annually (Braun 1979). Re-nesting rates less than 40 percent are typically reported (Connelly et al. 2011); however, Schroeder (1997) reported re-nesting rates greater than 80 percent in Washington. Sage-grouse are relatively long lived tetraonids, thus renesting may not be beneficial after weighing the benefits and costs of the increased parental investment in a second clutch

(Bergerud 1988). Nesting success in sage-grouse ranges from 15 to 86 percent and is typically around 50 percent (Connelly et al. 2011). Sage-grouse chicks are precocial and move immediately following hatch to search for food (Patterson 1952); females generally rear their broods for the first 2 to 3 weeks in immediate vicinity of their nest (Berry and Eng 1985; Connelly 1982). Most chick mortality occurs prior to the flight stage (2 to 3 weeks) when decreased mobility increases vulnerability to predation and starvation (Autrienth 1981; Patterson 1952). Sage-grouse broods remain in sagebrush habitats until range desiccation induces them to move to habitats still supporting succulent vegetation (Fischer et al. 1993; Neel 1980; Peterson 1970; Wallestad 1971). Brooding females may remain in upland habitats if suitable microsite conditions (e.g., swales, ditches, and springs) are found (Fischer et al. 1996; Hausleitner 2003; Wallestad 1971) or if weather conditions result in forbs remaining succulent in these habitats throughout the summer (Holloran 1999). The beginning of late brood-rearing coincides with forb desiccation but also with changes in chick diets from predominantly insects to forbs (Drut et al. 1994; Klebenow and Gray 1968; Patterson 1952; Peterson 1970). Late brood-rearing habitats are generally used from July to early September (Connelly et al. 1988; Dalke et al. 1963; Gill and Glover 1965; Patterson 1952; Savage 1969; Wallestad 1971). Fall is a transitional period for sage-grouse (Wambolt et al. 2002), during which sage-grouse diets change from a variety of forbs, insects, and sagebrush to predominantly sagebrush (Gill 1965; Leach and Hensley 1954; Patterson 1952; Rassmussen and Griner 1938; Wallestad et al. 1975). A precipitation event (usually snow) or a drop in the temperature initiates migration, which begins in late August (in advance of snow accumulation) and may continue into December (Berry and Eng 1985; Connelly et al. 1988; Dalke et al. 1960). During periods of early, severe winter snowstorms sage-grouse may begin migrations to winter habitats, but at the onset of milder weather later in the fall may return to sites adjoining late brood-rearing habitat (Patterson 1952). Sage-grouse may travel many kilometers or only short distances during fall migrations (Eng and Schladweiler 1972); migratory populations often travel 80 to 160 kilometers to winter ranges (Patterson 1952), while sedentary populations increase flock size and move from meadows into nearby sagebrush habitats during winter (Autrienth 1981).

Distribution and Habitat Requirements

Sage-grouse were historically distributed throughout the Intermountain and northwestern United States and southern regions of three Canadian provinces (Schroeder et al. 2004). Pre-settlement distributions included western Nebraska and the Dakotas, all of Montana, Idaho, Wyoming, Nevada and Utah, northwestern New Mexico, northern Arizona, western Colorado, portions of eastern California, Oregon and Washington, and southern British Columbia, Alberta, and Saskatchewan. Sage-grouse currently occupy 56 percent of the historical distribution, and are no longer found in Arizona, New Mexico, Nebraska or British Columbia (Schroeder et al. 2004). The Western Association of Fish and Wildlife Agencies recently defined 7 sage-grouse management zones that reflect ecological similarities and population linkages instead of political boundaries (Knick and Connelly 2011; Stiver et al. 2006). Sage-grouse Management Zone I (Great Plains) includes sage-grouse populations in eastern Montana, northeastern Wyoming, North and South Dakota, Saskatchewan, and Alberta. The Wyoming Basin Management Zone (II) consists of populations mostly in Wyoming and northwestern Colorado, but also including south-central Montana, and far southeastern Idaho and northeastern Utah. Management Zone III (Southern Great Basin) includes populations primarily in southern Nevada and Utah but includes parts of California. The Snake River Plains (IV) includes sage-grouse populations primarily in Idaho, northern Nevada and eastern Oregon, but also includes northwestern Utah and southwestern Montana. Management Zone V (Northern Great Basin) includes populations in Oregon, California, and Nevada; Management Zone VI (Columbia Basin) includes populations in Washington; and Management Zone VII (Colorado Plateau) includes populations in Utah and Colorado (Knick and Connelly 2011). The highest densities of sage-grouse occur in Management Zones I, II, IV and V (Connelly et al. 2004).

Sage-grouse population persistence has been linked to the availability of sagebrush habitat; the dependence of the species on sagebrush through all seasonal periods has been well documented (Connelly

et al. 2004). Sage-grouse are considered a landscape-scale species as populations generally inhabit and rely on large, interconnected expanses of sagebrush (Connelly et al. 2004). Connelly et al. (2011) report that sage-grouse populations typically occupy habitats with a diversity of species and subspecies of sagebrush interspersed with a variety of other habitats (e.g., riparian meadows, agricultural lands, grasslands, sagebrush habitats with some conifer or deciduous trees); these habitats are usually intermixed in a sagebrush-dominated landscape and are often used by sage-grouse during certain times of the year (e.g., summer) or during certain years (e.g., above normal snow pack). Populations generally exhibit one of three potential migratory patterns (Connelly et al. 2000): (1) non-migratory, where sage-grouse do not make long-distance movements between or among distinct seasonal ranges; (2) one-stage migratory, where sage-grouse move between two distinct seasonal ranges (e.g., distinct winter areas and integrated breeding and summer areas); or (3) two-stage migratory, where sage-grouse move among three distinct seasonal ranges (e.g., distinct winter, breeding and summer areas). Although migratory populations may use a large area, there are specific seasonal habitats used by the population that may be spatially isolated; corridors of sagebrush-dominated habitats are used by individuals to move among these seasonal ranges (Connelly et al. 2003). For non-migratory populations, Connelly et al. (2003) suggest that seasonal habitats are generally well interspersed with no major anthropogenic barriers (e.g., reservoirs) between habitats.

Leks are situated in areas with minimal shrub cover adjacent to relatively dense sagebrush stands where strutting male exposure is maximized, but escape, thermal, and feeding cover is readily available (Gill 1965; Patterson 1952). An important characteristic for leks may be their proximity and configuration with nesting habitat (per theories of lek evolution and mating behavior) (Gibson 1996). In non-migratory populations, leks generally occur within nesting habitat, and may be situated near the center of seasonal ranges (Eng and Schladweiler 1972; Wallestad and Pyrah 1974; Wallestad and Schladweiller 1974). In migratory populations, female dispersal routes between wintering and nesting areas may influence the locations of leks (Bradbury et al. 1989; Dalke et al. 1963; Gibson 1996; Wakkinen et al. 1992). Selection of specific habitat features within a landscape by nesting sage-grouse has been extensively documented. Across the range of the species, nesting sage-grouse consistently select areas with more sagebrush canopy cover and taller grasses compared to available habitats, and tall, dense herbaceous cover – including residual (e.g., standing dead) herbage – in selected dense sagebrush stands generally tends to increase the probability of a successful hatch (Hagen et al. 2007; Holloran 2005). Recent research suggests sage-grouse select nesting habitat at multiple spatial scales: selection is for sagebrush canopy cover at the site scale, for high-density sagebrush and flat topography at the patch scale, and against conifer, grassland and riparian cover at larger scales (Doherty 2008). Females show strong fidelity to nesting areas, generally selecting nest locations within 0.5 to 1 kilometer from previous years' nests (Fischer et al. 1993; Holloran et al. 2005). Additionally, fidelity of female offspring to their natal home ranges has been observed (e.g., yearling females nesting close to their natal nest), suggesting that family groups of females may inhabit relatively distinct areas (Thompson 2012). Thermal and predator protection of young chicks (e.g., dense sagebrush stands) (Thompson et al. 2006) and food availability (e.g., insects and succulent forbs) (Drut et al. 1994; Johnson and Boyce 1990) are important for chick survival during the early brood-rearing period (hatch through 2-weeks post-hatch). Protein-rich foods are additionally required for optimal development 10 to 45 days post-hatch (Johnson and Boyce 1990). Stand structure and food availability are characteristics most frequently associated with habitat selection by sage-grouse during the summer (Aldridge and Brigham 2002; Autrienth 1981; Klebenow 1969). Sage-grouse may use a variety of sagebrush habitats and other habitats (e.g., riparian, wet meadows and irrigated agricultural fields adjacent to sagebrush habitats) during summer, but tend to select feeding habitat near edges of sagebrush-dominated security cover types (Dunn and Braun 1986). Hagen et al. (2007) suggested that sage-grouse select areas with increased forb and grass cover during late brood-rearing periods (greater than 6 weeks post-hatch). Selection of wintering habitats by sage-grouse is influenced by snow depth and hardness, topography (i.e., elevation, slope, and aspect), and vegetation height and density (Batterson and Morse 1948; Gill 1965; Greer 1990; Schroeder et al. 1999); during the winter, sage-grouse rely almost

exclusively on sagebrush exposed above the snow for forage and shelter (Connelly et al. 2000; Crawford et al. 2004; Patterson 1952; Rassmussen and Griner 1938; Remington and Braun 1985; Robertson 1991; Schroeder et al. 1999). In certain areas and during certain winters when snow depths are sufficient to cover most sagebrush plants, suitable winter habitat (e.g., areas where plant exposure above the snow is maintained) may be the most limiting seasonal habitat (Beck 1977; Patterson 1952) with sage-grouse over a broad summering area congregating on smaller, traditional wintering grounds (Beck 1977; Berry and Eng 1985).

Primary Threats to Survival

Current sage-grouse breeding populations throughout western North America are approximately two to three times lower than those during the late 1960s, and populations declined on average 2 percent annually from 1965 to 2003 (Connelly and Braun 1997; Connelly et al. 2004) reported that long-term population declines prior to 1994 in states historically supporting the largest sage-grouse populations (Colorado, Idaho, Montana, Oregon, Wyoming) averaged 30 percent; in states and Canadian provinces historically supporting smaller populations, breeding populations declined by an average of 37 percent. Lek sizes and average rates of change in male numbers declined between 1965 and 2007 for 6 of the 7 Management Zones, and 2 Management Zones – Columbia Basin (VI) and Colorado Plateau (VII) – are projected to decline below an effective population size of 500 individual males in the next 30 years if current population trends continue (Garton et al. 2011). For the majority of management zones (86 percent), population change was best described by declining carrying capacity through time (Connelly et al. 2011), supporting conclusions that habitat quantity and quality are continuing to decline across the sagebrush biome (Connelly et al. 2004).

Potential factors contributing to sage-grouse range-wide declines includes many human caused impacts on the species and its habitats. The fundamental characteristics of the sagebrush biome that have been altered from pre-settlement conditions are grouped into 3 categories – habitat loss, habitat degradation, and habitat fragmentation (Braun 1998) i.e., (1) the total area dominated by sagebrush habitats has been reduced; (2) the composition and structure of (i.e., the vegetation and soils of) sagebrush communities has been negatively altered, including increased abundance and performance of invasive species and decreased abundance and performance of native species; and (3) roads, power lines, fences, energy developments, urbanization and other anthropogenic features have transformed large expanses of habitat into smaller pieces (Connelly et al. 2004; Fahrig 2003) Other factors such as hunting, predation, and drought have also been implicated (Braun 1998). The relative importance of these individual factors most likely has varied over the range of the sage-grouse as well as through time.

The primary contributors to permanent habitat loss in the sagebrush biome include agricultural conversion and urbanization, although one could convincingly argue that the ultimate result of the domination of a site by invasive annual grasses constitutes permanent habitat loss. As an example, cultivated agriculture – primarily cropland – covers more than 230,000 square kilometers (56.8 million acres; 11 percent) of the total land area within the estimated historic distribution of sage-grouse (Knick et al. 2011). Areas converted to croplands are generally those with deeper, loamy soils that are able to be irrigated while sagebrush remains in arid areas where soils and topography are limiting to crops; agriculture has replaced 75 percent of the shrub steppe in deep soils suggesting a majority of the most productive sage-grouse habitats no longer exist (Connelly et al. 2004). Agricultural development can also indirectly influence sage-grouse by providing access to sagebrush habitats for predators such as domestic cats, red fox (*Vulpes vulpes*) and corvids (Connelly et al. 2004). Habitat degradation is exemplified by the long-term consequences of overgrazing by livestock at the turn of the 19th century as well as the proliferation of invasive annual grasses (e.g., cheatgrass [*Bromus tectorum*]), especially in the Great Basin. (Miller et al. 2011) estimate that approximately 65 percent of the Great Basin ecoregion has conditions that put it at moderate to high risk of cheatgrass invasion. Dominance of a site by cheatgrass shortens fire-return

intervals, which—as most species of sagebrush are killed by fire—ultimately results in the conversion of a sagebrush-dominated site to a cheatgrass monoculture providing little to no habitat value for sage-grouse (Epanchin-Niell et al. 2009; Knapp 1996; Rowland et al. 2010). The major influence of livestock grazing on sage-grouse habitat is the potential to cause a transition from an ecological state dominated by sagebrush and cool season bunchgrasses to a site dominated by sagebrush and rhizomatous grasses, invasive annual grasslands or woodlands – all providing sage-grouse with either lower quality or no habitat value (Pyke 2011). Unmanaged overuse of sage-grouse habitats by wild horses and ungulates (e.g., elk, deer, and pronghorn) can have similar negative effects as livestock grazing. The transition to a lower quality condition can occur in 10 to 15 years at any given site under heavy uncontrolled grazing, and once a site has transitioned to a grazing tolerant state it will not revert without active restoration, even if the mechanism causing the conversion is eliminated (Connelly et al. 2004). Habitat fragmentation is generally the result of the addition of anthropogenic infrastructure to sagebrush habitats (e.g., roads, transmission lines, energy developments, fences). Mean sagebrush patch size within an 18-kilometers area was more the 9 times as large in occupied versus extirpated sage-grouse range (Wisdom et al. 2011). Paved roads exist in most sagebrush regions in densities up to greater than 5 kilometers per square kilometer, less than 5 percent of the sage-grouse range is greater than 2.5 kilometers from a paved road, and almost no area of sagebrush is greater than 6.9 kilometers from a paved road (Knick et al. 2011). Of 14 studies investigating the response of sage-grouse populations to energy development, (Naugle et al. 2011) reported that none indicated a positive influence, and the indirect effects of energy development on sage-grouse populations have been documented to 18 kilometers (Johnson et al. 2011).

Occurrence in the Project Area

All of the alternative routes cross sage-grouse habitats in Management Zones II and III, with the potential to cross habitats in Management Zone VII also existing. In Wyoming, the alternative routes cross two core areas (WGFD 2010b) and the entire length of each transmission line alternative route traverses occupied sage-grouse habitat. Active sage-grouse leks are located throughout sage-grouse habitats in Wyoming and all of the alternative routes cross within 4 miles of known active leks (WGFD 2012). In Colorado, approximately 30 to 50 percent of each alternative route crossed preliminary priority sage-grouse habitats (CPW 2012a), and the majority of the alternative routes traverse preliminary general sage-grouse habitat. Active sage-grouse leks are primarily located in preliminary priority sage-grouse habitats in Colorado and all of the alternative routes cross within 4 miles of known active leks in Moffat County (CPW 2012b). In Utah, populations of sage-grouse are more isolated with many distinct areas supporting sage-grouse occurring throughout the Project area. All alternative routes in Utah cross occupied sage-grouse habitat to some extent, with the northern alternative routes crossing between 5 and 10 distinct population areas and the southern-most routes crossing between 3 and 4 distinct population areas (UDWR 2011c). Active sage-grouse leks are distributed throughout sage-grouse habitats in Utah and all of the northern alternative routes cross within 4 miles of known active leks (UDWR 2013a). The southern-most alternative routes in Utah would not cross within 4 miles of active sage-grouse leks (UDWR 2013a).

Humpback Chub (*Gila cypha*) – FWS: Endangered; State: Colorado, Utah

Regulatory Status

The humpback chub was listed as endangered under the Endangered Species Preservation Act on March 11, 1967 (32 FR 4001). With the 1973 passage of the ESA, the fish retained its endangered status. On March 21, 1994 the FWS designated seven reaches of the Colorado River system including portions of the Colorado, Green, and Yampa rivers in the Upper Basin and portions of the Colorado and Little Colorado rivers in the Lower Basin, totaling 379 miles of critical habitat for the species (59 FR 13374). On April 18, 2007, the FWS initiated a 5-year species status review (72 FR 19549). The humpback chub is also included in the Lower Colorado River Multi-Species Conservation Program (2004).

The current recovery plan for the humpback chub was published in 1990 and amended in 2002. The species may be downlisted from endangered to threatened, if during a 5-year period: (1) the numbers of adults in the six extant populations do not decline significantly; (2) the recruitment of age-3 naturally produced fish equals or exceeds mean annual adult mortality for each of the sex extant populations; (3) two genetically and demographically viable, self-sustaining populations of more than 2,100 adults are maintained; and (4) site-specific management tasks to minimize or remove threats have been identified, developed and implemented. Delisting can occur if the four goals listed above are maintained for an additional 3 years past downlisting and a necessary level of protection is attained (FWS 2002d).

Taxonomy and Life History

The humpback chub was first described by Miller in 1946. Prior to that time, the humpback chub was considered part of the *Gila robusta* (roundtail chub) complex.

The humpback chub is a medium-sized unusually shaped fish of the minnow family (*Cyprinidae*). The head is narrow, flattened and generally dorsally concave with a long fleshy snout and small eyes. The mouth is inferior-subterminal. There is a pronounced dorsal hump that begins at the dorsal origin of the gill covers, protrudes anteriorly, and then ends at the origin of the dorsal fin. It is believed that the odd shape of the fish aids in fast water by pushing the fish to the bottom where the current would be slower and would expend less energy to hold position. The grooves in the hump may also aid in directing water to the fish's gills (FWS 2002d).

The humpback chub evolved in seasonally warm and turbid waters and is highly adapted to unpredictable hydrologic conditions that occurred in the Colorado River System prior to extensive damming. Spawning of the humpback chub occurs in spring shortly after peak flow (Gorman and Stone 1999). In the Little Colorado River of Arizona, individuals moved upriver in early spring and slowly back downstream post-reproductively. Humpback chubs are opportunistic omnivores that are known to eat insects, crustaceans, plants, seeds, and occasionally small fish, reptiles, and amphibians depending on availability (FWS 2002d).

Distribution and Habitat Requirements

Historically, the humpback chub was found throughout the Colorado River basin from western Colorado and Wyoming to northern Arizona in the Colorado, Green, lower Yampa, and White rivers. Currently, there are six known self-sustaining populations consisting of 7,300 to 13,800 wild adults. Five occur in the Upper and one on the Lower Basin Recovery Units. The Upper Recovery Unit consists of populations on the Colorado River (Black Rocks and Westwater Canyon in Utah and Cataract Canyon of Colorado), one population on the Yampa River (Yampa Canyon in Colorado), and on the Green River (Desolation/Gray Canyons of Utah). The only population in the Lower Basin Recovery Unit occurs on the mainstem Colorado River in Marble and Grand Canyons and the Little Colorado River. A small number of humpback chub have been captured in the Green River in Dinosaur National Monument, but are not considered to be a self-sustaining population (FWS 2002d).

Humpback chubs are found in large rivers in a variety of habitats. Adults have been found in deep turbulent currents, shaded canyon pools, areas under shaded ledges in moderate current, riffles, and eddies (FWS 1994b). Young and spawning adults are generally found in sandy runs and backwaters (FWS 1990b).

Primary Threats to Survival

The current primary threats to the humpback chub are loss fragmentation, and modification of habitat due to construction and operation of the Hoover Dam. The dam has led to impoundment of streams causing

stream inundation, reduced water temperatures, reduced spring flow, and increased daily fluctuation in flow. Decreased temperatures and flow reduction may impede successful spawning and increase competition with other species. As with the other Colorado River Basin endangered fishes, predation by introduced species is also likely to have been an important factor in the decline of the species. Species such as bass, sunfish, catfish, red shiner, and the redside shiner have been suggested to be the main problem (45 FR 27710).

Other threats include hybridization with *G. elegans* (bonytail chub) and *G. robusta* (roundtail chub), introduced parasites, and effects of a species with a small population. Increased hybridization among the native *Gila* species it thought to be symptomatic of changes in habitat and movement patterns leading to the genetic introgression (UNHP 2003). The introduced Asian tapeworm may also be a serious threat to the survival of the humpback chub. Small population sizes magnify all threats, as small losses have a greater impact on long-term genetic diversity.

Occurrence in the Project Area

The humpback chub is endemic to the Colorado River basin and is primarily found in Utah. In the Project area, there are four known populations of humpback chub: Black Rocks, Westwater, Yampa, and Desolation/Gray Canyons. Some individuals have also been seen in the Green River through Dinosaur National Monument. Designated critical habitat for the species, in the Project area, includes portions of the Colorado, Green, and Yampa rivers. Water depletions within the upper Colorado River system in Wyoming, Colorado, and Utah could affect humpback chub or its habitat.

Least Chub (*Iotichthys phlegethontis*) – FWS: Candidate; BLM: Utah; State: Utah

Regulatory Status

In June 2007, the least chub was petitioned for listing under the ESA based on threats to habitat including: livestock grazing, mining; including peat mining and oil and gas leasing and exploration, urban development, and water withdrawal and diversion (73 FR 61007). FWS issued a 12-month finding on a petition to list the least chub in June of 2010, in which they found that listing of the least chub was warranted but precluded by higher priority actions (75 FR 35398). The least chub had been previously listed as a candidate species, but was removed from the candidate species list in October 1999 when the FWS found the least chub did not warrant listing under the ESA. Currently, only six known wild populations remain, but one of these is considered functionally extirpated. The species currently has a listing priority number of 7 (76 FR 66370–66439).

Taxonomy and Life History

The least chub is endemic to the Bonneville Basin of Utah. E.D. Cope first described the least chub from specimens collected by H.C. Yarrow and H.W. Henshaw from the Bear River in 1872 (60 FR 50518).

Adult least chubs can range from 0.2 to 2.5 inches and are identified by their upturned or oblique mouth as well as the absence of a lateral line. The least chub usually has eight dorsal fin rays and eight anal fin rays. Algae, midges, microcrustaceans, and algae are common diet items for the least chub.

Least chub begin spawning in the spring when water temperatures increase, releasing eggs over extended periods but only a few eggs at a time. Peak spawning occurs in May but the reproductive months are from April through August. The least chub's adhesive eggs are released over aquatic vegetation where they sink and attach. The fertilized eggs hatch and young larvae use that submerged vegetation as an oxygenated habitat with an abundance of food.

Distribution and Habitat Requirements

Once having a wide distribution within the Bonneville Basin of northwestern Utah, the least chub occupied streams, springs and ponds and was quite common in its preferred habitats. Least chub have been observed in the Beaver River, Provo River, tributaries of the Great Salt Lake and Sevier Lake as well as Utah Lake, Parowan Creek, Clear Creek, Leland Harris Spring Complex, and the Gandy Salt Marsh Complex in the Snake Valley.

The species is now limited to the Snake Valley of the Bonneville Basin, occurring on a mixture of federal, state, and private lands at five locations. Small populations of least chub exist in Central Spring (Bishop Spring Complex in Millard County) and Miller Spring (Juab County), Leland Harris Spring Complex (Juab County) and Gandy Salt Marsh Complex (Millard County), Snake Creek (60 FR 50518).

The least chub has historically occurred in a variety of habitat types but presently occupy springs, marshes and pools, and stream habitats. Springs exhibit cool stable temperatures, relatively low conductivity, and little variation in dissolved oxygen content. The marsh and pool environments exhibit extreme diurnal fluctuations in dissolved oxygen, and water temperature that may vary. Seasonal water quality changes in marsh and stream segments tend to influence fish movement between different habitat types. Plentiful aquatic vegetation along with muddy substrates is also an important habitat character for the least chub (Christ 1990).

Primary Threats to Survival

Habitat loss and degradation are one of the major causes of the least chub's decline. Reports of livestock trampling and grazing have been linked to fish habitat degradation in streams and springs (Christ 1990). Predation by nonnative fish is another known factor contributing to native desert fish declines in southwestern North America (Minckley et al. 1991). Spring complex surveys indicate that areas with nonnative fish introductions maintain few if any least chub populations. In addition to introductions of game fish, as least chub predators (largemouth bass, rainbow trout, common carp, and brook trout), other nonnative fish with similar diets are considered potential competitors (mosquitofish and rainwater killifish).

Occurrence in the Project Area

UDWR studies in 1990s and 2000s have monitored a least chub population in Burraston Ponds near Mona, approximately 1 mile from Links U640 and U650. This is the only known population in the vicinity of the Project area.

Least Tern (Interior Population; *Sternula antillarum*) – FWS: Endangered; State: Colorado

Regulatory Status

The least tern was listed as endangered on May 28, 1985, primarily due to river habitat loss and nesting site destruction from reservoir and channelization projects. Unfavorable vegetational succession for nesting on remaining river islands resulted from alteration of natural river dynamics (50 FR 21784). On September 19, 1990, a recovery plan was published with the objective of delisting the least tern in 2005 if the recovery criteria were met. Recovery criteria includes increasing or maintaining adult population in the Missouri River system, Lower Mississippi River, Arkansas River system, Red River system, and Rio Grande River system; and maintaining those stable population sizes for 10 years (FWS 1990c). A notice of initiation of a 5-year review of the listing of the least tern was published in March of 2008 that will be based on requested new information on the species (73 FR 21643).

Taxonomy and Life History

Subspecies of the least tern in North America were recognized as a result of studies on vocalization and behavior differences in the Old and New Worlds (AOU 1998). The interior least tern (*Sterna antillarum athalassos*), the eastern or coastal least tern (*Sterna antillarum antillarum*), and the California least tern (*Sterna antillarum browni*) were originally distinguished. Given reports of no consistent morphological, behavioral, or vocal difference between the California and the coastal least terns, and lack of morphometric or biochemical distinctions of the different subspecies, the FWS did not list the subspecies but instead designated those least terns occurring in interior North America as endangered (FWS 1990c).

The least tern is the smallest of the North American terns. In breeding seasons the adult plumage includes a black cap and loral stripe contrasting with a white forehead. The least tern is often most distinguishable from other terns in basic and subadult plumages by small size. Nest selection by the least tern is generally dependent on open areas free of vegetation, above high water levels and safe from ground predators. Islands are often preferred where they occur. Sandy areas with sparse vegetation, mudflats, graveled rooftops and parking lots, and dredged-material deposits are also used for nesting sites. Breeding time periods vary geographically. Early April on the Gulf Coast, later April in California, early May on the north Atlantic coast, and late April to late May are all feasible breeding times in the interior population. Typically clutches are two or three, sometimes one; three-egg clutches are more prevalent at interior breeding areas than coastal areas, with an incubation period generally between 19 and 25 days (Thompson et al. 1997).

The least tern primarily feeds on fish and aquatic invertebrates that occur in the upper portion of the water column. The species appears to select for fish, especially if non-deep-bodied fish are available. The least tern forages throughout the day searching for prey while flying or hovering above the water, quickly plunging to the surface, but not fully submerging when grasping aquatic prey. Occasionally, the species captures flying insects over land and water, or skims the water's surface to capture swimming insects (Wilson et al. 1993).

Distribution and Habitat Requirements

The least tern is a widely distributed breeder in North America. The species typically nests in open sandy beaches, sandbars, unvegetated islands, and a variety of material deposits along the coasts of oceans, bays, inland rivers, large lakes and reservoirs as well as Great Plains wetlands. In the coastal United States, the least tern breeds locally from southern Maine south to southern Florida, and along both shores of the Chesapeake Bay north to Baltimore and Queen Anne's, Maryland; as well as along the extreme southern Delaware Bay. The least tern also breeds locally along the Gulf Coast from southern Florida west to southern Texas and along the Pacific Coast from the San Francisco Bay south to the Mexican border.

Within the inland United States, the least tern breeds locally from Missouri, Ohio and Mississippi rivers west throughout the Great Plains to eastern Montana, eastern Colorado, and eastern New Mexico. The species also breeds in Colorado's Adobe Creek and Nee Noshe Reservoirs, Kiowa County, and Horse Creek Reservoir, Otero County. In S. Dakota: along Cheyenne River in Meade County, and in Nebraska: Platte River throughout from Lincoln County eastward, on Lake McConaughy of North Platte River, Loup River from Nance County to confluence with Platte, Elkhorn River throughout, and Niobrara River in Keyapaha. The least tern is also found in localized areas in the states: Nebraska, Kansas, Oklahoma, Texas, Arkansas, New Mexico, Louisiana, South Carolina, and Florida.

In Middle America, the least tern breeds in Mexico at coastal sites along Baja, the Pacific Coast from Sonora south to at least Oaxaca, along the Atlantic Coast in northern Tamaulipas, and along the northern

and eastern coast of the Yucatan Peninsula. They also breed in Belize and western Honduras (Thompson et al. 1997).

The least tern usually forms colonies on bare or sparsely vegetated sand or dried mudflats along coasts or rivers, and sandy islands as well as gravel and sand pits (Smith and Renken 1991). Colonies are typically near lagoons, estuaries, rivers, or coasts. Often nests are found on deposited dredged materials (Burger and Gochfeld 1990).

Least tern colony habitats can be ephemeral, which makes continued use difficult, but the species shows high colony site tenacity and fidelity that are both influenced by changes in vegetative cover, predators, human activity, flood, and colony size (Atwood and Massey 1988). The presence and number of suitable nest sites as well as human activity limit colony sites.

Primary Threats to Survival

Human activity causing least tern habitat alteration and destruction via channelization, irrigation, and the construction of reservoirs and pools have contributed to the elimination of much of this tern's sandbar and nesting habitat in the Missouri, Arkansas, and Red River systems (FWS 1990c). Most sandbars of the Missouri River have disappeared between Sioux City, Iowa, and Saint Louis. Habitat with sandbars often experience dam discharges, causing problems for the least terns nesting in remaining habitats. Before human regulation of river flows, summer flow patterns were more predictable with peak flows occurring in March and again in May and June with mountain snowmelt, allowing for flow decline during the rest of the summer and exposing sandbars during least tern nesting periods. Present hydropower, irrigation, and public recreation demands on river flow can conflict with historic flood regimes, often decreasing the quality and quantity of least tern nesting sites (FWS 1990c).

Occurrence in the Project Area

No least tern occurrences have been noted within or near the Project area based on Heritage data provided. According to FWS, the least tern does not occur west of Routt National Forest; however, the endangered interior populations may be affected by potential Platte River water use by the Project in Wyoming.

Mexican Spotted Owl (*Strix occidentalis lucida*) – FWS: Threatened; State: Colorado, Utah

Regulatory Status

The Mexican spotted owl was federally listed as a threatened species on March 16, 1993 (58 FR 14248). Critical habitat was originally designated on March 16, 1993 (58 FR 14248), and subsequently revoked on March 25, 1998 (63 FR 14378). Critical habitat was re-established on February 1, 2001 (66 FR 8530) and a comment period on critical habitat was re-opened on November 18, 2003 (68 FR 65020). The current defined critical habitat was established on August 31, 2004 (69 FR 53181). This apparent vacillation in designation of critical habitat is the result of conflict between environmental and economic interests in late seral stage coniferous forests inhabited by the bulk of northern spotted owls (*Strix occidentalis caurina*) in the Pacific Northwest. This conflict has resulted in several management plans and several FWS status reviews for the species (Gutierrez et al. 1995).

A recovery plan for the Mexican spotted owl was published in 2012. The recovery objective of the plan is to delist the species, which can occur when the population in the three most populated Recovery Units are stable or increasing, habitat monitoring protocols are designed and implemented, and a long-term management plan is in place to ensure appropriate management (FWS 2012e).

Taxonomy and Life History

The Mexican spotted owl is one of three recognized subspecies of the spotted owl in North America. *S. o. lucida* is the only subspecies that occurs in the Project study area. The other subspecies (*S. o. occidentalis* and *S. o. caurina*), the California spotted owl and the northern spotted owl, respectively, are found along the west coast from south-central California north to southwestern British Columbia (Gutierrez et al. 1995).

Spotted owls are usually found in steep canyons with mature or old growth forest, but they may also be found in canyons with steep cliffs and relatively little forest habitat. They usually occur in habitats that support a multi-leveled canopy with a perennial water source nearby. They have been reported at elevations ranging from 3,700 feet to the subalpine transition (Ganey 1998; Gutierrez et al. 1995; Johnsgard 1988).

Spotted owls are nocturnal ambush hunters that feed mainly on small mammals, primarily rodent species, with wood rats (*Neotoma* spp.) often the dominant dietary component. Invertebrates make up a small portion of their prey, and they may supplement their diet with birds, bats, or lagomorphs (Ehrlich et al. 1988; Ganey 1998; Gutierrez et al. 1995). In Arizona, Mexican spotted owls feed on wood rats, white-footed mice (*Peromyscus leucopus*), voles (*Microtus* spp.), rabbits, and pocket gophers (*Thomomys* spp.) (Ganey 1998).

Spotted owls may construct nests in tree cavities (usually in live trees) or on constructed platforms on tree limbs. In Utah they nest almost exclusively in caves (Gorell et al. 2005). They may use abandoned raptor or corvid platform nests (Ehrlich et al. 1988; Terres 1980). They produce from 2 to 4 eggs, with the typical number being two (Ehrlich et al. 1988; Gutierrez et al. 1995; Terres 1980).

Distribution and Habitat Requirements

The Mexican spotted owl is a permanent resident in the interior mountain ranges of western North America, from southern Utah and central Colorado south through the mountains of Arizona, New Mexico, and extreme west Texas. Its range in Mexico includes mountainous regions from Sonora, Chihuahua, Coahuila, and Nuevo Leon south to Jalisco, Michoacan, and Guanajuato (AOU 1998).

The Mexican spotted owl normally occupies old growth forest in mixed conifer, pine-oak woodland, deciduous riparian, or a combination of these habitats that will support a home range of 1,400 to 4,500 acres (Ehrlich et al. 1988; Gutierrez et al. 1995). An unaltered core area of approximately 600 acres centered on the nest site is the currently recommended disturbance buffer (Gutierrez et al. 1995). Habitat typically also has a structured canopy, a perennial water source, and a rodent dominated prey base of adequate size (Gutierrez et al. 1995).

Primary Threats to Survival

The primary threats to spotted owls are habitat destruction and fragmentation related to human activities, particularly timber harvest (Ehrlich et al. 1988; Gutierrez et al. 1995). Secondary human caused habitat impacts include losses associated with developments for urban or suburban expansion, and development for agriculture, reservoirs, mining, and fuel wood harvesting (Gutierrez et al. 1995).

Occurrence in the Project Area

There are several areas where the spotted owl could occur in the Project area in Utah: the northeast corner of Uintah County south of and including the Green River and its tributary canyons and the Desolation Canyon area of the Green River on the boundary between Carbon and Uintah counties (Gorell et al. 2005;

Utah Department of Natural Resources 2008). The Mexican spotted owl is not believed to occur in Colorado or Wyoming. The Project does not cross designated critical habitat for the species.

Pallid Sturgeon (*Scaphirhynchus albus*) – FWS: Endangered

Regulatory Status

The pallid sturgeon was originally submitted as a category 2 candidate species on December 30, 1982 (47 FR 58454–58460). The species was listed as endangered on September 6, 1990 (55 FR 36641–36647). On November 7, 1993, a recovery plan for the pallid sturgeon was published. The objective of this plan is to delist the species by 2040. Delisting may be considered when a population structure with at least 10 percent sexually mature females in each recovery-priority management area and there are sufficient population numbers in the wild to maintain stability. Specific numbers quantifying "sufficient population numbers" has yet to be determined (Dryer and Sandvol 1993; FWS 2007c). No critical habitat has been designated for the pallid sturgeon.

Taxonomy and Life History

The pallid sturgeon is a member of an ancient group of bony fishes (subclass *Paleopterygii*) that thrived from the Paleozoic Era through to the early Mesozoic Era. Most species in this subclass went extinct, but eight species of sturgeon (family *Acipenseridae*) and the paddlefish (family *Polyodnotidae*) continue to inhabit portions of North America (Dryer and Sandvol 1993).

The pallid sturgeon was described in 1905 from nine specimens collected out of the Mississippi River near Grafton, Illinois. It was originally classified as its own genus (*Paracaphirhynchus*), but was ultimately determined to be part of the genus *Scaphirhynchus* in 1954 (Dryer and Sandvol 1993).

The pallid sturgeon is long and slender with a completely armored caudal peduncle. It has a flattened, shovel-shaped snout with a toothless mouth located on the ventral side of the snout. The species is the largest fish species found in the Missouri/Mississippi River drainage with some individuals near 86 pounds. Individuals found in the northern portions of the species' ranges tend to be significantly larger than those in the southern portions of the range (Dryer and Sandvol 1993).

Spawning occurs between June and August. It is unclear at what size and age sexual maturity is reached, but for most sturgeon species, sexual maturity is not reached until 7 years of age and several years for eggs to mature between spawnings is required. One study estimates that male pallid sturgeons reach sexual maturity at 7 to 9 years with 2- to 3- year intervals between spawning years. Females were estimated to reach sexual maturity at 15 to 20 years with 3- to 10-year intervals between spawning years (Dryer and Sandvol 1993).

Pallid sturgeons primarily consume fish, but will also consume aquatic invertebrates (Dryer and Sandvol 1993).

Distribution and Habitat Requirements

Pallid sturgeons inhabit the Missouri and Mississippi River systems from Montana to southern Louisiana in addition to tributaries of those rivers. The pallid sturgeon evolved with the rivers and relied on the annual floods that would occur as a result of snowmelt. These flood events would occur in April and June stimulating spawning migrations (Dryer and Sandvol 1993).

Specific habitat preference data is extremely limited due to the rarity of the species. Utilizing capture occurrences may or may not provide a true representation of the micro-habitat characteristics of the pallid sturgeon. Pallid sturgeons are often captured over a sand bottom which is the predominant bottom

substrate within the species' range. The species has been captured over gravel and rock in the Yellowstone River. The species is most often captured in areas with a velocity of 1.3 to 2.9 feet per second or in slower currents near to shore (Dryer and Sandvol 1993).

Primary Threats to Survival

The primary threat to the survival of the pallid sturgeon is habitat loss. Destruction and alteration of the river system by humans through dams and channelization has greatly altered the water flow and ecosystems of these rivers. Channelization results in changes in water velocity, reduces the width of the river, and prevents water flow into backwaters. Dams have resulted in the control of annual flooding as well as fragmenting habitat. Impoundments have also reduced the sediment. Pallid sturgeons evolved to live in a nearly sightless world. Water clarity has increased predation by sight-feeding predators as well as making capture of prey by pallid sturgeons more difficult (Dryer and Sandvol 1993).

Occurrence in the Project Area

There are no occurrences of pallid sturgeon with or near the Project area. However, the species does inhabit the lower Platter River. The lower Platte River is considered to be the Platte River from the confluence with the Missouri River upstream to the Loup River (FWS 2007c). This area is entirely located in eastern Nebraska, but may be affected due to drawdown should the Project use water from the Platte River in Wyoming.

Piping Plover (*Charadrius melodus circumcinctus*) – FWS: Threatened; State: Colorado

Regulatory Status

All regulatory designations for piping plover have been at the species level. On December 30, 1982, the FWS designated the piping plover as a category 2 candidate for listing (47 FR 58458). On December 11, 1984, the Great Lakes breeding population was designated as endangered and all other piping plovers were designated as threatened (50 FR 50726–50734). The Great Lakes breeding population includes the states of Illinois, Indiana, Mississippi, Minnesota, New York, Ohio, Pennsylvania, and Wisconsin, and the province of Ontario.

Critical habitat for the Great Lakes breeding population was designated on May 7, 2001 (66 FR 22938–22969). Critical habitat for wintering piping plovers was designated on July 10, 2001 (66 FR 36038–36143). Critical was designated for the Northern Great Plains breeding population on September 11, 2002 (67 FR 57638–57717).

Recovery plans have been developed for each of three separate breeding populations: Atlantic Coast, Great Lakes, and Northern Great Plains. These plans call for recovery criteria specific to each population (FWS 2009b).

Taxonomy and Life History

Two subspecies of piping plover (*Charadrius melodus circumcinctus and C.m. melodus*) have been recognized since 1957. The subspecies *melodus* is considered the Atlantic coast subspecies and *circumcinctus* is the inland subspecies. There has been debate over the recognition of these subspecies; however, recent genetic analysis has come to suggest that subspecific differentiation is valid and that Great Lakes birds align more closely with the inland birds than the Atlantic birds (Elliott-Smith and Haig 2005; FWS 2009b). Even though the Great Lakes and Northern Great Plains populations are a single subspecies, behavioral and ecological factors provide enough separation to continue managing these two populations separately (FWS 2009b).

Piping plovers are small shorebirds with a brown dorsal side and white underbelly. They have a ring around their neck that may be complete or incomplete. Plovers have stubby bills with an orange base and black tip (Elliott-Smith and Haig 2005).

Piping plovers tend to lay four eggs per clutch and have one brood per year. Females may lay multiple clutches if nests are destroyed, but will only raise a single brood. Nests are dug in sandy substrate. In the northern reaches of the breeding range, the species will begin laying eggs during the first 2 weeks of May and incubate for 25-28 days. Chicks fledge between 21 and 35 days of age (Elliott-Smith and Haig 2005).

Piping plovers forage along freshwater and marine shorelines. They feed on freshwater, marine, terrestrial, and benthic invertebrates (Elliott-Smith and Haig 2005).

Distribution and Habitat Requirements

As previously mentioned, there are three breeding populations. The Atlantic Coast population inhabits the Atlantic Coast between Newfoundland and North Carolina. The northern Great Plains breeding populations ranges from northern Saskatchewan and south to portions of Kansas and Oklahoma and from Montana east to Minnesota. The Great Lakes population was found throughout much of north-central United States and south-central Canada, but is currently limited to northern Michigan and northern Wisconsin. Piping plovers winter along the Atlantic and Gulf Coasts from North Carolina to Mexico and portions of the West Indies and Bahamas (66 FR 22939).

Breeding habitat consists of open sandy beaches. These beaches may be found on shorelines of oceans or Great Lakes, but may also be found along alkali lakes, reservoirs, rivers, freshwater lakes, dry alkali lakes, sandpits, industrial ponds, and gravel mines. The species tends to prefer wide, sparsely vegetated sand or gravel beaches adjacent to vast waters. Along rivers, piping plovers will use beaches, sand flats, dredge islands, and drained floodplains where vegetative cover is less than 20 percent. Winter habitat is similar to breeding habitat, but is almost entirely located along oceanic coasts and bays (Elliott-Smith and Haig 2005).

Primary Threats to Survival

The primary threat to piping plovers is loss of habitat. Shoreline development along the Gulf and Atlantic Coasts and along the Great Lakes has greatly reduced the amount of available habitat. Additional efforts to stabilize beaches in the wake of large storms have altered the natural tidal flows in many areas. In the northern Great Plains population area, development of reservoirs, channelization of rivers, and modification of river flows have greatly altered the vegetation growth in areas that were previously scoured of vegetation by spring flooding events (FWS 2009b)

In addition to these threats, other human-related impacts are threatening the survival of piping plovers. Recreation along coasts and shorelines disturb roosting and/or nesting plovers. Pets often destroy nests. Wind and oil development throughout much of the species' range may further impact survival (FWS 2009b)

Occurrence in the Project Area

There are no piping plovers or habitat in the Project area. However, the species is known to inhabit the Platte River throughout Nebraska. There may be potential for impact to the species through project-related water use resulting in drawdown of water downstream in the Platte River.

Razorback Sucker (*Xyrauchen texanus*) – FWS: Endangered; State: Colorado, Utah

Regulatory Status

The razorback sucker was first proposed for listing as a threatened species under the ESA of 1973 on April 24, 1978 (43 FR 17375). On May 27, 1980, the FWS withdrew the proposal, because it was not finalized within the 2-year time limit from the initial publication in the *Federal Register* (45 FR 35410). In 1989, the FWS received a petition from the Sierra Club, National Audubon Society, The Wilderness Society, Colorado Environmental Coalition, Southern Utah Wilderness Alliance, and the Northwest Rivers Alliance requesting that the razorback sucker be listed as an endangered species. A positive finding was made and subsequently published by the FWS on October 23, 1991 (56 FR 54957). On March 21, 1994 the FWS designated 15 reaches of the Colorado River system, including portions of the Green, Yampa, Duchesne, Colorado, White, Gunnison, and San Juan rivers in the Upper Basin and portions of the Colorado, Gila, Salt, and Verde rivers in the Lower Basin, totaling 1,724 miles of critical habitat for the species (59 FR 13374). On February 14, 2007, the FWS and Nevada Department of Wildlife entered into a Safe Harbor Agreement, encouraging the conservation, enhancement of survival, and recovery of the species through development of facilities for the rearing of juveniles and providing refuge habitats for adult razorback suckers (71 FR 57558). A 5-year review was initiated on April 18, 2007 (72 FR 19549).

The current recovery plan for the razorback sucker was published in 1998 and amended in 2002. To address unique threats and site-specific management actions, the entire population of the razorback sucker has been reduced to upper and lower basin recovery units. The upper basin recovery subunit is composed of the Green River, upper Colorado River, and San Juan River subbasins and the lower basin recovery subunit includes the mainstem and tributaries of the Colorado River from Lake Mead downstream to the southerly International Boundary with Mexico. The species may be downlisted from endangered to threatened, if during a 5-year period: (1) two subbasins (one Green River subbasin and one in either the Colorado River or San Juan River subbasins) and two subunits (lower basin recovery subunit) demonstrate that genetically and demographically viable, self-sustaining populations of more than 5,800 adults are maintained; (2) a genetic refuge is maintained in a suitable location in the lower basin recovery unit such as Lake Mohave; and (3) site-specific management tasks to minimize or remove threats have been identified, developed and implemented. Delisting can occur if the three goals listed above are maintained for an additional 3 years past downlisting and a necessary level of protection is attained (FWS 2002b).

Taxonomy and Life History

The razorback sucker, also known as the humpback sucker, is a member of the family *Catostomidae*. The razorback sucker was first described by Charles Conrad Abbott as *Catostomus texanus* because it was mistakenly thought that the species had come from the Colorado River in Texas. In 1889 it was reorganized into the *Xyrauchen* genus, which translates to "razornape". LaRivers redescribed the species, correctly identifying the place of origin to the Colorado and New rivers in Arizona (FWS 2002b).

Adult razorback suckers can grow up to 3 feet long and weigh up to 13 pounds. However, most specimens are smaller. The largest razorback suckers currently inhabit the warmer climates of the lower Colorado River. It is easily distinguished from other catostomids by a pronounced bony keel that grows from the dorsal surface of its back and gill rakers, an adaptation for feeding on zooplankton. Razorback suckers consume insects, zooplankton, phytoplankton, algae, and detritus, depending on age and habitat. Larvae begin feeding on plankton, as the mouth migrates to a sub-terminal position, larvae begin feeding on benthos as well (FWS 2002b).

Razorback suckers spawn as early as 3 to 4 years of age. Depending on water temperature, spawning may begin in mid-April and last as late as June. In Lake Mohave, spawning has been observed as early as

November, but no earlier than February in Lake Mead. They migrate long distances, congregating in large numbers at spawning sites. Razorback suckers are broadcast spawners that deposit adhesive eggs over a cobble substrate that are quickly covered by silt. Adults do not guard nests (FWS 2002b).

Distribution and Habitat Requirements

Historically, the razorback sucker was widely distributed and abundant in the Colorado River and major tributaries from Northern Mexico through Arizona and Utah into Wyoming, Colorado, and New Mexico. Now it is much reduced in range and abundance. In the Lower Colorado Basin numbers of razorback sucker began to decline with the impoundment of Lake Mead.

In the Upper Colorado River Basin, razorback suckers are considered extant in 4 locations: Westwater and Cataract Canyons and the Utah-Colorado border on the Colorado River, Desolation/Gray Canyons of the Green River, and a population in northeastern Colorado on the Yampa River. The razorback sucker is more widely distributed in the Lower Basin. The total population is estimated at approximately 10,500 individuals in three areas. The Lake Mohave population is the largest, estimated at 9,000 individuals. There is no observed recruitment in the population though, so as the population ages it becomes smaller. In Lake Mead, the population is estimated at about 400 individuals with an average age of 20 to 25 years of age, indicating recent recruitment. Approximately 1,000 individuals are believed to inhabit a 60-mile reach between Davis Dam and Lake Havasu and have demonstrated reproduction (FWS 2002b).

Razorback sucker habitat includes slow areas, backwaters, and medium to large eddies of medium to large rivers and their impoundments. Three of the four remaining populations of more than 100 individuals are found in reservoirs. Flooded lowlands and lower portions of tributary streams serve as resting and feeding areas during breeding season in the Green River basin. The razorback sucker is commonly associated with sandy, muddy, and rocky substrates in areas with little aquatic vegetation. In Lake Mohave, individuals were associated with inshore habitats except during the hotter months when they moved offshore possibly to avoid warmer water temperatures (FWS 2002b).

In streams, spawning occurs most commonly near shores in streams over silty sand, gravel, or rock substrate. In reservoirs, spawning occurs on gravel bars swept clean by wave action or along shorelines over mixed substrates. Larvae appear to remain in gravel until swim-up in the shallow littoral zone for a few weeks after hatching, and then disperse to deeper waters. Seasonally inundated flood plains provide favorable feeding areas for young (FWS 2002b).

Primary Threats to Survival

Primary threats to the razorback sucker are non-native fishes and invertebrates and human alteration of riparian habitat. Predation on larvae and juveniles by introduced fishes results in low and sometimes absent recruitment despite confirmed spawning and hatched larvae. Competition with and predation by exotic crayfish may have also been documented in some areas. Hybridization with other suckers is a potential problem in some locations. The loss, fragmentation, and modification of habitat due to construction and operation of dams greatly restrict the amount of suitable habitat. Dams lead to impoundment of streams causing changes in winter and spring flows, altered river temperatures, and reduced flooding (FWS 2002b).

Occurrence in the Project Area

The razorback sucker is endemic to the Colorado River Basin, found primarily in Utah. In the Project area, the razorback sucker is found in Westwater and Cataract Canyons on the Colorado River in Grand, San Juan, and Wayne counties, Desolation/Gray Canyons on the Green River in Carbon, Emery, and Grand counties, and in the Yampa River in Moffat County, Colorado. Portions of the designated critical

habitat are also in the Project area in the Green, Yampa, Duchesne, Colorado, White, and Gunnison rivers. Water depletions within the upper Colorado River system in Wyoming, Colorado, and Utah could affect razorback sucker or its habitat.

Southwestern Willow Flycatcher (*Empidonax traillii extimus*) – FWS: Endangered; State: Colorado, Utah

Regulatory Status

The southwestern willow flycatcher was listed as endangered on February 27, 1995, primarily because of loss and modification of riparian habitats (60 FR 10695–10715). Critical habitat was later designated on July 22, 1997 (62 FR 39129). A court decision in 2001 resulted in a subsequent final rule on critical habitat on October 19, 2005 (70 FR 60885). It includes a portion of the Virgin River in Washington County, Utah, and Clark County, Nevada. A 5-year review of the species was completed by the FWS in 2005 (73 FR 14995).

A recovery plan for the southwestern willow flycatcher was published in 2002. Reclassification status includes increasing the total population to 1,950 geographically distributed territories, which must be maintained for 5 years before delisting can occur (FWS 2002e).

Taxonomy and Life History

The southwestern willow flycatcher was originally described by John James Audubon in 1828 as Traill's Flycatcher (*Muscicapa traillii*), from specimens obtained in wooded areas along the Arkansas River (Sedgwick 2000). Phillips (1948) described *E. t. extimus*, the southwestern willow flycatcher, from specimens collected on the San Pedro River in southeastern Arizona. Depending on the author, there are four or five recognized subspecies of the willow flycatcher; *E. t. traillii*, *E. t. adastus*, *E. t. brewsteri*, *E. t. extimus*, and *E. t. campestris (the outlier)* (Sedgwick 2000).

Southwestern willow flycatchers normally select nest sites in thickets of shrubs and trees between 4 and 7 meters (4 to 23 feet) in height, with dense foliage between ground level and 4 meters (13 feet) (60 FR 10695–10715; Ehrlich et al. 1988). The nest is an open, compact cup of plant bark, fiber, and grass, and it is lined with a thin layer of fine grass, and cottony and silky plant materials. There are frequently feathers in the rim, and the nest may have plant material dangling from the bottom (Harrison 1979). Nest trees are often rooted in or near water. Plant species diversity in nest territories varies. The southwestern willow flycatcher will nest in native riparian species where available, but it will also nest in monocultures of salt cedar (*Tamarix* sp.) or Russian olive (*Elaeagnus angustifolia*) (USGS 2008). Nest sites are commonly reported in Geyer willow (*Salix geyeriana*), Goodding willow (*S. gooddingii*), boxelder (*Acer negundo*), and live oak (*Quercus agrifolia*) (Sogge et al. 1997). Southwestern willow flycatchers usually spend only 3 to 4 months on their breeding grounds, spending the rest of the year in migration or at wintering grounds (FWS 2002e). Females lay a clutch of 3 to 4 eggs (FWS 2002e). Nestlings fledge after 12 to 15 days (Ehrlich et al. 1988; FWS 2002e).

Like most other flycatchers, the willow flycatcher forages primarily by flying from a perch to capture flying insects (Ehrlich et al. 1988). It also will use gleaning techniques when foraging for spiders, millipedes, and other flightless arthropods, and also when feeding on berries (Sedgwick 2000; Terres 1980). Food preferences of the willow flycatcher are reported by Bent (1942), in documentation associated with the Alder flycatcher. These were considered a single species at the time the data were collected, and the sample set included both species. In the sampled diets, animal material made up 96 percent, and vegetative material was only 4 percent of the food. The vegetative part of the diet included elderberries (*Sambucus* spp.), blackberries or raspberries (*Rubus* spp.), dogwood berries (*Cornus* spp.), juniper berries (*Juniperus* spp.), and unidentified fruits and seeds.

Distribution and Habitat Requirements

All subspecies of the willow flycatcher winter in Central America, from southwestern Mexico (Nayarit and Oaxaca) south to Panama and possibly northwestern Columbia (AOU 1998), but migration routes are relatively unknown (FWS 2002e) and are believed to pass through primarily the southern and southwestern parts of the United States, with the northern subspecies passing through the breeding areas of the southwestern willow flycatcher (AOU 1998; Sogge et al. 1997). The normal spring migration period is from early May through early June, and the fall migration may extend from late July through September (Phillips et al. 1964). Historic breeding records exist for southern California, southern Nevada, southern Utah, Arizona, New Mexico, western Texas, southwestern Colorado, and northwestern Mexico (FWS 2002e). In the western United States, southwestern willow flycatchers are often found on willow-covered islands, brush along watercourses, beaver meadows, and mountain parks, always in close association with riparian waters and lentic waters (FWS 2002e). They may be found as high as 7,875 feet, and they also follow willow- or cottonwood-lined streams out into desert regions (Terres 1980). Southwestern willow flycatcher territories and nest sites are usually located near open water, cienegas, marshy seeps, or saturated soils (Sogge et al. 1997). In the semiarid and arid parts of the southwest, hydrologic conditions can vary radically both within a season and between years. Many sites have surface water or saturated soil only during the early part of the breeding season. Breeding habitat on the edge of a reservoir may have standing water during a wet year, or it may be further from surface water during dry conditions (Sogge et al. 1997).

Four specific habitat types have been described as breeding areas for the southwestern willow flycatcher (Sogge et al. 1997). The first of these types is monotypic high-elevation willow. This habitat is comprised of dense stands of willows 3 to 7 meters (10 to 23 feet) in height, with no distinct overstory. This community is often associated with sedges, rushes, or other herbaceous wetland plants. A second habitat type is monotypic exotic, with dense stands of salt cedar or Russian olive up to 10 meters (33 feet) in height. These species form a dense, closed canopy, with no distinct overstory layer (Sogge et al. 1997).

Native broadleaf-dominated communities form a third habitat type. This habitat may be composed of a single species, such as Goodding willow, but often contains other broadleaf tree and shrub species, including cottonwood (*Populus* spp.), other willows, boxelder ash (*Fraxinus* spp.), alder (*Alnus* spp.), and buttonbush (*Cephalanthus occidentalis*). The vegetation in this habitat type ranges in height from 3 to 15 meters (10 to 49 feet). There are trees of various size classes, and there is often a distinct overstory. The final habitat type is a mixture of native and exotic species, including those listed above. Within any particular area, the native and exotic species may be dispersed as patches dominated by natives or exotics, or they may be more evenly distributed throughout the area (Sogge et al. 1997).

Regardless of the species composition, all of these habitats share common structural characteristics. Occupied habitats always have dense vegetation in the patch interior, and dense patches are often interspersed with small clearings, open water, or areas of sparse shrubs. Habitat patches can vary in size and shape, with some occupied areas being relatively dense, linear, contiguous stands, and others being large, irregularly shaped mosaics of dense vegetation intermingled with open areas. Patch sizes can range from as little as 2 acres to several hundred hectares (several hundred to a thousand acres). Southwestern willow flycatchers have not been found nesting in narrow riparian habitats less than 10 meters (33 feet) wide (Sogge et al. 1997).

Migration and wintering habitat may differ from breeding habitat. During migration, riparian habitat along major southwestern drainages is commonly used, but a close association with water may not always exist. These areas might be considered stopover areas, and may be very important resources for the southwestern willow flycatcher (FWS 2002e).

Primary Threats to Survival

Two primary factors have been identified as serious threats to the continued existence of the southwestern willow flycatcher (60 FR 10695–10715). These threats are the loss and degradation of riparian habitat, and brood parasitism by brown-headed cowbirds (*Molothrus ater*). The primary causes for riparian alteration and degradation include urban and agricultural development, water diversion and impoundment, channelization, livestock grazing, off-road vehicles and other recreational use, and hydrological changes resulting from these uses (Jones and Cahlan 1975) (60 FR 10695–10715).

The FWS believes that the invasion of salt cedar is a factor in the loss and modification of habitat for the southwestern willow flycatcher (60 FR 10695–10715). Many other human activities, including livestock grazing, water diversion, channelization, and vegetation removal, in the riparian area tend to favor the spread of salt cedar. The spread of salt cedar coincides with the decline of the southwestern willow flycatcher, although the flycatchers have been documented to breed in dense salt cedar stands (60 FR 10695–10715).

Brown-headed cowbirds also are a threat to southwestern willow flycatchers because of their reproductive strategy of brood parasitism. The spread of cowbirds into the range of the southwestern willow flycatcher began in the late 1800s, with the increase in the human-population density and their associated livestock (60 FR 10695–10715). The willow flycatcher is a common host to cowbirds (Ehrlich et al. 1992; Sogge et al. 1997). The flycatchers appear to be nearly incapable of rearing their own young if a cowbird chick is in the nest, and parasitism almost always leads to a complete failure of the nest (Sogge et al. 1997).

Occurrence in the Project Area

Portions of the Project area in Utah are within the breeding range of the southwestern willow flycatcher (Sedgwick 2000). However, the Project area does not include any designated critical habitat for the species. Southwestern willow flycatchers may be present within riparian habitats in Grand and Emery counties, Utah.

Whooping Crane (*Grus americana*) – FWS: Endangered; State: Colorado

Regulatory Status

The whooping crane was listed as endangered on March 11, 1967 (32 FR 4001). Currently, any populations occurring in Colorado, Idaho, Florida, New Mexico, Utah, the western half of Wyoming, or specifically named eastern states of the contiguous United States are considered nonessential experimental populations (66 FR 33903–33917, 62 FR 38932–38939, 58 FR 5647–5658). Critical habitat was designated in the United States in 1978 for key wintering and migration areas (43 FR 20938–20942).

Taxonomy and Life History

The whooping crane is a member of the family *Gruidae*, its closest relatives in continental North America being five races of sandhill cranes (*Grus canadensis*). The whooping crane is North America's tallest bird, with males approaching 5 feet (1.5 meters) in height. The sexes appear the same, although their guard call vocalizations are sexually distinct. The plumage is snowy white, with black primaries, a carmine crown and malar region, and a dark wedge-shaped patch on the nape. Juvenile birds have reddish-cinnamon plumage until the end of their second summer.

Eggs are normally laid from late April to mid-May, and hatch a month later. Whooping cranes generally nest annually, unless nesting habitat conditions are unsuitable or the birds are nutritionally stressed. The diet varies seasonally and by habitat, but includes insects, frogs, rodents, fish, plant tubers, berries, crabs, crayfish, clams, and agricultural grains (Canadian Wildlife Service and FWS 2007).

Distribution and Habitat Requirements

Historically, whooping cranes ranged from the Arctic coast south the central Mexico, and from Utah east to New Jersey, South Carolina, Georgia, and Florida (Canadian Wildlife Service and FWS 2007). Currently, only three wild populations exist, with another nine in captivity at various facilities. As of February 2006, the total wild population consisted of 338 individuals, and the total captive population of 135 individuals (Canadian Wildlife Service and FWS 2007).

The Aransas-Wood Buffalo population nests in and around Wood Buffalo National Park in Alberta and the Northwest Territories, and winters in and adjacent to Aransas National Wildlife Refuge on the Texas coast. Departure from the wintering grounds generally begins between March 25 and April 15, with the autumn migration commencing around mid-September. Most birds will have arrived on the wintering grounds between late October and mid-November (Canadian Wildlife Service and FWS 2007).

Reintroduction attempts in the Rocky Mountains took place from 1975 to 1989 and again in 1997. One male from that population remains in captivity; the last remaining wild bird died in 2002 (Canadian Wildlife Service and FWS 2007). A non-migratory flock was introduced in the Kissimmee Prairie and surrounding area in central Florida in 1993. Efforts have been ongoing since 2001 to establish a migratory flock between Wisconsin and the central Florida Gulf Coast.

Breeding habitat within Wood Buffalo National Park (Canada) consists of numerous shallow, poorly drained wetlands of varying sizes and shapes, separated by narrow, slightly elevated ridges with an overstory of white and black spruce (*Picea glauca*, and *P. mariana*), tamarack (*Larix laricina*), and willows (*Salix* spp.), with a shrub understory. Habitat on the wintering grounds includes tidal flats, estuarine marshes, and other shallow coastal wetland communities (Lewis 1995).

Primary Threats to Survival

A variety of factors threaten the survival of the whooping crane. As with many other endangered species, destruction of habitat, loss of migration stopover habitat, and displacement due to human activities are threats. Additionally, loss of individuals by human shooting remains a threat. As recently as November 2009, a reproductive female whooping crane from the Wisconsin/Florida migratory population was shot and killed in Indiana (FWS 2009c). An estimated 60 to 80 percent of crane losses occur during migration, with the primary cause of loss being collisions with utility lines. Additional threats are posed by disease, inclement weather, predation, and the species' delayed reproductive maturity, low reproductive rates, and drastically reduced gene pool (Canadian Wildlife Service and FWS 2007; Lewis 1995).

Occurrence in the Project Area

The Aransas-Wood Buffalo population of whooping cranes migrates across the Great Plains twice a year, between the Texas Gulf Coast and northern Alberta/southern Northwest territories in Canada. The vast majority of whooping crane sightings for this migration route fall within a narrow corridor crossing Texas, Oklahoma, Kansas, Nebraska, South Dakota, North Dakota, Saskatchewan, Alberta, and the Northwest territories (FWS 2009d; Stehn 2007). The introduced Rocky Mountain population included wintering grounds in eastern Idaho and western Wyoming, however no individuals of that population remain in the wild (Canadian Wildlife Service and FWS 2007); therefore, no whooping cranes would be expected to occur within the Project study area. Whooping crane and designated critical habitat along the Platte River could be affected by water use in the Platte River system.

Yellow-billed Cuckoo (*Coccyzus americanus*) – FWS: Proposed Threatened; BLM: Wyoming, Colorado, Utah; USFS: Ashley, Manti-La Sal, Uinta National Forests; State: Wyoming, Colorado, Utah

Regulatory Status

FWS proposed listing the yellow-billed cuckoo of the western United States DPS as a threatened species under the ESA of 1973, as amended (78 FR 61622-61665). The DPS was previously a candidate for listing as threatened or endangered (66 FR 54808–54832). Yellow-billed cuckoo has not been assigned federal status east of the Continental Divide but is considered a sensitive species by federal and state agencies in the western region.

Taxonomy and Life History

The yellow-billed cuckoo is one of six species of the family *Cuculidae* that breed in the United States (National Geographic Society 2002). The yellow-billed cuckoo was first described by Linnaeus in 1758 as *Cuculus americanus*, with the western yellow-billed cuckoo being described in 1887 as *Coccyzus americanus occidentalis* by Ridgeway. However, since the late 1800s, debate has centered on whether the species should be split into eastern (*C. a. americanus*) and western (*C. a. occidentalis*) subspecies (66 FR 38611–38626). Those in favor or recognizing subspecies cited differences in morphology between eastern and western birds. Review and study of yellow-billed cuckoo taxonomy occurred in response to a petition in 1986 to list the yellow-billed cuckoo as endangered in California, Washington, Oregon, Idaho, and Nevada. In their response to a second petition the FWS determined that there was not enough evidence to consider the western population as a distinct subspecies, but the population did warrant listing as a DPS. The range of the western yellow-billed cuckoo was determined to be the area west of the west of the Rocky Mountains (66 FR 38611–38626).

Western populations of yellow-billed cuckoos breed in dense riparian woodlands, primarily of cottonwood (*Populus fremontii*), willow (*Salix* spp.), and mesquite (*Prosopis* spp.), along riparian corridors in otherwise arid areas (Hughes 1999). Dense undergrowth may be an important factor in selection of nest sites (Ehrlich et al. 1988). Western yellow-billed cuckoos appear to require relatively large tracts of riparian woodland. Several studies have reported western yellow-billed cuckoos nesting in tracts greater than 25 acres in size. These cuckoos may be restricted to areas close to water because of humidity requirements for hatching eggs and rearing chicks (Laymon 1998).

Most western yellow-billed cuckoos arrive on their breeding grounds in June (Laymon 1998). They construct an unkempt stick nest on a horizontal limb, often in shrubby vegetation (Ehrlich et al. 1988; Terres 1980). Nest heights range from 4.3 feet to (rarely) 98 feet and average below 20 feet (Laymon 1998).

Yellow-billed cuckoos lay one to five large eggs, which hatch after 9 to 11 days of incubation (Ehrlich et al. 1988). Nestlings fledge at 5 to 8 days of age, giving the species the shortest combined incubation/nestling period known for any bird (Corman and Wise-Gervais 2005; Hughes 1999). They are occasionally brood parasites of other species (Hughes 1999). This behavior may be stimulated by high egg production resulting from abundant food supplies (Ehrlich et al. 1988).

Yellow-billed cuckoos forage primarily by gleaning insects from vegetation, but they may also capture flying insects (Ehrlich et al. 1988; Hughes 1999; Laymon 1998). They specialize on relatively large prey, including caterpillars, katydids, cicadas, grasshoppers, and tree frogs (Laymon 1998; Terres 1980). Their breeding season may be timed to coincide with outbreaks of insect species, particularly tent caterpillars (Hughes 1999; Ehrlich et al. 1988; 66 FR 38611–38626). They also consume some wild berries; take small lizards and frogs, and occasionally bird eggs and young as prey (Hughes 1999; Terres 1980).

Distribution and Habitat Requirements

The western yellow-billed cuckoo was formerly widespread and locally common in California and Arizona; locally common in New Mexico, Oregon, and Washington; and local and uncommon along drainages in western Colorado, western Wyoming, Idaho, Nevada, and Utah (66 FR 38611–38626). Populations of yellow-billed cuckoos in the western United States have declined over the past century and their breeding range has contracted. The species may be extirpated from British Columbia, Washington, and Oregon (Hughes 1999).

The yellow-billed cuckoo breeds from interior California, southern Idaho, the Dakotas, and southern New Brunswick south to Baja California, southern Arizona, Chihuahua, the Gulf Coast and the Greater Antilles. The breeding range formerly extended north to western Washington (AOU 1998). Although an uncommon summer resident in Wyoming, it has not been confirmed as breeding in the area (Cerovski et al. 2004). Breeding records are very rare and the species only occurs in scattered drainages in western Colorado, Idaho, Nevada, and Utah (NatureServe 2008c). Breeding records in Utah are rare in lowland riparian habitats. Records exist in the northern Salt Lake Valley (Weber and Salt Lake counties), Utah Lake near the mouth of the Provo River (Utah County), Cedar City, and Beaver Dam Wash (Washington County). Extensive riparian habitat occurs at the confluence of the Duchesne, White, and Green rivers on the Uintah and Ouray Reservation (Grand and Uintah counties) (Bosworth 2003; Parrish et al. 2002), and sustains the largest breeding population of yellow-billed cuckoo in Utah (BLM 2008d).

The western yellow-billed cuckoo prefers large stands of mature, dense willows, typically associated with riparian corridors, for nesting, but also prefers a multi-storied canopy and dense shrubby vegetation that provides adequate invertebrate prey and cover for foraging juveniles (Corman and Wise-Gervais 2005). Water is required near the nesting site (Corman and Wise-Gervais 2005; Floyd et al. 2007). Dense vegetation may also be important in maintaining humidity in the nesting area (Corman and Wise-Gervais 2005).

Primary Threats to Survival

The primary threat to western yellow-billed cuckoos is the loss of high quality riparian habitat suitable for nesting (Corman and Wise-Gervais 2005; Floyd et al. 2007). Riparian habitat throughout the western United States has been modified or destroyed by dams, water diversions, riverflow management, stream channelization and stabilization, conversion to agricultural uses (e.g., livestock grazing), construction of urban and transportation infrastructure, and an increased incidence of wildfire. Habitat fragmentation and invasion of native habitats by nonnative plant species (especially tamarisk) result from the aforementioned habitat modifying factors (78 FR 61622-61665). The increasingly fragmented yellow-billed cuckoo habitat landscape resulting from this level of habitat loss and modification can decrease breeding success due to barriers to disappearing juvenile and adult birds, increase predation rates, and decrease local yellow-billed cuckoo abundances (78 FR 61622-61665).

Other natural and manmade factors threatening the continued existence of yellow-billed cuckoo include habitat rarity, small overall population size, isolation of populations, lack of immigration, chance weather events, fluctuating availability of prey populations, pesticides, collisions with tall vertical structures during migration, spread of the introduced tamarisk leaf beetle as a biocontrol agent in the Southwest that results in defoliation of non-native habitats used for nesting, and climate change (78 FR 61622-61665).

Occurrence in the Project Area

The western yellow-billed cuckoo may occur in riparian habitats associated with major river systems in the Project area. The species has been observed in the vicinity of Flaming Gorge (Sweetwater County, Wyoming) (Cerovski et al. 2004). One known occurrence is located within the 1-mile buffer of Link

U420 along Lake Fork River near Upalco, Utah. The species is also known to breed along the Green River in Uintah County, Utah.

E.6.2.2 Bureau of Land Management, U.S. Forest Service, and State-Sensitive Fish and Wildlife Species

American Bittern (*Botaurus lentiginosus*) – State: Wyoming

The American bittern's breeding range encompasses the northern half of the United States north through Canada to the Northwest Territories. Wintering birds are found along the southern edges of the United States south to Panama. The species is a heron-like bird that inhabits wetlands dominated by tall, emergent vegetation. American bitterns forage on insects, amphibians, crayfish, and small fish and mammals (Lowther et al. 2009). The eastern half of the Project area is located within the known breeding range for the American bittern. There is a single known occurrence in the Project area located at the western end of Stevies Lake along the Big Ditch west of Hanna, Wyoming (Link W21). The American bittern is likely to occur in the Project area in suitable wetland and marsh habitats.

American Marten (*Martes americana*) – State: Wyoming

The American marten range includes most of North America from Alaska through forested areas in Canada, northeastern United States, and south along western United States mountain ranges. The species is considered uncommon in Wyoming. Old-growth conifer and mixed stands, including spruce-fir, lodgepole pine, and deciduous forests are typical marten habitats. Mesic stands with closed canopies, living branches lower on trees, abundant woody debris, dense understory, and lengthy fire regimes are habitat characteristics where the American marten often dens in tree cavities, rotten logs, or underground. The marten also forages for small mammals, birds, insects, and fruits in riparian, meadow, forest edge, and rocky alpine areas (WGFD 2010a). The American marten has intrasexual overlapping territories. Home range size varies by geographic location and prey densities. Daily activity patterns are diurnal in winter and crepuscular in summer. Predator-prey dynamics are closely linked, with predator abundance and age structure of marten populations fluctuating with relative prey abundance. A further limiting factor is predation by mammalian and avian predators, with a 50 percent survival rate in the first year (Powell et al. 2003). A portion of the Project area lies within the range of the American marten in northeastern Utah and southwestern Wyoming and the species is likely to breed and forage in the Project area.

American Pika (*Ochotona princeps*) – State: Wyoming

The American pika primarily occurs in higher elevation mountainous regions in the western United States. The species is considered common in Wyoming and can be found year-round throughout the state. Talus slopes or rock outcrops associated with grasses, alpine and sub-alpine plants providing a food source are typical American pika habitat characteristics. A portion of the Project area lies within the range of the American pika in northeastern Utah and southwestern Wyoming (WGFD 2010a). The species is likely to breed and forage in suitable habitat in the Project area.

American White Pelican (*Pelecanus erythrorhyncos*) – BLM: Colorado, Utah; State: Utah

The American white pelican is a migratory species that breeds in very localized areas of Wyoming, Colorado, Utah, and Nevada and migrates to the coasts of California and Mexico for the winter (Anderson 1991). The species arrives at breeding grounds in March, where it prefers islands with flat or low gradient slopes associated with fresh water lakes. Preferred foraging areas are shallow lakes, marshlands, and rivers, and are typically over 30 miles from nesting areas. Pelicans are monogamous and pair up after arrival at breeding grounds (Knopf 1979).The species is highly social, nesting in colonies, and often incorporates cooperative feeding strategies (Anderson 1991).

Gunnison Island in the northern arm of the Great Salt Lake is the only known nesting site for the species in Utah and represents one of the four largest breeding colonies in North America (Bosworth 2003). During spring and fall migration, pelicans occur on lakes and reservoirs throughout Utah, Wyoming, and Colorado. The species is regularly observed at the Ouray National Wildlife Refuge in Uintah County, Utah, though breeding has not been observed at this site (USGS 2012). Threats to the species are greatest at nesting colony locations (Bosworth 2003). Migrating or foraging American white pelicans are likely to occur in the Project area.

Aquatic Snails (combined account) – State: Wyoming

Aquatic snails and limpets are soft-bodied mollusks with a spiral, coiled disk-shaped (snails) or cone-shaped (limpets) shell. Approximately 526 species of aquatic snails and limpets are known throughout North America. These species feed on algae, microbes, fungi, and detritus from solid surfaces within aquatic systems (WGFD 2010a). These species can be found in most aquatic systems in the Project area.

Ash-throated Flycatcher (*Myiarchus cinerascens*) State: Wyoming

The ash-throated flycatcher's breeding distribution spans southwestern Oregon, eastern Washington, to southern Idaho, southwestern Wyoming, Colorado, New Mexico, and northern and central Texas. The species occasionally breeds in Oklahoma, Baja California and the mainland of Mexico. Outside of the breeding season, the ash-throated flycatcher can be found in northern Baja California, southeastern California, central Arizona, and south into the mainland of Mexico, El Salvador, and Costa Rica. Desert scrub, pinyon-juniper and oak woodland, chaparral, thorn scrub, and riparian woodland are all suitable habitats of the ash-throated flycatcher. In the Project area, the species most commonly uses pinyon-juniper habitats. Nests are typically found in tree cavities, holes in cacti, and in abandoned woodpecker holes and cactus wren nests (Cardiff and Dittmann 2001). The ash-throated flycatcher is known to occur in the Project area along Red Creek at Richards Gap (Links W492, W493, W520) and along the Little Snake River near the Wyoming/Colorado border (WYNDD 2011). The ash-throated flycatcher is likely to breed and forage in suitable habitats throughout the Project area.

Baird's Sparrow (*Ammodramus bairdii*) – BLM: Wyoming

Baird's sparrow was once considered one of the most common prairie birds in some areas; it is now rare throughout its range and only abundant in local areas with suitable grassland habitat. During breeding season, Baird's sparrow prefers idle or lightly grazed native grasslands. Native prairie appears to be preferred habitat, although there is some use of crested wheatgrass (*Agropyron cristatum*) (Casey 2000). In dry years or drier parts of the range, breeding occurs in grassy sloughs, alkali flats, and depressions in low lying grasslands. Baird's Sparrows leave their breeding grounds in August and spend the winter in extreme southeastern Arizona, southern New Mexico, and Mexico (Luce and Keinath 2003). Non-breeding habitat consists of overgrown fields and open grasslands with very few woody plants greater than 1 meter in height (Gordon 2000). In the United States, breeding occurs in central and eastern Montana, North and South Dakota. In Wyoming, there is circumstantial evidence of breeding in Laramie, Platte, Albany, Converse, and Campbell counties and observations of the species in central and eastern portions of the state during migration (Cerovski et al. 2004). All suspected breeding locations occur outside of the Project area. Transient individuals may fly through the Project area during seasonal migration, but it is a secretive and difficult species to see during migration (Luce and Keinath 2003).

Bald Eagle (*Haliaeetus leucocephalus*) – BLM: Wyoming, Colorado, Utah; USFS: Ashley, Manti-La Sal, and Uinta National Forests; State: Wyoming, Colorado, Utah

Once an endangered species, the FWS now considers the bald eagle fully recovered; the species was delisted on August 8, 2007 (72 FR 37345). It continues to receive federal protection through the Bald and

Golden Eagle Protection Act, the Migratory Bird Treaty Act and is protected as a BLM, USFS, and State sensitive species. Breeding habitat for the bald eagle is typically mature and old-growth forests within 6.5 miles of large bodies of water with availability of food sources such as fish, waterfowl, and sea birds. However, the distance to water may not be as important as the presence of superdominant trees, areas of lower human disturbance, and abundance of fish species (Livingston et al. 1990). Nesting is in either deciduous or conifer, but generally in the largest tree available. Nests are often reused in successive years. Wintering habitat is found along large rivers and unfrozen lakes throughout the range of the species; juveniles are more likely to move large distances than adults that typically only migrate as needed to find food (Buehler 2000).

Both breeding and wintering sites are found in the Project area portions of Wyoming. In Colorado, there is both good wintering and nesting areas, though nesting is uncommon. The Colorado River near Ruby Canyon (30 miles downstream of the confluence with the Gunnison River) and Horsethief Canyon State Wildlife Area are known nesting locations and in the Project area. In Utah, the species is widespread during winter, but very few known breeding pairs exist. According to available data, one nest site occurs in Emery County south of Castledale (approximately 4 miles southwest of Link U731) and two occur in Grand County (one along the Colorado River near Nine Mile Bottom approximately 6 miles southeast of Link U490 along the Colorado River between the Colorado-Utah border and Bitter Creek approximately 5 miles southeast of Link U490) (Bosworth 2003).

Big Brown Bat (*Eptesicus fuscus*) – State: Wyoming

A medium to large bat, the big brown bat is a habitat generalist, found in timberline meadows to lowland deserts, although it is most abundant in deciduous forest and suburban and mixed agricultural use areas (Bat Conservation International 2009a). Maternity roosts are established in buildings, barns, bridges, and bat houses. The species hibernates in caves, preferring areas near the cave entrance where temperatures are low and the relative humidity is below 100 percent (Schmidly 1991). Often big brown bats are found in association with Yuma and little brown myotis, and Brazilian free-tailed and pallid bats (Schmidly 1991). Big brown bats forage in tree foliage or cleared meadows with small beetles comprising the majority of the diet (Barbour and Davis 1969; Bat Conservation International 2009a; Schmidly 1991). Caves, trees, mines, buildings, bridges, rock crevices, cliff swallow nests, and tunnels are used for day roosts (Bradley et al. 2006; Schmidly 1991), with roosts containing small groups of bats to several hundred (Bradley et al. 2006). The big brown bat occurs from extreme northern Canada all the way to the extreme southern tip of Mexico (Bat Conservation International 2009a). There are no known occurrences of big brown bats within or near the Project area; however, the entire Project lies within the range of the species.

Big Free-tailed Bat (*Nyctinomops macrotis*) – BLM: Utah; State: Utah

The big free-tailed bat is associated with canyon lands and very rocky country. It is generally associated with floodplain-arroyo habitats at low elevation in Nevada (Bradley et al. 2006) and lowland riparian, desert shrub, and montane forests of Colorado and Utah (Oliver 2000).The species primarily roosts on cliff faces, but occasionally has been found in buildings and caves (Bradley et al. 2006). The big free-tailed bat is a summer resident of Colorado and Utah. In Colorado, it is found on both sides of the Continental Divide as far north as the Colorado River in Mesa County. In Utah it has been found as far north as Utah County (Bradley et al. 2006). Portions of the Project area are located within summer range of the species and contain suitable habitat; the big free-tailed bat is likely to forage throughout the Project area in Colorado and Utah.

Bigmouth Shiner (*Notropis dorsalis*) – State: Wyoming

The bigmouth shiner inhabits riverine systems from northern Minnesota to eastern Illinois and west to central Wyoming (WGFD 2010a). The species is not found in the Project area, but inhabits the Platte River system, which may be affected from drawdown of water from the Platte River watershed as a result of project-related water usage.

Black-rosey Finch (*Leucosticte atrata*) – State: Wyoming

The black rosy finch is found throughout the Great Basin and Intermountain regions of the United States. The species seasonally migrates between lower and higher elevations, and rarely nests below 10,000 feet in elevation (WGFD 2010a). The species is often observed in winter in grasslands, agricultural areas, roadsides, and residential areas (WGFD 2010a). The black rosy finch primarily feeds on seeds and insects with seeds being the dominate food source during the winter (Johnson 2002). The entire the Project area lies within the known range of the black rosy finch. The Heritage data provided included one known occurrence of the species from in the Project area near Crescent Junction, Utah, approximately 7 miles west of Thompson along Link U490. The black rosy finch may forage and winter in the Project area.

Black Swift (*Cypseloides niger*) – BLM: Utah; State: Utah

The black swift is an elusive bird that feeds at high altitudes. The black swift's nest site requirements are very specialized; nests are always found behind waterfalls in dark recesses with unobstructed access (Knorr 1961). Black swifts typically nest in colonies of less than 10 pairs (Marín 1997) and lay only one egg. In Utah and Colorado, breeding occurs in localized areas. The species migrates out of the Project area for winter. Known breeding sites occur in Utah at Bridal Veil Falls, Aspen Grove, and Stewart Falls in the Uinta National Forest, all near Provo (UDWR 2006), and in Colorado from Garfield County (NatureServe 2009). The black swift may migrate through the Project area, but nesting individuals are unlikely to occur near transmission line alternative routes. One known occurrence crosses the centerline of Link U420 along Red Creek near Fruitland, Utah.

Black Tern (*Chlidonias niger*) – BLM: Colorado; State: Wyoming

The black tern is a localized breeder throughout most of the northern Great Plains and Great Basin and winter along the coasts of Central and South America. It nests in semi-colonies, in shallow, freshwater wetlands on floating material or on the ground in the emergent vegetation. Nests are typically within several feet of open water (Casey 2000). The Project area is on the southern boundary of the breeding range of the species, but the black tern is known to occur in the Project area. The species is believed to breed in the vicinity of Elk Mountain, Wyoming, but breeding has not been confirmed (Cerovski et al. 2004). Breeding has not been documented elsewhere in the Project area, though suitable wetland habitat can also be found in Colorado and Utah (Ridgely et al. 2007). Black tern occurrences have been noted from Pelican Lake (Utah), Ouray (Utah), and Hogback Lake (Wyoming).

Black-crowned Night-heron (*Nycticorax nycticorax*) – State: Wyoming

The black-crowned night-heron inhabits most of the western hemisphere from Saskatchewan and Alberta south to Tierra del Fuego, Argentina. The species inhabits a wide variety of wetland habitats including fresh, brackish, and salt-water situations such as swamps, streams, rivers, pools, ponds, lakes, lagoons, tidal mudflats, salt marsh, freshwater marsh, ditches, canals, reservoirs, and wet agricultural fields. Black-crowned night-herons wade through shallow waters feeding on a wide variety of foods such as leeches, earthworms, aquatic and terrestrial insects, prawns and crayfish, clams, mussels, squid, fish, amphibians, lizards, snakes, turtles, small mammals, birds, eggs, plant materials, and even garbage from landfills (Hothem et al. 2010). There are no known occurrences in the Project area; however, the majority of the

Project area falls within the known range of the black-crowned night-heron. The black-crowned night-heron is likely to breed and forage in suitable wetland habitats in the Project area.

Bluehead Sucker (*Catostomus discobolus*) – BLM: Wyoming, Colorado, Utah; State: Wyoming, Utah

The bluehead sucker occurs in mountain streams and large rivers that are often turbid or muddy and sometimes alkaline. It is usually found in swift currents, but has also been found in moderate to still water with very little vegetation (UDWR 1998). Current known distribution of the bluehead sucker includes the Little Snake (Carbon County) and Green (Sweetwater County) River drainages in Wyoming; the Little Snake and Green (Moffat County), White (Rio Blanco County), and Colorado (Mesa County) River drainages in Colorado; and the Colorado River Drainage including the Colorado (Grand County), Green (Uintah, Emery, and Grand counties), San Rafael (Emery County), Price (Carbon County), and White (Uintah County) rivers in Utah (UDWR 1998). The bluehead sucker is threatened by habitat alteration and loss, introduction of exotic fished, and hybridization with other species of sucker (UDWR 1998). Populations of the species may be declining (UDWR 1998; WGFD 2010a). Transmission line alternative routes are located within the known range of the bluehead sucker in Wyoming, Colorado, and Utah. The bluehead sucker is known to occur in the Project area.

Bobolink (*Dolichonyx oryzivorus*) – BLM: Utah; State: Wyoming, Utah

The bobolink is a neotropical migrant that has one of the longest annual migrations of any North American songbird, approximately 12,500 miles. The species is found throughout the northern United States from the east to the west. The species leaves breeding grounds in August and winters in southern South America. In the west, the bobolink nests and forages primarily in wet meadows, wet grasslands, and irrigated agricultural fields associated with riparian or wetland areas. Nests are built on the ground, often located at the base of large forbs (UDWR 2006). Habitat for the bobolink is found throughout Wyoming, Colorado, and Utah. Isolated breeding populations occur in northern Utah, primarily along the Wasatch Mountains (Bosworth 2003). In Wyoming, bobolinks have been observed throughout the state, but are considered to be an uncommon summer resident (WGFD 2010a). In Colorado, substantial populations occur in the Yampa and White River valleys, and near Boulder, Colorado (Beason et al. 2008). The bobolink may breed and forage in suitable habitats in the Project area.

Bonneville Cutthroat Trout (*Oncorhynchus clarki utah*) – BLM: Utah; USFS: Manti-La Sal and Uinta National Forest; State: Wyoming, Utah

The Bonneville cutthroat trout occurs in streams and lakes of the Bonneville Basin and Virgin River drainage. It is typically found in headwater streams at high elevations entering and exiting the Bonneville Basin, but also located in perennial streams of the Deep Creek Mountains and the Virgin River drainage in the Pine Valley Mountains. The species is threatened by loss, degradation, and fragmentation of habitat, overutilization, hybridization with non-native trout, and disease (Bosworth 2003). Bonneville cutthroat trout was formally believed to be extinct (UDWR 1998). Conservation and stocking efforts have stabilized many extant populations, re-established extirpated populations, and expanded the range of the species (Bosworth 2003). Current known distribution of the Bonneville cutthroat trout includes streams in the Deep Creek Mountains and the Santa Clara, Sevier, and Virgin River drainages in Utah and Nevada (UDWR 1998). Suitable habitat for the species can be found on the Manti-La Sal and Uinta National Forests. Transmission line alternative routes are located within the known range of the Bonneville cutthroat trout in Utah and the species is known to occur in the Project area. Known occurrences of the species that in the Project area are located in Lake Fork east of Thistle, Utah, where this creek is crossed by Link U460; along Sheep Creek where it is crossed by Link U420; and in Tie Fork where it is crossed by Link U539.

Brassy Minnow (*Hybognathus hankinsoni*) – State: Wyoming, Colorado

The brassy minnow inhabits the Missouri and upper Mississippi river drainages from eastern Wyoming and Montana across the northern states to Ontario and New York and south to Kansas and Missouri (WGFD 2010a). The species is not found in the Project area, but inhabits the Platte River system that may be affected from drawdown of water from the Platte River watershed as a result of project-related water usage.

Brewer's Sparrow (*Spizella breweri*) – BLM: Wyoming, Colorado; State: Wyoming

Brewer's sparrow is a neotropical migrant; though some populations may only migrate a short distance between breeding and wintering grounds. The species breeds from southeastern Alaska and Saskatchewan south to southern California and southwestern Kansas. Brewer's sparrow migrates south to winter between southern California, western Texas, and central Mexico. Within the species breeding range, the Brewer's sparrow is considered a shrub steppe obligate, strongly associated with sagebrush in areas with scattered shrubs and short grass. It nests low in sagebrush, other shrub, or cactus. It is mainly a Great Basin species, but occurs in shrub steppe habitats in all states in the Project area, breeding throughout Utah, Wyoming, and western Colorado. The entire Project area lies within the breeding range of the species and the Brewer's sparrow is known to occur in suitable habitats throughout the entire Project area during the breeding season (mid-April through July) (Rotenberry et al. 1999).

Brown-capped Rosy Finch (*Leucosticte australis*) – State: Wyoming

The species inhabits the mountainous areas of extreme southern Wyoming through Colorado and into northern New Mexico. The species is considered relatively sedentary and only migrates elevationally with the seasons. Brown-capped rosy finches inhabit cliffs, caves, rock slides, or old buildings during breeding season and open areas including alpine tundra and high parks and meadows during the winter. Brown-capped rosy finches rarely nest below 10,000 feet (WGFD 2010a). The species forages on seeds, insects, and spiders (Johnson et al. 2000). The Project area lies on the boundary of the known range for the species in Colorado and Wyoming (WGFD 2010a). The brown-capped rosy finch may forage and winter in the Project area.

Burrowing Owl (*Athene cunicularia*) – BLM: Wyoming, Utah; State: Wyoming, Colorado, Utah

The burrowing owl is a small, ground-dwelling owl with relatively long legs. The species is often seen active during the day, with peaks at dawn and dusk. The burrowing owl is a neotropical migrant that breeds throughout the Western United States and migrates to southern California and Central America during the winter. The species lives in a variety of shrub-dominated or sparsely vegetated habitats within deserts, grasslands, prairies, farmland, and sagebrush steppe communities. They nest in previously excavated burrows in in the ground and are largely dependent on prairie dog colonies or other fossorial mammals for suitable nesting sites (NatureServe 2009). Occasionally, burrowing owls nest in manmade structures such as culverts. The entire Project area lies within the breeding range of the species and the burrowing owl is known to breed and forage throughout the Project area (Bosworth 2003). Over 60 known burrowing owl occurrences fall in the Project area in Colorado, Utah, and Wyoming.

Bushtit (*Psaltriparus minimus*) – State: Wyoming

The bushtit is found throughout much of the western United States from extreme southern British Columbia south through central Mexico to Guatemala. The species inhabits a wide variety of habitats from forested mountains to arid brush. Bushtits tend to prefer open mixed woodland with some evergreen foliage or shrubby understory. In the Project area, the bushtit nests only in juniper woodlands (WGFD

2010a). The species forages by gleaning small insects and spiders from vegetation (Sloane 2001). The Project area is within the known range of the bushtit and the species is likely to breed and forage in suitable habitats in the Project area.

California Floater (*Anodonta californiensis*) – State: Wyoming, Utah

The California floater is a freshwater mussel that inhabits lakes, ponds, and low-gradient streams (UDWR 2010a). There are currently seven known California floater populations in eastern Utah. Several historic populations (including Utah Lake) have been extirpated, and reported sightings of the California floater in Tooele County have not been verified (Oliver and Bosworth 1999). The distribution of the California floater in Wyoming is limited to extreme western Lincoln and Uinta counties (WGFD 2010a). The only known California floater population in the Project area occurs within the Burraston Ponds south of Mona (1 mile of the centerline of Link U650). Specimens have been collected at this location.

Canvasback (*Aythya valisineria*) – State: Wyoming

Regulatory Status

The WGFD classifies the canvasback as a Species of Special Concern with a Native Species Status of 3 because its breeding population in Wyoming is restricted in numbers, habitat is restricted, and is vulnerable with no recent or on-going significant loss (WGFD 2010a).

Taxonomy and Life History

Canvasbacks are ecological specialists and require deep, open, permanent ponds, marshes and potholes for feeding, resting, and courtship activities. They are omnivorous and their diet consists of aquatic vegetation and aquatic invertebrates. Breeding may occur in small lakes, deep-water marshes, sheltered bays of large freshwater and alkali lakes, permanent and semi-permanent ponds, sloughs, potholes and shallow river impoundments. Females usually breed in their natal area and may either make a floating nest, or nest on top of a muskrat house. Nests are made of loosely woven reeds and sedges. In aspen parklands and mixed-grass prairies, the preferred breeding habitat is semi-permanent and permanent, shallow marshes bordered by dense emergent vegetation, including bulrushes, cattails and reed grass. Brood rearing often takes place in the same habitat as breeding (WGFD 2010a).

Distribution and Habitat Requirements

Breeding grounds are from Alaska to California and Nebraska with the highest densities in the prairie-parklands of southern Canada. Canvasbacks winter along the Atlantic Coast, Mississippi River delta and delta lakes in Louisiana, Gulf coast, and Pacific coast. In Wyoming, canvasbacks are much less common during the breeding season than during migration. Most of the breeding effort has been observed in the south-central and western portions of the state. The canvasback has low abundance in Wyoming and is considered an uncommon summer resident (WGFD 2010a).

Primary Threats to Survival

There are no ongoing efforts to delineate important habitats for canvasbacks in Wyoming. The species is susceptible to impacts from energy development and other large-scale projects that destroy or impair suitable habitats. Human encroachment of wetlands is impacting the species. Heavy livestock grazing in wetland margines can adversely impact brood rearing habitat. Population status and trends of the species are not well-known in Wyoming, but the continental population appears stable. Species may be susceptible to impacts caused by climate change (WGFD 2010a).

Occurrence in the Project Area

Heritage data indicated the canvasback is not known to occur in the Project area (WYNDD 2011). However, Christmas Bird Count and Breeding Bird Survey data include occurrences of the species near water bodies in the Project area (Gough et al. 1998). Seasonal migrants of the species may occur in portions of the Project area.

Canyon Mouse (*Peromyscus crinitus*) – State: Wyoming

Canyon mouse habitat distribution includes Oregon south to northwestern Mexico and east to Colorado and Wyoming. The species is considered rare in Wyoming as it is likely limited to isolated bluffs and tabletop mesas of Sweetwater County. In Wyoming, the canyon mouse occurs in limber pine or juniper areas with sandy soil for digging burrows or sandstone rock outcrops that provide shelter. A portion of the Project area lies within the range of the canyon mouse in northeastern Utah, northwestern Colorado, and southwestern Wyoming (WGFD 2010a). The species is likely to breed and forage in suitable habitat in the Project area.

Caspian Tern (*Hydroprogne caspia*) – State: Wyoming

The Caspian tern is found throughout the world. In North America, the species has a widely scattered distribution inhabits coastal estuarine, salt marsh, and islands along the coastlines to rivers and salt lakes in the interior of the continent. Caspian terns feed primarily on fish, only occasionally taking crayfish and insects (Cuthbert and Wires 1999). There is a single known occurrence of the species on the edge of the Project area at Lake Boreham west of Myton, Utah, along Link U430. The Project is within the known range of the Caspian tern and the species is likely to breed and forage in the Project area.

Chestnut-collared Longspur (*Calcarius ornatus*) – State: Wyoming

The chestnut-collared longspur's breeding range includes southern Alberta to southern Manitoba, southeast of the Rocky Mountains to northeastern Colorado, western Kansas, north-central Nebraska, and western Minnesota, with a non-breeding range that includes California, northern Arizona, eastern New Mexico, eastern Colorado, and central Kansas south to northern Sonora, Chihuahua, Zacatecas, San Luis Potosi, and southern Texas. Cropland/hedgerow, grassland/herbaceous, and desert are all terrestrial habitats of the chestnut-collard longspur. During the breeding season the species uses level to rolling mixed-grass and shortgrass uplands, and moist lowlands in drier habitats. Grasslands and deserts with primarily grasses and forbs, as well as cultivated fields near water sources are used during non-breeding parts of the year. The species avoids shrubby areas, but uses scattered shrubs and other lower perches for singing (WGFD 2010a). The chestnut-collared longspur is known to occur in the Project area (WYNDD 2011) and is likely to breed and forage in suitable habitat in the Project area in Colorado and Wyoming.

Clark's Grebe (*Aechmophorus clarkii*) – State: Wyoming

The breeding range of Clark's grebe extends from Washington to Wyoming, south to California, Arizona, New Mexico and Mexico, and winters from on the Pacific coast from central California south to Mexico. Clark's grebe habitats include marshes, lakes and bays during migration and also along sheltered seacoasts in winter. They typically nest among tall plants growing in water on the edge of large areas of open water systems including estuaries, lagoons, rivers, lakes, and wetlands. Drought-related habitat changes have degraded some of the historic nesting sites and reduced the number of nesting pairs detected during the past several years (WGFD 2010a). There are known occurrences of Clark's grebe near transmission line alternative routes.

Cliff Chipmunk (*Tamias dorsalis*) – State: Wyoming

Cliff chipmunk habitat distribution includes from southern Idaho south into northern Mexico. The species is considered rare in Wyoming as it is limited to areas of rock outcrops near Sage Creek in Sweetwater County. The cliff chipmunk inhabits steep, rocky hillsides, rock outcrops, cliffs, and talus slopes in juniper woodlands where it nests in cliff crevices, rocky bluffs and underground burrows. A portion of the Project area lies within the range of the cliff chipmunk in northeastern Utah, northwestern Colorado, and southwestern Wyoming (WGFD 2010a). The species is likely to breed and forage in suitable habitat in the Project area.

Colorado River Cutthroat Trout (*Oncorhynchus clarki pleuriticus*) – BLM: Wyoming, Colorado, Utah; USFS: Ashley, Manti-La Sal, and Uinta National Forests; State: Wyoming, Colorado, Utah

The Colorado River cutthroat trout is endemic to the cold tributaries of the Green and Colorado River systems where it occupies headwater streams and mountain lakes. The species is threatened by loss, degradation, and fragmentation of habitat, overutilization, hybridization with non-native trout, and disease (Bosworth 2003). The range of the species has dramatically declined since the mid-1800s and currently occupies approximately 13 percent of its historic range (Hirsch et al. 2006). Recent conservation actions and re-introductions have helped to reduce threats and stabilize populations. Rangewide populations are probably increasing (Bosworth 2003). The Colorado River cutthroat trout is known to occur in the Project area in headwater streams of the Green, Little Snake, Colorado, and Yampa rivers. Known occurrences crossed by centerlines occur in the Indian Creek where crossed by Link U630 and in South Fork Gordon Creek where crossed by Link U537

Columbia Spotted Frog (*Rana luteiventris*) – BLM: Wyoming, Utah; USFS: Ashley, Manti-La Sal, and Uinta National Forests; State: Wyoming, Utah

The Columbia spotted frog is a highly aquatic frog with a relatively large range in the northwestern United States and British Columbia (Stebbins 2003). An inhabitant of ponds, creeks, streams, and lakes, they are frequently found in areas with dense willows (*Salix* spp.) and basking sites (Reaser and Pilliod 2005). The species is not known to occur in Colorado and the Project area is outside of the species range in Wyoming (WGFD 2010a). In Utah, populations of Colombia spotted frogs have declined and are threatened by habitat loss, competition with nonnative species, and disease (Bailey et al. 2006). The Columbia spotted frog is known to occur in Juab, Sanpete, Utah, and Wasatch counties in Utah (NatureServe 2009). Known occurrences within 1-mile of transmission line alternative routes are located along Links U600, U631, and U650. Known occurrences south of Burraston Ponds (south of Mona, Utah) in the creeks and washes where it is crossed by Link U650.

Columbian Sharp-tailed Grouse (*Tympanuchus phasianellus columbianus*) – BLM: Wyoming, Colorado, Utah; State: Wyoming, Colorado

The Columbian sharp-tailed grouse is one of six recognized subspecies of the sharp-tailed grouse in North America, based on geographic location, size, plumage, and types of habitat that it occupies. The Columbian sharp-tailed grouse inhabits big sagebrush (*Artemisia tridentata*), shrubsteppe, mountain shrub, and riparian shrub plant communities. It nests near or under shrubs or small trees if available (Hoffman and Thomas 2007). Leks of Columbian sharp-tailed grouse are on knolls, ridge-tops, or benches that are higher than the surrounding topography; leks are often in taller vegetation and shrub cover than the other subspecies. Nests are typically located within 0.6 mile of the lek at which they were hatched (Giesen and Connelly 1993). The species does not migrate outside of the breeding range, but may move short distances due to snow. Columbian sharp-tailed grouse is known to occur in the Project area in south-central portion of Wyoming in Carbon County immediately west and north of the Medicine Bow

National Forest and in Moffat and Rio Blanco counties in Colorado (Hoffman and Thomas 2007). There are known occurrences in the Project area along Link C13.

Common Loon (*Gavia immer*) – State: Wyoming

The common loon's breeding range includes Iceland, Greenland, and the lake regions of the northern United States and Canada. The winter range is located along the Pacific, Atlantic, and Gulf coasts. In Wyoming, the common loon distribution is small and nests only occur in northwestern parts of the state, although the common loon is found on lakes across most of Wyoming during migration. Breeding habitat requires both shallow and deep water areas with nest sites on small islands, quiet backwaters, or mainland shores. Ideal common loon nesting lakes have at least partially forested, rocky shorelines; an area of shallow water with emergent vegetation; and a steep slope along the shoreline for an underwater approach to nests (WGFD 2010a). Given its range and predicted distribution, the common loon is likely to occur in the Project area.

Common Shiner (*Luxilus cornutus*) – State: Wyoming, Colorado

The common shiner inhabits riverine systems across the eastern United States and Canada west to eastern Wyoming (WGFD 2010a). The species is not found in the Project area, but inhabits the Platte River system that may be affected from drawdown of water from the Platte River watershed as a result of project-related water usage.

Cornsnake (*Elaphe guttata*) – BLM: Utah; State: Utah

The cornsnake is primarily known from east of the continental divide (Bosworth 2003). The species is found in moist areas such as stream courses, canyons, arroyos, mountain streams, and farmland. Important components of cornsnake habitat are a permanent water source and good cover for daytime retreat or hibernation. Although primarily a diurnal species, this snake is active at night in warm weather (Degenhardt et al. 1996; Stebbins 2003). This constrictor's flattened belly makes it an excellent climber, enabling it to forage in trees and shrubs for small mammals, lizards, birds and their eggs, and even climb cave walls while hunting bats (Degenhardt et al. 1996; Stebbins 2003). Scattered populations of cornsnake occur in Utah along the Colorado and Green River corridors from Moab in Grand County to Dinosaur National Monument in Uintah County (Bosworth 2003). Suitable habitat for the cornsnake occurs in the Project area and the species may occur along transmission line alternative routes that are near the Green and Colorado rivers and their tributaries.

Desert Bighorn Sheep (*Ovis canadensis nelsoni*) – BLM: Colorado; USFS: Manti-La Sal National Forest

The desert bighorn sheep is at home in the rugged, steep mountains and canyons of the western United States and northern Mexico. The range of *O. c nelsoni* extends from central Nevada, across the southern third of Utah, northwestern Arizona, and southern California (Shackelton 1985). For a detailed species account refer to Section 3.2.7.4.

Devil Crayfish (*Cambarus diogenes*) – State: Wyoming

The devil crayfish are crustaceans with red tips on their pincers and along the margins of their body. The species has a large native range from Ontario, Canada, to Texas and Wyoming to North Carolina. The species builds burrows in forested habitats near temporary or permanent water or where the water table is near the surface (WGFD 2010a). There are no known occurrences of the species in the Project area; however, potentially suitable habitat may be present in the Project area.

Dwarf Shrew (*Sorex nanus*) – State: Wyoming

Local populations of dwarf shrew are distributed from Montana and South Dakota south to Arizona and New Mexico. The dwarf shrew likely occurs in small isolated populations as it is considered rare in Wyoming. The dwarf shrew is not limited to areas near permanent water and occurs in diverse habitats including alpine tundra, subalpine forests, rock-sides, montane forests, and foothills to arid shortgrass prairie. A portion of the Project area lies within the range of the dwarf shrew in northeastern Utah, northwestern Colorado, and southwestern Wyoming (WGFD 2010a). The species is likely to breed and forage in suitable habitat in or near the Project area.

Eastern Red Bat (*Lasiurus borealis*) – State: Wyoming

The habitat distribution of the eastern red bat includes most of the eastern United States from the Continental Divide to Canada south to Mexico. The red bat occurs seasonally in the eastern third of Wyoming and is considered rare in the state. Red bat foraging habitats include forested areas, riparian corridors, and shelter belts of vegetation where they primarily predate moths and other soft bodied insects. Roosts typically occur in mature hardwoods, shrubs, and conifers, and occasionally on the ground in leaf litter. A portion of the Project area lies within the range of the eastern red bat in southwestern Wyoming (WGFD 2010a). The species is likely to breed and forage in suitable habitat in or near the Project area.

Eureka Mountainsnail (*Oreohelix eurekensis*) – State: Utah

The Eureka mountainsnail is endemic to Utah and has only been documented in Juab, Duchesne, Tooele counties, with one population in northern Grand County. The species of terrestrial snail is found in shrubland and forested habitats, usually around limestone outcrops or soils with high calcium concentration (UDWR 2010a). There is one known Eureka mountainsnail occurrence in the Project area in the Red Narrows on the southern end of Uinta National Forest and other occurrences have been noted in vicinity. The Eureka mountainsnail is likely to occur in suitable habitats in the Project area.

Fairy and Tadpole Shrimp (combined account) – State: Wyoming

Fairy shrimp are found throughout North America. Tadpole shrimp inhabit areas west of the Mississippi River and in the Arctic of North America. These species range in size from 0.4 to 2.4 inches in length. Both fairy and tadpole shrimp inhabit temporary wetlands as well as permanent waters (WGFD 2010a). There are no known occurrences of the species in the Project area; however, potentially suitable habitat may be present in the Project area.

Fatmucket (*Lampsilis siliquoidea*) – State: Wyoming

The fatmucket is known from river systems throughout the Midwest as far west as Wyoming (WGFD 2010a). The species is not found in the Project area, but inhabits the Platte River system that may be affected from drawdown of water from the Platte River watershed as a result of project-related water usage.

Ferruginous Hawk (*Buteo regalis*) – BLM: Wyoming, Colorado, Utah; State: Wyoming, Colorado, Utah

During the breeding season, ferruginous hawk habitat includes grasslands, agricultural lands, sagebrush/saltbush/greasewood shrub lands and the interface between pinyon-juniper and shrubsteppe habitats. The species is known to breed from the Canadian Prairie Providences south to Oregon, Nevada, Arizona and Oklahoma (WGFD 2010a). Nesting sites are elevated, often in cliffs, buttes, and creek banks. During the winter, the species migrates south to the central and southern portions of its breeding range

south into Baja California where it uses open farmlands, grasslands, deserts, and other arid regions (WGFD 2010a). The species' diet consists of lagomorphs, pocket gophers, and prairie dogs, but can also include other small mammals and birds (Bechard and Schmutz 1995).

The western two-thirds of Carbon County has one of the highest nesting densities of ferruginous hawks in Wyoming (BLM 2012d). In Colorado, ferruginous hawks nest in the eastern prairies, but have also been observed in the northwestern portion of the state (Beidleman 2000). The species occurs throughout most of Utah, in appropriate habitat. It is most prevalent in the southern Bonneville Basin in southwest Utah and the Colorado Plateau in eastern Utah (Bosworth 2003). The species is known to breed and forage and is believed to be relatively common throughout the Project area.

Flammulated Owl (*Otus flammeolus*) – USFS: Ashley, Manti-La Sal, and Uinta National Forests

The flammulated owl is a migratory cavity-nesting owl of mid-elevation, open ponderosa pine or other similarly structured dry forest. Nesting occurs from southernmost British Columbia through the forested ranges of Washington, Oregon, and portions of California and Nevada into central Mexico (Mccallum 1994). The species winters from central Mexico to Guatemala (Ehrlich et al. 1988), with migration most likely being tied to prey availability. The species consumes nocturnal arthropods, especially moths, beetles, crickets, and grasshoppers (Mccallum 1994). Flammulated owls inhabit mid-level open conifer forests, and are associated with ridges and upper slopes. The species is a secondary cavity nester and prefers mature growth forest. The Project area is within the known breeding range of the flammulated owl and the species is known to occur on the Ashley, Uinta, and Manti-La Sal National Forests (USFS 2013b). The flammulated owl has been observed in the Project area north of Helper, Utah, along Link U545 (UNHP 2012).

Flannelmouth Sucker (*Catostomus latipinnis*) – BLM: Wyoming, Colorado, Utah; State: Wyoming, Utah

The flannelmouth sucker inhabits pools or streams and large rivers with little to no vegetation and clear to murky waters over rock, gravel, or mud substrate. The species was once widespread throughout the Colorado River basin but currently only occupies 45 percent of their historic range (WGFD 2010a). Threats to the species include habitat fragmentation and competition and hybridization with non-native fishes (WGFD 2010a). Current known distribution of the flannelmouth sucker includes the Little Snake (Carbon County) and Green (Sweetwater County) River drainages in Wyoming; the Little Snake and Green (Moffat County) and Colorado (Mesa County) River drainages in Colorado; and the Colorado River drainage including the Colorado (Grand County), Green (Uintah, Emery, and Grand counties), San Rafael (Emery County), and Price (Carbon County) rivers in Utah (UDWR 1998). Some transmission line alternative routes are located within the known range of the flannelmouth sucker in Wyoming, Colorado, and Utah and the species is known to occur in the Project area.

Flathead Chub (*Platygobio gracilis*) – State: Wyoming

The flathead chub inhabits turbid rivers of the Great Plains from the Northwest Territory in Canada south to Oklahoma and New Mexico (WGFD 2010a). The species is not found in the Project area, but inhabits the Platte River system that may be affected from drawdown of water from the Platte River watershed as a result of project-related water usage.

Forster's Tern (*Sterna forsteri*) – State: Wyoming

The breeding range for Forster's tern includes the Central Prairie Provinces of Canada south to southern California, western Nevada, southern Idaho, northern Utah, northern and eastern Colorado, central

Kansas, western, Nebraska, northern Iowa, northwestern Indiana, to eastern Michigan; coastally from northeastern Mexico, southeastern Texas to southern Alabama; along the Atlantic coast from Long Island to South Carolina. Forster's tern winters in central California and Baja California to Oaxaca and Guatemala, Costa Rica; northern Veracruz to western Florida; Virginia to northern Florida; Bahamas and Greater Antilles. The Forster's tern breeds in marshes with lots of open water and large stands of island-like vegetation. It winters in marshes, coastal beaches, lakes and rivers (McNicholl et al. 2001). Three occurrences of the Forster's tern southwest of Rawlins near Hogback Lake (Link W30) are known within transmission line alternative routes.

Franklin's Gull (*Leucophaeus pipixcan*) – State: Wyoming

During summer, Franklin's gull is found in Alberta and Saskatchewan, Canada south to northern South Dakota with disjunct populations in northwestern Wyoming, along the Great Salt Lake in Utah, and near Reno, Nevada. The species winter along the Pacific coast of South America. The species breeds along freshwater marshes an always nests over water on floating mats built on the water's surface, on muskrat houses, or on floating debris. Franklin's gull has a highly variable diet feeding on invertebrates (earthworms, grubs, insects, snails), seeds and other vegetable matter, mice, fish, and crabs (Burger and Gochfeld 2009). Most Franklin's gull populations are known from outside of the Project area. However, the species may occur in suitable aquatic habitats in the Project area in Wyoming (WGFD 2010a).

Fringed Myotis (*Myotis thysanodes*) – BLM: Wyoming, Colorado, Utah; State: Wyoming, Utah

The fringed myotis occurs in a wide range of habitat from lowland riparian and desert shrub to montane forests and meadows at an elevation range of 2,400 to 8,900 feet. It typically roosts in caves, mines, and buildings (Bradley et al. 2006). The fringed myotis most likely does not migrate, but hibernates during the winter (Oliver 2000). It is widely distributed throughout Wyoming, Colorado, and Utah, but is not common. The Project area is located within the range of the species and contain suitable habitat. The fringed myotis is likely to forage throughout the Project area in Wyoming, Colorado, and Utah.

Grasshopper Sparrow (*Ammodramus savannarum*) – BLM: Utah; State: Wyoming, Utah

The grasshopper sparrow is a neotropical migrant that breeds throughout the Great Plains and eastern United States and spends winters in the southern United States, Mexico, and Central America. It prefers grasslands with moderately deep litter, patches of vegetation alternated with bare surface areas, and sparse woody vegetation coverage (Smith 1963). Grasshopper sparrows nest on the ground at the bases of grass clumps from April to June (Vickery 1996). The Project area is on the border of the species' range and breeding is believed to be rare in the western Wyoming and Utah (Bosworth 2003; WGFD 2010a). Grasshopper sparrow may occasionally breed in the Uinta Basin, but no heritage records exist in the area (Bosworth 2003). The grasshopper sparrow is likely to occur transiently in the Project area during seasonal migrations, and may occasionally use the Project area for breeding or foraging.

Gray Wolf (*Canis lupus*) – State: Colorado, Utah

Today, the gray wolf is found south of Canada only in northern Mexico, a few areas in the Rocky Mountains (reintroduction sites in Montana, Wyoming and Idaho), northwestern Great Lakes region and Cascade Mountains of northern Washington. Formerly, gray wolves were much more numerous in the Rocky Mountain states than in the southwestern United States. The gray wolf is a habitat generalist, with large stable home ranges and exclusive pack territories. Wolf packs generally consist of a breeding pair and offspring. Travel patterns across home ranges are influenced by elevation, topography, prey distribution and climatic conditions; travel routes along roads, trails and survey lines for efficiency are common (Paquet and Carbyn 2003). In addition to avoiding roads and human activity, the gray wolf

selects den sites (natal and secondary) according to proximity of stable food and water resources; selecting for close proximity to ungulate prey species and often denning along ungulate migration routes. Den sites are also located relative to adjacent wolf pack proximity. However, territory overlap with other apex and meso-predators occurs. Limiting factors include climate, prey density, human-induced mortality and disease (Paquet and Carbyn 2003).There are currently no known occurrences of wolves in Utah or Colorado. In the Project area, there is one known occurrence near Baggs, Wyoming. This wolf was a confirmed identification by WGFD biologists in 2003; however, an exact location is not known.

Great Basin Gopher Snake (*Pituophis catenifer deserticola*) – State: Wyoming

The Great Basin gopher snake is found from southern British Columbia to northern Arizona and from Nevada to Colorado in sagebrush and desert habitats (Stebbins 2003; WGFD 2010a). The species primarily feeds on small mammals such as mice, gophers, ground squirrels, and rabbits (WGFD 2010a). Except for Carbon County, Wyoming, the entire Project area lies within the known range of the Great Basin gopher snake. The Great Basin gopher snake is likely to occur in the Project area.

Great Basin Pocket Mouse (*Perognathus parvus*) – State: Wyoming

The Great Basin pocket mouse distribution includes the majority of the Great Basin from south-central British Columbia south to southern California and northern Arizona. The species is considered rare in Wyoming as it only occurs in the southwestern corner of the state. Sagebrush dominated areas, steppe and arid open shrub and woodlands are typical Great Basin pocket mouse habitats. A portion of the Project area lies within the range of the Great Basin pocket mouse in southwestern Wyoming and central Utah (WGFD 2010a). The species is likely to breed and forage in suitable habitat in the Project area.

Great Basin Spadefoot (*Spea intermontana*) – BLM: Wyoming, Colorado; State: Wyoming

The Great Basin spadefoot lives in drier habitats than most amphibians. It is fairly abundant throughout the Great Basin, but becoming rarer at the extremities of the Great Basin in southern Wyoming and western Colorado (UDWR 2005a). The Great Basin spadefoot is found in sagebrush communities below 6,000 feet with loose soil for burrowing. The Great Basin spadefoot is found primarily west of the Continental Divide in the Wyoming Basin and Green River Valley in Wyoming (WGFD 2005c, 2010a) and north of the Uncompahgre Plateau in Colorado (CPW 2010). The Project area is almost entirely within the known range of the Great Basin spadefoot. There are numerous known occurrences in the Project area in Wyoming and Colorado.

Greater Sandhill Crane (*Grus canadensis tabida*) – State: Wyoming, Colorado

A large, heavy-bodied, long-lived bird, the greater sandhill crane breeds on tundra, grasslands, and marshes (National Geographic Society 1999), in isolated bogs and marshes surrounded by shrub and forest habitat (Tacha et al. 1992). The species nests across large expanses of Siberia, Alaska, and northern Canada, but also in much smaller areas around the Great Lakes, Idaho/Wyoming border, northern Nevada, northwestern Colorado, Oregon, the southeastern United States, and Cuba (Tacha et al. 1992). Breeding does not occur until the birds reach 2 to 7 years of age, with both parents providing care of the young. Large flocks form during migration, composed of numerous pairs or family groups. The wintering range includes south-central California, southeastern Arizona, southern New Mexico, west and central Texas and scattered areas along the Gulf Coast, peninsular Florida, and northern Mexico (Tacha et al. 1992). Known occurrences in the vicinity of the Project area are located along the North Platte River, Little Snake River, Yampa River and in Routt National Forest. Only two confirmed occurrences are located in the Project area. These occurrences are located where Link C100 crosses the Yampa River approximately 11 miles east of Craig, Colorado. In addition to these known occurrences, greater sandhill cranes are likely to breed, forage, and migrate through the Project area.

Greater Short-horned Lizard (*Phrynosoma hernandesi*) – State: Wyoming

The greater short-horned lizard can be found from extreme southern Canada to southern Durango, Mexico, and from Nevada to western Nebraska. The species feeds primarily on ants, but will also eat other insects, snails, and spiders (Stebbins 2003). There are no known occurrences of the species in the Project area; however, the entire Project area falls within the range for the species.

Iowa Darter (*Etheostoma exile*) – State: Wyoming, Colorado

The Iowa darter inhabits clear to lightly turbid water in small cool lakes, bogs, ponds, and in slow-moving waters of small brooks to medium rivers. The species is known to occur throughout much of southern Canada and northern United States from New York to Montana and as far south as New Mexico (Fuller and Neilson 2012; WGFD 2010a). In the Project area, the Iowa darter is known to occur in the Yampa River between Dinosaur National Monument and Craig, Colorado. In Utah, the species is known from a single collection in the Green River near Jensen (Fuller and Neilson 2012). There are no known occurrences of the species in the Project area in Wyoming; however, the northeastern end of the Project area in Carbon County Wyoming lies within the known range of the Iowa darter in Wyoming (WGFD 2010a). The Iowa darter may occur in suitable aquatic habitats in the Project area.

Juniper Titmouse (*Baeolophus ridgwayi*) – State: Wyoming

The juniper titmouse is a year-round resident in western North America from southern Oregon west to Wyoming and south to Arizona, Sonora, and western Texas. Terrestrial habitats of this titmouse species include juniper woodlands, sagebrush and other mixed shrub woodlands, but require old-growth woodlands with open canopy and higher herbaceous ground cover. The juniper titmouse uses secondary cavities for nest, often using woodpecker holes or natural cavities (WGFD 2010a). The Project area is within the known range of the species and suitable habitat is known to occur near transmission line alternative routes in Utah, Wyoming, and Colorado. Ten occurrences of the juniper titmouse have been noted in the Project area along Links W492, W520, and W493 in southwestern Wyoming. The juniper titmouse is known to breed and forage in the Project area.

Kit Fox (*Vulpes macrotis*) – BLM: Colorado, Utah; State: Colorado, Utah

The kit fox is a desert adapted fox that is absent from high elevation montane regions. Populations are associated with sparsely vegetated arid habitat, primarily greasewood, shadscale, or sagebrush dominated habitat (Bosworth 2003). They are also found adjacent to irrigated crop land and urban fringes, and may use man-made structures for denning. Kit fox are primarily carnivorous and have adapted to obtain water requirements directly from prey, but have to consume prey over and above energetic requirements to do so. In addition, kit fox den during the day and have nocturnal movement patterns to minimize water loss and reduce heat loads (Cypher 2003). Kit fox populations occupy habitats that provide favorable combinations of low predator numbers, sufficient prey, and soils suitable for denning (UDWR 2011a). Home range size varies according to sex, food availability, season, and geographic location. Population density fluctuates according to food availability as a consequence of climatic conditions, namely drought. Further limiting factors include predation by coyotes (the primary source of mortality for kit fox), collisions with vehicles and accidental death through anthropogenic development (Cypher 2003). Increased availability of water in arid environments and introduction of invasive weeds are known to threaten kit fox populations by extending the distribution of competitors (coyotes) into kit fox habitat and altering the availability of prey species. Transmission line alternative routes are located within the known range of the species in Colorado and Utah and contain suitable habitat. The kit fox is known to occur throughout desert shrub and sagebrush communities near transmission line alternative routes.

Land Snails (combined account) – State: Wyoming

Land snails are found throughout North America. Approximately 1,000 land snails and slugs inhabit most terrestrial habitats across North America. These species feed on plants, litter, wood, and dead animals (WGFD 2010a). There are no known occurrences of these species in the Project area; however, that these species are found in most terrestrial habitats, potentially suitable habitat is likely present in the Project area.

Lark Bunting (*Calamospiza melanocorys*) – State: Wyoming

The breeding range of the lark bunting extends from southern Alberta and Saskatchewan south to northeastern New Mexico and the Texas Panhandle. The wintering range extends from central Texas west to Baja California and south to central Mexico. The species inhabits grasslands and shrub-steppe of high plains including agricultural areas. Lark buntings feed on small seeds, grain, insects, and arachnids (Shane 2000). There are three known occurrences in the Project area; all are located in Utah. The lark bunting is considered to be an abundant summer resident in Wyoming (WGFD 2010a). The lark bunting is likely to breed and forage in the Project area.

Lesser Scaup (*Aythya affinis*) – State: Wyoming

The breeding range of the lesser scaup extends from northern Alaska to Quebec and as far south as southern Wyoming. The wintering range covers the southern United States south to Honduras and along both coasts of the continental United States and portions of the central United States including Colorado. Lesser scaups often inhabit fresh to moderately brackish, seasonal and semi-permanent wetlands and lakes with emergent vegetation such as bulrush (*Scirpus* spp.), cattail (*Typha* spp.), and river bulrush (*Scirpus fluviatilis*). This duck dives to feed on aquatic invertebrates such as insects, crustaceans, and mollusks; however, the species may also eat seeds and vegetative portions of aquatic plants (Austin et al. 1998). The lesser scaup is known to migrate through the Project area and is likely to breed, forage, and nest in aquatic habitats in the Project area.

Lewis's Woodpecker (*Melanerpes lewis*) – BLM: Utah; State: Wyoming, Utah

The breeding distribution of Lewis's woodpecker is associated with the distribution of ponderosa pine, although the species is also known to use riparian and mountain shrub habitats. It is an open country bird, found most often where trees are scattered on woodland edges, streamside trees, and recently burned forests with a good under-story of grasses and shrubs to support insect prey populations. Nests are excavated in trunks or large branches of large, dead, or decaying trees, including burned trees (Tobalske 1997). The Project area is within the known range of the Lewis's woodpecker and the species is known to breed and forage in the vicinity of the Project area in Colorado, Utah, and Wyoming (Cerovski et al. 2004; Tobalske 1997). There are three known occurrences of the Lewis's woodpecker in the Project area. One is located where Link U402 crosses the Green River. The remaining two occurrences are located near the junction of Nebo Creek and Spencer Canyon along Link U625 between Uinta and Manti-La Sal National Forests.

Little Brown Myotis (*Myotis lucifigus*) – State: Wyoming

This small bat is abundant in forested areas. In the west, it is found primarily in higher elevations and riparian areas within forest habitats (Bat Conservation International 2009b; Bradley et al. 2006). Little brown myotis hibernates in caves, abandoned mines, and tunnels in the east; however, winter roosts in the west are not known. Day roosts include hollow trees, rock outcrops, caves, mines and buildings (Bradley et al. 2006). One of North America's most wide-ranging bats, the little brown myotis occurs from Alaska, across Canada to the Atlantic, across much of the United States, and down to central Mexico (Tuttle

2006). There are no known occurrences of little brown myotis within or near the Project area; however, the entire Project lies within the range of the species.

Loggerhead Shrike (*Lanius ludovicianus*) – BLM: Wyoming

The loggerhead shrike is a predatory passerine bird that hunts from perches and impales its prey on thorns and barbed wire fences. The species has a wide distribution and can be found throughout the United States. Habitat is open country with short vegetation, particularly pastures with fence lines (Yosef 1994), old orchards, mowed roadsides, cemeteries, golf courses, agricultural fields, riparian areas, and open woodlands (Yosef 1996). Shrikes nest in a variety of trees and shrubs, where degree of cover is the most significant determinant. The loggerhead shrike often nests in trees with thorns (e.g., Russian olive or honey locust, *Gleditsia triacanthas*), possibly to provide increased protection (Porter et al. 1975). The loggerhead shrike breeds throughout the Project area and is a year-round resident of much of the Project area in Colorado and Utah (Yosef 1996). There are several known occurrences of the loggerhead shrike near transmission line alternative routes.

Long-billed Curlew (*Numenius americanus*) – BLM: Wyoming, Colorado, Utah; State: Wyoming, Colorado, Utah

The long-billed curlew is the largest North American shorebird, and a neotropical migrant. It is endemic to the Great Plains and winters in coastal/inland areas of the southern United States and Central America. It nests primarily in short-grass or mixed prairie habitat with flat to rolling topography but moves to taller grasses when brood rearing. It lives and breeds in higher and drier meadowlands than most other shorebird species (Parrish et al. 2002). The species commonly nests in cheatgrass (*Bromus tectorum*) dominated landscapes (Pampush and Anthony 1993) and agricultural fields in the Great Basin. The species is considered to be an uncommon summer resident in Wyoming (WGFD 2010a). The Project area is within the species' breeding range in Wyoming, Colorado, and Utah. The long-billed curlew has been observed near transmission line alternative routes near Hogback Lake southwest of Rawlins, Wyoming, along the Yampa River near Craig, Colorado, and in Duchesne and Juab counties in Utah. The long billed curlew is known to breed and forage in the Project area.

Long-eared Myotis (*Myotis evotis*) – BLM: Wyoming; State: Wyoming

The long-eared myotis is primarily associated with high elevation forests, but has also been found in other habitats ranging from lowland riparian and sagebrush to montane forest habitats. The species primarily roosts during the day in hollow trees, under exfoliating bark, crevices in small rock outcrops, and occasionally in mines, caves and buildings. Night roosts are caves, mines, and bridges. Long-eared myotis are believed to be non-migratory and hibernate during the colder months (Bradley et al. 2006). The species is widely distributed throughout the Project area. Transmission line alternative routes are located within the range of the species and contain suitable habitat. The long-eared myotis is likely to forage throughout the Project area.

Long-legged Myotis (*Myotis volans*) – State: Wyoming

Habitat for the long-legged myotis includes pinyon-juniper and Joshua tree woodland, montane coniferous forest, blackbrush, and sagebrush (Bradley et al. 2006). This bat hibernates in winter, but is capable of winter activity. Hibernacula are most likely mines or caves, while day roosts may be hollow trees, rock crevices, caves, mines, or buildings. Foraging is in open areas, with moths being the primary food source (Bradley et al. 2006). The majority of nursery colonies are found in trees of sufficient age (100 years or more) to provide crevices and exfoliating bark (Bat Conservation International 2009c). The long-legged myotis is one of the most widely distributed bats of the western United States (Bat Conservation International 2009c). There are no known occurrences of long-legged myotis within or

near the Project area; however, the entire Project area lies within the range of the species. Long-legged myotis are likely to forage near transmission line alternative routes.

Long-nosed Leopard Lizard (*Gambelia wislizenii*) – BLM: Colorado; State: Colorado

The long-nosed leopard lizard inhabits flat to gently sloping shrublands with scattered shrubs and other low plants. It is known to occur in Colorado and Utah. It is an uncommon species in Colorado, restricted to the west-central and southwest edge of the state (CPW 2010). The species is widespread and common in Utah. The southern portion of the Project area in Colorado and Utah is located within the known range and distribution of the species and contains habitat for the long-nosed leopard lizard. The long-nosed leopard lizard is known to occur in the Project area.

McCown's Longspur (*Calcarius mccownii*) – State: Wyoming

The McCown's longspur breeds from southern Alberta and Saskatchewan south to northern Colorado and western Nebraska. Its winter range is primarily in western Texas extending through very southern New Mexico south to northern Durango, Mexico. During both breeding and wintering seasons, the species inhabits open habitat with sparse vegetation such as shortgrass prairie, and semi-arid shortgrass steppe. These birds feed on the seeds of grasses and forbs, insects such as grasshoppers, moths, and beetles, and other arthropods (With 2010). There are no known occurrences of McCown's longspur in the Project area. The Project area is on the boundary of the species' range in Wyoming. The McCown's Longspur may occur in suitable habitats in the Project area in Wyoming.

Merlin (*Falco columbarius*) – State: Wyoming

The merlin is a raptor that occurs in Eurasia and North America from the northern tree limit in North America south to Washington, Oregon, Montana, Idaho, Wyoming, and the western border of North and South Dakota. In North America, the merlin winters from British Columbia and the Western and Southern United States south to Venezuela and Peru. Open woodlands, savannah, grasslands, and shrub-steppe below 8,500 feet (2,600 meters) are typical merlin habitat. Merlin typically nest in large ponderosa pines, in old domed magpie nests, and near open sagebrush-grassland for foraging. Nesting sites seem to be selected based on easy access, high vantage of the surrounding area, and maximum nest concealment (WGFD 2010a). Three relatively recent merlin occurrences (1983 to 2007) have been noted in the Project area: along Muddy Creek (Link W111), east of Hogback Lake, and along North Platte River (Link W30) (WYNDD 2011). The merlin is likely to breed and forage in the Project area.

Milk Snake (*Lampropeltis triangulum taylori*) – BLM: Colorado

The milk snake occurs in rocky thornscrub desert valleys, up through desert grasslands, into sagebrush desert, desert grassland, and open grassland in burrows of small mammals. Much of the Project area is located within the known range of the milk snake. There are numerous know occurrences of the species in the Project area throughout Utah.

Moose (*Alces alces*) – State: Wyoming

In Wyoming, moose are considered common as they occupy a variety of habitats including Engelmann spruce, Douglas and subalpine fir, and lodgepole pine forests along riparian communities where willows and shrubs are available as food resources. Moose tend to summer in higher elevation conifer forests and winter in willow and deciduous habitats. A portion of the Project area lies in the predicted moose range of southwestern Wyoming and northeastern Utah (WGFD 2010a). The species is likely to breed and forage in suitable habitat in the Project area. Refer to Section 3.2.7.4 for more detailed information about moose in the Project area.

Mountain Plover (*Charadrius montanus*) – BLM: Wyoming, Colorado, Utah; State: Wyoming, Colorado, Utah

The mountain plover was formerly a candidate to be listed as threatened under the ESA. On September 9, 2003 the FWS withdrew the listing because newly acquired information indicated that the threats to the species originally included in the proposal were not as significant as earlier believed (68 FR 53803). The mountain plover is associated with shortgrass prairie landscapes where the topography is fairly flat and the vegetation is sparse (Beidleman 2000), composed primarily of blue grama (*Bouteloua gracilis*) and buffalo grass (*Buchloe dactyloides*) (Parrish et al. 2002). Mountain plovers often breed near areas of excessive disturbance (Knopf and Miller 1994) and prairie dog colonies (Knowles and Stoner 1982). Mountain plovers migrate from their wintering grounds in the Central Valley of California and Mexico to breeding grounds in mid-March. Mountain plovers leave breeding grounds in August. Habitats used during wintering periods include plowed fields, heavily grazed annual grasslands, and burned fields (Knopf and Rupert 1995). In Wyoming, mountain plovers have been documented in every county and are known to breed in the Project area. In Colorado, populations are concentrated in and around the Pawnee and Comanche National Grasslands and in South Park, all outside of the Project area. The breeding population in Utah (Duchesne and Uintah counties) is in the Project area but has not been detected since 2002 and may have been extirpated (Bosworth 2003).

Mountain Sucker (*Catostomus platyrhynchus*) – BLM: Colorado; State: Colorado

The mountain sucker occurs throughout large portions of the western United States and Canada in smaller rivers and streams with a substrate of gravel, sand, and mud. It is typically found near undercut banks, eddies, small pools, and areas of moderate current. The Project area is within the southern portions of the species' range. Current known distribution includes the upper reaches of the White, Yampa, Green, and Colorado River Basins (Belica et al. 2006; CPW 2010). The mountain sucker is known to occupy streams and rivers in the Project area.

Mountain Whitefish (*Prosopium williamsoni*) – State: Wyoming

The mountain whitefish occurs in the Mackenzie River drainage and the Northwest Territories in Canada, south through western Canada, and northwestern United States in the Pacific, Hudson Bay, and upper Missouri River basins, to Truckee River drainage, Nevada, and as far southeast as Colorado and the Sevier River drainage in Utah. In riverine habitats, whitefish occur in creek, high gradient, medium river, pool, and riffle; and in lacustrine habitats, in deep and shallow water. Cold mountain lakes and fast, clear or silty streams with large pools; and streams with gravel riffles for spawning (NatureServe 2011). Two mountain whitefish occurrences have been noted in the Yampa River between the Project area and Hayden, Colorado. The mountain whitefish is known to occur in the Project area.

Northern Flying Squirrel (*Glaucomys sabrinus*) – State: Wyoming

The northern flying squirrel distribution ranges from Alaska through most of Canada, southward to the mountains of southern California, the southern Rocky Mountains, western South Dakota, the Great Lakes region, and the southern Appalachians. The species is considered uncommon in Wyoming as it is limited to western mountain ranges and isolated populations in the Black Hills and Sweetwater County in the state. The species prefers coniferous, deciduous, mixed, and riparian forests and woodlands. The northern flying squirrel often inhabits areas with sands of varying age, understory density and composition; however, old-growth forests near wetlands or streams are ideal for its gliding form of locomotion, cavity nesting, and use of wood fungi and lichens for food. A portion of the Project area lies on the extreme edge of the predicted northern flying squirrel range in southwestern Wyoming and central to northeastern Utah (WGFD 2010a). The species is likely to breed and forage in suitable habitat in the Project area.

Northern Goshawk (*Accipter gentilis*) – BLM: Wyoming, Colorado, Utah; USFS: Ashley, Manti-La Sal, and Uinta National Forests; State: Wyoming, Utah

The northern goshawk is a large forest-dwelling raptor that inhabits old-growth forests in mountains and riparian zone habitats with a dense canopy (Daw and DeStefano 2001). Nests are typically in the largest trees, constructed of sticks just below the forest canopy (Speiser and Bosakowski 1987), and often occur in dead trees at elevations as low as 5,700 feet in Utah (Rodriguez 2012). The goshawk is partially migratory in the northern portion of its range where, in winters of food shortage, it migrates southward. In the Project area, the northern goshawk is found year-round in Wyoming and Utah. In Utah, it is an uncommon permanent resident found throughout the state in proper habitat, including montane conifer-aspen forests to the treeline (UDWR 1998). In Wyoming, it is found in both Sweetwater and Carbon counties in primarily coniferous forests, especially Douglas fir and lodgepole pine and aspen (Cerovski et al. 2004). All three national forests crossed by the Project contain suitable habitat for the species. Northern goshawk is managed as a management indicator species in all three forests.

Northern Leatherside Chub (*Lepidomeda copei*) – BLM: Wyoming, Utah; State: Wyoming

The northern leatherside chub is one of two taxa formerly known as leatherside chub that was recently split into two species based on genetic differences (WGFD 2010a). The northern leatherside chub occurs in streams and rivers of the northeastern Bonneville Basin in Utah, Wyoming, and Idaho. The species is not native to the Project area but introduced populations have been observed in the Colorado and Green River systems (UDWR 2009c). The species spawns over cobble and gravel substrate in the spring and is threatened by habitat loss and fragmentation and competition, hybridization, and predation by other fish. Populations of northern leatherside chub have been declining (WGFD 2010a). Transmission line alternative routes are located outside of the native range of the northern leatherside chub but introduced populations occur in the Project area.

Northern Leopard Frog (*Rana pipiens*) – BLM: Wyoming, Colorado; State: Wyoming, Colorado

The northern leopard frog occurs in wet meadows and the banks and shallows of marshes, ponds, lakes, reservoirs, streams, and irrigation ditches. In Wyoming, it inhabits the plains, foothills, and montane zones up to 8,500 feet (2,600 meters) (WGFD 2010a). In Colorado, the species occurs statewide in the mountains and lowlands (CPW 2010). Populations are known to be declining throughout the species range (WGFD 2010a). The Project area is located within the known range of the species and suitable habitats are present in Wyoming, Colorado, and Utah. There are numerous know occurrences of the species in the Project area throughout all three states. In Utah, centerlines cross known occurrences in Ashley Creek where it is crossed by Link U320, in Willow Creek south of Ouray where it is crossed by Link U400, and in the Green River where it is crossed by Link U490.

Northern Pintail (*Anas acuta*) – State: Wyoming

The northern pintail is found throughout most of North America from northern Alaska to Costa Rica. This duck typically nests in open country with shallow, seasonal, or intermittent wetlands and low vegetation. Outside of breeding season, the species can be found in most types of aquatic habitat. The species feeds on grains, moist-soil and aquatic plant seeds, pond weeds, aquatic insects, crustaceans, and snails (Austin and Miller 1995). There are no known occurrences in the Project area; however, the entire project is within the known range of the northern pintail.

Northern Plains Killifish (*Fundulus kansae*) – State: Wyoming

The northern plains killifish inhabits riverine systems in the Great Plains region of North America (WGFD 2010a). The species is not found in the Project area, but inhabits the Platte River system that may be affected from drawdown of water from the Platte River watershed as a result of project-related water usage.

Northern Tree Lizard (*Urosaurus ornatus wrighti*) – State: Wyoming

Distribution data for the northern tree lizard are not complete for the United States and Canadian providences (NatureServe 2012). The northern tree lizard occurs in southwestern Sweetwater County, in Wyoming where it is considered extremely rare. The species inhabits rocky cliffs, canyon walls, steep exposures of bedrock, and large boulders in sagebrush and juniper habitats. The northern tree lizard predates spiders and insects when active while basking in the sun most of the day, and perching in shaded areas in the hottest parts of the afternoon. A portion of the Project area lies within the range of the northern tree lizard in southwestern Wyoming (WGFD 2010a). The species is likely to breed and forage in suitable habitat in the Project area.

Olive-backed Pocket Mouse (*Perognathus fasciatus*) – State: Wyoming

Distribution of the olive-backed pocket mouse includes the northern Great Plains and Intermountain basins, from southern Alberta, Saskatchewan, and Manitoba south to northeastern Utah, southern Colorado and eastern South Dakota. A variety of arid and semiarid upland habitats, typically sparsely vegetated grasslands and sagebrush-grasslands are olive-backed pocket mouse habitat. This pocket mouse species occupies loose sandy to clay soils for burrowing (WGFD 2010a). The Project area is within the known range of the species and several occurrences of the olive-backed pocket mouse have been noted in the Project area. The olive-backed pocket mouse is likely to occur in suitable habitats throughout the Project area.

Oreohelix Mountain Snails (combined account) – State: Wyoming

Oreohelix mountain snails are land snails that live in the mountains in areas with canopy cover and leaf or needle litter. These snails are found in western North America from Saskatchewan and British Columbia to Mexico and California to South Dakota. Mountain snails feed on leaf litter, detritus, and microorganisms on solid surfaces (WGFD 2010a). There are no known occurrences of these species in the Project area; however, potentially suitable habitat may be present in the Project area.

Pale Milksnake (*Lampropeltis triangulum multistriata*) – State: Wyoming

Milksnakes are found in eastern and Midwestern North America, throughout Central America, and into northwest South America. The pale milksnake is the northernmost subspecies and is found in Montana, Wyoming, Colorado, Nebraska, and South Dakota west of the Missouri River to the Rocky Mountains. Milksnakes inhabit a wide variety of habitat types, but are primarily found in areas with a diverse grass-forb mixture with lower populations where woody vegetation dominated. Milksnakes feed on small vertebrates and eggs and kill by constricting their prey. The species is believed to be nocturnal (Smith and Stephens 2003). There are no known occurrences of pale milksnakes in the Project area; however, the northeastern end of the Project area lies within the known range of this subspecies (WGFD 2010a).

Pallid Bat (*Antrozous pallidus*) – State: Wyoming

Habitat for the pallid bat includes low desert, brushy terrain, coniferous forest and deciduous woodland. The species is found between 1380 to 8465 feet elevation in pinyon-juniper woodland, salt desert scrub, creosote, and sagebrush habitats (Bradley et al. 2006). The pallid bat hibernates in winter, but arouses

periodically to forage and drink. Day roosts include rock outcrops, mines, caves, hollow trees, buildings, and bridges. Unlike most other North American bats that capture prey in flight, the pallid bat primarily captures large ground-dwelling prey such as scorpions, centipedes, long-horned beetles, grasshoppers, and Jerusalem crickets (Bat Conservation International 2009d; Bradley et al. 2006). There are no known occurrences of pallid bats within or near the Project area; however, the entire Project area lies within the range of the species. The pallid bat is likely to forage in the Project area.

Peregrine Falcon (*Falco peregrinus anatum*) – BLM: Wyoming, Colorado; USFS: Ashley, Manti-La Sal, and Uinta National Forests; State: Wyoming, Colorado

The peregrine falcon was listed as an endangered species in 1970 under the Endangered Species Conservation Act of 1969, but after a successful recovery due to restrictions on the use of organochlorine pesticides, the species was delisted in 1999 (FWS 1999b) (64 FR 46543). The peregrine falcon is a widely distributed bird, occurring from the tundra to the tropics in a variety of different terrestrial biomes. The species most commonly occupies cliff habitats with open landscapes for foraging in close proximity to water (coasts, lakes, rivers, etc.), but also occurs in artificial habitats such as towers, buildings, and urban settings (White et al. 2002). The species feeds on other birds and is known to breed, forage, and migrate throughout the Project area.

Pill Clams (combined account) – State: Wyoming

Pill clams are mollusks found in almost all Wyoming waters. These clams inhabit fine substrates in cold to warm water that ranges from flowing to stagnant and even temporary. They can be found at elevations from lowlands to over 9,600 feet (2,900 meters) (WGFD 2010a). There are no known occurrences of the species in the Project area; however, given the omnipresence of these clams in Wyoming, potentially suitable habitat is likely present in the Project area.

Pinyon Mouse (*Peromyscus truei*) – State: Wyoming

The pinyon mouse distribution ranges from central Oregon, east to eastern Colorado and the panhandle of Texas, and south to southern Mexico. The pinyon mouse is considered rare in Wyoming as it likely limited to suitable habitat along Flaming Gorge Reservoir and isolated mesas of southern Sweetwater County of the state. The species occurs in stands of juniper grasslands and shrub-steppe where vegetation is not dense, often nesting in hollow junipers or rock crevices on rocky slopes. A portion of the Project area lies in the predicted pinyon mouse range in southwestern Wyoming, northwestern Colorado, and northeastern Utah (WGFD 2010a). The species is likely to breed and forage in suitable habitat in the Project area.

Plain Pocketbook (*Lampsilis cardium*) – State: Wyoming

The plain pocketbook inhabits river drainages including the Mississippi River drainage, St. Lawrence River, and Great Lakes region in the United States (WGFD 2010a). The species is not found in the Project area, but inhabits the Platte River system that may be affected from drawdown of water from the Platte River watershed as a result of project-related water usage.

Plains Black-headed Snake (*Tantilla nigriceps*) – State: Wyoming

The Plains black-headed snake is found from southeastern Wyoming to central Durango, Mexico and from Arizona to east-central Texas. The species inhabits plains and desert grassland, shrubland, and woodlands where it feed on invertebrates (Stebbins 2003). There are no known occurrences of the Plains black-headed snake in the Project area and the species was only recently discovered in Wyoming (WGFD

2010a). Portions of the Project area cross the potential range of the species in Wyoming (WGFD 2010b). The Plains black-headed snake may occur in the Project area.

Plains Orangethroat Darter (*Etheostoma spectabile*) – State: Wyoming

The Plains orangethroat darter inhabits riverine systems from central Texas to southern Wisconsin and Michigan with a western extent to eastern Wyoming. The species is not found in the Project area, but inhabits the Platte River system that may be affected from drawdown of water from the Platte River watershed as a result of project-related water usage.

Plains Topminnow (*Fundulus sciadicus*) – State: Wyoming

The Plains topminnow inhabits river systems in Nebraska, South Dakota, and eastern Wyoming and Colorado (Rahel and Thel 2004). The species is not found in the Project area, but inhabits the Platte River system that may be affected from drawdown of water from the Platte River watershed as a result of project-related water usage.

Pond Snails (combined account) – State: Wyoming

Pond snails (genus *Stagnicola*) are air-breathing freshwater snails that are found throughout northern North America. These snails feed on algae, microbes, fungi, and detritus on surfaces such as logs macrophytes, rocks, and other substrates. Pond snails inhabit ponds or slow-moving streams (WGFD 2010a). There are no known occurrences of these species in the Project area; however, potentially suitable habitat may be present in the Project area.

Pygmy Nuthatch (*Sitta pygmaea*) – State: Wyoming

The pygmy nuthatch occurs in disjunct populations found throughout western North America. The pygmy nuthatch inhabits ponderosa and similar pine habitats, which results in the patchy distribution of these birds. The species primarily feeds on insects such as beetles, wasps, ants, true bugs, and caterpillars (Kingery and Ghalambor 2001). There are no known occurrences of pygmy nuthatch in the Project area; however, the Project area is within the known range of the species the pygmy nuthatch may be present where suitable habitat is located.

Pygmy Rabbit (*Brachylagus idahoensis*) – BLM: Wyoming, Utah; State: Wyoming, Utah

The pygmy rabbit is patchily distributed throughout the Great Basin and adjacent Intermountain areas including Utah, Wyoming, and Colorado. The species is restricted to areas having dense, tall stands of sagebrush and soil characteristics conducive to burrowing. The FWS has reviewed a petition to list the species range-wide, but found that listing of the pygmy rabbit was not warranted (75 FR 60516–60561). Pygmy rabbits are dependent on sagebrush, which composes up to 99 percent of its winter diet (WGFD 2010a). Because of this dependence, pygmy rabbits are susceptible to fragmentation and degradation of sagebrush habitats due to fire, agriculture, development, grazing, and other human land uses (UDWR 2011a). Transmission line alternative routes are located within the known range of the species and contain suitable habitat. In Wyoming, the species is likely to occur in the Project area in Carbon and Sweetwater counties. Pygmy rabbits have recently been identified in Moffat County in Colorado and may exist in sagebrush habitats crossed by the Project in other counties in the state as well as well (Estes-Zumpf and Rachlow 2009). Pygmy rabbits are not known to inhabit the Project area in Utah (Bosworth 2003).

Redhead (*Aythya americana*) – State: Wyoming

The redhead is found throughout most of the United States and Mexico as well as portions of Canada and Alaska. This duck inhabits almost any type of wetland from small, seasonal wetlands to larger semi-

permanent wetlands. Redheads feed on vegetative parts and tubers of submerged aquatic plants, muskgrass (*Chara* spp.), and aquatic invertebrates (Woodin and Michot 2002). The Project is in the species' range and redheads are likely to occur throughout the Project area where wetlands are present.

Ringed Crayfish (*Orconectes neglectus*) – State: Wyoming

The ringed crayfish inhabits river drainages from Nebraska to Oklahoma and Missouri to Wyoming (WGFD 2010a). The species is not found in the Project area, but inhabits the Platte River system that may be affected from drawdown of water from the Platte River watershed as a result of project-related water usage.

River Otter (*Lontra canadensis*) – State: Wyoming, Colorado

The river otter occurs throughout the United States and Canada. The species is primarily present in states bordering the Great Lakes, Atlantic Ocean and the Gulf of Mexico, and the forested regions of the Pacific coast in North America. Bog lakes with banked shores containing semi-aquatic mammal burrows and lakes with beaver lodges are typical river otter habitat. The otter usually avoids water systems with gradually sloping shorelines of sand or gravel, residing more commonly in lakes, streams, and aquatic areas in cottonwood riparian, riparian shrub, willow, and marsh-swamp land habitat. The river otter occurs in river systems crossed by or near the Project area including the Green, North Platte, Yampa, and Colorado river systems (Boyle 2006) The species appears to be recolonizing its former range in Wyoming (WGFD 2010a). River otter occurrences have also been noted near Flaming Gorge in the Project area.

Rocky Mountain Bighorn Sheep (*Ovis canadensis canadensis*) – USFS: Ashley and Uinta National Forests; State: Wyoming

The Rocky Mountain bighorn sheep distribution ranges from southwestern Canada, south through the Rocky Mountains, Sierra Nevada, and desert mountains of the southwestern United States to Baja California and the northwestern mainland of Mexico. A portion of the Project area lies in the range of the Rocky Mountain bighorn sheep in west central Wyoming (Beecham et al. 2007). The species is likely to breed and forage in suitable habitat in the Project area. Refer to Section 3.2.7.4 for more detailed information about Rocky Mountain bighorn sheep in the Project area.

Roundtail Chub (*Gila robusta*) – BLM: Wyoming, Colorado, Utah; State: Wyoming, Colorado, Utah

The roundtail chub is endemic to rivers and streams in the Colorado River drainage (Bosworth 2003). The species is threatened by fragmentation and loss of habitats and competition and predation by nonnative species. Roundtail chub currently occupy 45 percent of their historic range in the Colorado River Basin (WGFD 2010a). Current known distribution of the roundtail chub includes the Little Snake (Carbon County) and Green (Sweetwater County) River drainages in Wyoming (WGFD 2005a), the Little Snake and Green (Moffat County) and Colorado (Mesa County) River drainages in Colorado; and the Colorado River Drainage including the Colorado (Grand County), Green (Uintah, Emery, and Grand counties), and San Rafael (Emery County) rivers in Utah (UDWR 1998). Transmission line alternative routes are located in or cross the known range of the roundtail chub in Wyoming, Colorado, and Utah. The species is likely to be present in the Project area. One known occurrence is crossed by Link U400 where it crosses the White River.

Sage Sparrow (*Amphispiza belli*) – BLM: Wyoming; State: Wyoming

The sage sparrow prefers semi-open habitats with evenly spaced shrubs that are less than 6.5 feet high (Martin and Carlson 1998). The sage sparrow is typically considered big sagebrush (*Artemisia tridentata*)

obligate inhabiting pure stands as well as stands that are interspersed with bitterbrush, saltbush, shadscale, rabbitbrush, or greasewood. It is rarely found in mixed sagebrush-juniper (*Juniperus* spp.) except where it is adjacent to shrub-steppe habitat (Martin and Carlson 1998). Evidence suggests that sage sparrows abandon cheatgrass-dominated areas and areas where sagebrush has been removed (Martin and Carlson 1998). The sage sparrow is found throughout the Project area during the breeding season (Beason et al. 2008; Beason et al. 2005; Cerovski et al. 2004). The species is considered a common summer resident in Wyoming (WGFD 2010a). The species winters between central California, east to central New Mexico, and south to northwestern Mexico (WGFD 2010a). It is an uncommon permanent resident statewide and a common winter resident in southern Utah (Parrish et al. 2002). There are numerous known occurrences of the sage sparrow in the Project area in all three states and the species is known to breed and forage in the Project area.

Sage Thrasher (*Oreoscoptes montanus*) – BLM: Wyoming; State: Wyoming

The sage thrasher is a sagebrush obligate (Baker et al. 1976); however, the species is also noted to occur in black greasewood (*Sarcobatus vermiculatus*) and bitterbrush (*Purshia tridentata*) habitats (Reynolds et al. 1999). The sage thrasher is found throughout Wyoming, Colorado, and Utah in appropriate habitat during the breeding season (Cerovski et al. 2001). The species winters from central California, east to central Texas and south to central Mexico. The entire Project area lies in the breeding range of the species and suitable habitat is present. The species has been observed near transmission line alternative routes in Wyoming, particularly along Link W108. The sage thrasher is known to breed and forage in the Project area.

Short-eared Owl (*Asio flammeus*) – BLM: Utah; State: Wyoming, Utah

Short-eared owls can be found in all open environments in North America, especially in lowland areas where there is a higher density of low vegetation and rodents. They occur in native grasslands, extensive grassy areas of broad lowland floodplains, marshes and wet hummocks, and agricultural areas. The species also frequent areas intermixed with brush and woodland, provided there is ample open grassland to hunt. Short-eared owls tend to be found in the densest stands of grass (Glinski 1998b). They nest on the ground, sometimes in small colonies (Terres 1980). Short-eared owls eat mainly rodents, especially meadow mice, but also shrews, cotton rats, rabbits, pocket gophers, and bats. They also eat insects such as grasshoppers, June beetles, and cutworms in addition to small birds. The Project area is in the known range of these species and suitable breeding and foraging habitats are present. The short-eared owl is likely to breed and forage near transmission line alternative routes in Wyoming, Colorado, and Utah.

Smooth Greensnake (*Opheodrys vernalis*) – BLM: Utah; State: Wyoming, Utah

The smooth greensnake inhabits prairies, meadows, marshes, stream edges, and grassy upland areas. The species is rarely seen far from riparian areas (WGFD 2010a). In Utah, the smooth greensnake occurs in scattered localities in the mountains of central and eastern Utah (Bosworth 2003). The Project area is located in the known range of the smooth greensnake in Colorado, Utah, and Wyoming (Redder et al. 2006). Populations of the species in the Project area are geographically isolated from larger populations in the eastern United States (Redder et al. 2006). Suitable habitat for the smooth greensnake occurs in the Project area in Utah and Colorado and the species has been observed in the Red Narrows along Link U460 between the Uinta and Manti-La Sal National Forests. The smooth greensnake is known to occur in the Project area.

Snowy Egret (*Egretta thula*) – State: Wyoming

The snowy egret is primarily found along the coastal regions of the United States and throughout Mexico. However, there is an area of suitable breeding habitat found in northern Nevada and Utah into

southwestern Wyoming and a disjunct area in southeast Wyoming. In these interior areas, the species tends to inhabit willows along large rivers, reservoirs, grassy marshes, and wet meadows. The species primarily feeds on invertebrates, but will also feed on fish, frogs, toads, snakes, and lizards (Parsons and Master 2000). No known occurrences of snowy egret are located in the Project area; however, the species may be found breeding or foraging along waterways in the northern portion of the Project.

Southern Bonneville Springsnail (*Pyrgulopsis transversa*) – State: Utah

The southern Bonneville springsnail is a Utah endemic that is known to currently occur in six freshwater springs in central Utah, including four localities in Tooele County and one each in Utah County and Sanpete County. The species is found in aquatic habitats produced by springs in a wide elevation range from 5,830 to 6,740 feet (UDWR 2010a). One known Southern Bonneville springsnail population exists in the Project area in Thistle Creek along U.S. Highway 89 south of Thistle, Utah (Link U625).

Southern Leatherside Chub (*Lepidomeda aliciae*) – BLM: Utah; USFS: Manti-La Sal and Uinta National Forests; State: Utah

The southern leatherside chub in one of two taxa formerly known as leatherside chub that was recently split into two species based on genetic differences (Johnson et al. 2004). The southern leatherside chub is a small minnow native to streams and rivers of the southeastern portion of the Bonneville Basin. Observations of introduced leatherside chub populations have been found in the Strawberry, Green, and Freemont rivers in the Upper Colorado River Basin (UDWR 2010b). In Utah, the current known distribution includes Utah Lake and the Sevier River drainage (UDWR 2010b). Transmission line alternative routes are located in the known range of the southern leatherside chub in Utah and contain suitable habitat. The species is known to occur in the Project area.

Spotted Bat (*Euderma maculatum*) – BLM: Wyoming, Utah; USFS: Ashley, Manti-La Sal, and Uinta National Forests; State: Wyoming, Utah

The spotted bat roosts in crevices on cliff walls and forages in open grassland, desert shrub, sagebrush, and mountain meadow communities (Bosworth 2003). The habitat is patchy and depends on the availability of cliff roosting habitat. It does not appear to migrate, but hibernates locally during winters (Bradley et al. 2006). The spotted bat is widely distributed throughout the Project area. The Project area is located in the range of the species and contains suitable habitat; the spotted bat is likely to forage near transmission line alternative routes in Wyoming, Colorado, and Utah. All three national forests contain suitable habitat for the species.

Stonecat (*Noturus flavus*) – State: Colorado

The stonecat inhabits riverine systems throughout much of the northern United States from Montana and Wyoming east to Vermont (Florida Museum of Natural History 2012). The species is not found in the Project area, but inhabits the Platte River system that may be affected from drawdown of water from the Platte River watershed as a result of project-related water usage.

Suckermouth Minnow (*Phenacobius mirabilis*) – State: Wyoming, Colorado

The suckermouth minnow inhabits river drainages throughout the Mississippi River Basin from Ohio to Wyoming in isolated populations also present in the Gulf Coast drainage (WGFD 2010a). The species is not found in the Project area, but inhabits the Platte River system that may be affected from drawdown of water from the Platte River watershed as a result of project-related water usage.

Swainson's Hawk (*Buteo swainsoni*) – State: Wyoming

Swainson's hawk is widely distributed in the summer in the western United States. It is generally found in savannas, prairies, deserts, open pine-oak woodlands, and agricultural areas (Ehrlich et al. 1988). Grass-lined nests of large sticks and twigs are usually built in large trees, but may occasionally be located on cliffs (Ehrlich et al. 1988). Swainson's hawks feed on small mammals, snakes, lizards, and large insects (Ehrlich et al. 1988). At least one threat to the species is the shooting of birds perched along roadsides, but they are also susceptible to pesticides on their wintering grounds in Argentina (Ehrlich et al. 1992; Glinski and Hall 1998). The entire Project area lies in the breeding range for the species. There are two known nest sites near transmission line alternative routes in Utah. One is located in Grand Valley along Link U490 and the other is located between Mona and Nephi along Link U650. The Swainson's hawk is known to breed and forage in the Project area in Colorado, Utah, and Wyoming.

Three-toed Woodpecker (*Picoides dorsalis*) – BLM: Utah; USFS: Ashley, Manti-La Sal, and Uinta National Forests; State: Utah, Wyoming

The three-toed woodpecker inhabits boreal and montane coniferous forests, generally above 8,000 feet (2400 meters) in elevation (Parrish et al. 2002). Typical nesting trees include alpine fir, Engelmann spruce, blue spruce, and white fir; wintering habitat also includes aspen forest (UDWR 1998). Three-toed woodpeckers are closely associated with infestations of spruce beetles (*Dendroctonus rufipennis*) and other scolytid beetles. This food source is particularly abundant after fires because it attacks trees that have been weakened or killed. Following the increased food supply, three-toed woodpeckers can be common at burn sites (Murphy and Lehnausen 1998). The three-toed woodpecker nests in the trunks of coniferous and deciduous snags and trees and shows a preference for trees with heartrot (Leonard 2001). It is primarily a resident throughout its breeding range, but often migrates elevationally throughout the year. The species can be found in Wyoming, Colorado, and Utah; however, it is only present in the Project area in Wyoming and Utah. In Wyoming, the species is an uncommon year-round resident of coniferous forests (Cerovski et al. 2001). In Utah, the three-toed woodpecker is a permanent resident of the high-elevation plateaus in the south-central portion of the state, including Manti-La Sal National Forest (Bosworth 2003). The species is a management indicator species on the Uinta National Forest. Much of the Project area lies in the known range of the species and the American three-toed woodpecker is likely to breed and forage in the Project area. One known occurrence is crossed by Link U600 along Utah Highway 31 in Cottonwood Canyon east of Fairview.

Townsend's Big-eared Bat (*Corynorhinus townsendii*) – BLM: Wyoming, Colorado, Utah; USFS: Ashley, Manti-La Sal, and Uinta National Forests; State: Wyoming, Colorado, Utah

The Townsend's big-eared bat is a relatively common species that roosts in caves and abandoned mines and forages in sagebrush, pinyon-juniper, mountain shrub, and mixed conifer communities. It is highly associated with the availability of caves and mines. The Townsend's big-eared bat does not appear to migrate through much of its range, but hibernates locally during winters (Oliver 2000). It is widely distributed throughout the Project area. Transmission line alternative routes are located in the range of the species and contain suitable habitat. Townsend's big-eared bat is likely to forage in portions of the Project area in Wyoming, Colorado, and Utah.

Trumpeter Swan (*Cygnus buccinator*) – BLM: Wyoming; State: Wyoming

The trumpeter swan is the largest native North American waterfowl. Breeding habitat includes freshwater marshes, ponds, lakes, and occasionally rivers (Hansen et al. 1971). Nests are typically built in emergent vegetation, with surrounding water less than 36 inches deep, but are also found on muskrat structures or house islands with low human disturbance. Nests require approximately 330 feet of open water for takeoff and close proximity to large invertebrate populations. Most flocks of trumpeter swans are year-round

residents, only migrating short distances to ice-free waters (Mitchell 2010). The trumpeter swan is primarily found in western Canada and Alaska, but localized populations occur throughout the Intermountain and Rocky Mountain regions, including Wyoming. The Project area is in the known range of the trumpeter swan and potential habitat for the species occurs throughout the Project area. However, trumpeter swans are not known to occur in or in the vicinity of transmission line alternative routes. Transient trumpeter swans may occur in the Project area.

Vagrant Shrew (*Sorex vagrans*) –State: Wyoming

The vagrant shrew occurs from southern British Columbia and Alberta south to central Nevada with an isolated population in central Mexico. The species is considered rare in Wyoming because populations are limited in numbers due to dependence on vulnerable riparian habitat and ongoing loss of habitat. The vagrant shrew prefers areas with moist soil, leaf litter accumulation, and/or rotting logs in a variety of habitats including riparian shrub, meadow grassland, bog, and conifer forest. A portion of the Project area lies in the predicted vagrant shrew range in southwestern Wyoming (WGFD 2010a).

Virginia Rail (*Rallus limicola*) – State: Wyoming

The Virginia rail is found throughout much of the United States and northern Mexico, excluding the interior southeastern United States. The species breed primarily in freshwater wetlands, but may utilize salt marshes as well. Typically habitat contains shallow water with emergent cover and substrate with a high invertebrate abundance. Virginia rails' primarily feed on small invertebrates and a variety of aquatic plants and seeds of emergent plants (Conway 1995). There are no known occurrences of Virginia rail located in the Project area; however, the entire Project area is located in the known range of the species. The Virginia rail is likely to breed and forage in suitable wetland habitats in the Project area.

Western Red Bat (*Lasiurus blossevillii*) – BLM: Utah; State: Utah

The western red bat roosts in trees and foliage in low elevation, riparian cottonwood forests. The species is migratory and spends winters outside of the Project area. In Utah, historical records indicate the presence of the species in Washington County, but none have been observed since the 1950s, which is believed to correlate with the replacement of cottonwoods with tamarisk (*Tamarix* spp.). The western red bat is very rare in Utah, but is known to occur in Washington, Carbon, and Utah counties (Bosworth 2003). Some transmission line alternative routes are located in the summer range of the species in Utah and contain suitable habitat. The western red bat is very rare, but could potentially forage near transmission line alternative routes in Utah.

Western Scrub Jay (*Aphelocoma californica*) – State: Wyoming

The western scrub jay is found throughout the Intermountain west, much of California, and parts of Mexico and Texas. As its name implies, the western scrub jay inhabits scrub habitat such as oak, pinyon-juniper, brush, and chaparral as well as orchards and riparian woodland. Western scrub jays are omnivorous feeding on a mix of arthropods, fruit, and seeds depending on the time of year (Curry et al. 2002). The Project area is in the known range of the Western scrub jay and the species is likely to breed and forage in suitable habitats in the Project area.

Western Small-footed Myotis (*Myotis ciliolabrum*) – State: Wyoming

The western small-footed myotis uses a variety of habitats, from desert scrub, grassland, and sagebrush, to pinyon-juniper woodland, pine-fir forests, and urban and agricultural areas. The species hibernates during the colder months, either individually or in colonies. As with many other bats, the western small-footed myotis roosts in caves, mines, and trees. It forages in open areas, searching for small moths, flies,

ants, and beetles (Bradley et al. 2006). The range of the western small-footed myotis extends from western Canada, through the western United States, and into central Mexico (Bat Conservation International 2009e). There are no known occurrences of western small-footed myotis in or near the Project area; however, the entire Project lies in the range of the species. Western small-footed myotis are likely to forage near transmission line alternative routes.

Western Snowy Plover (*Charadrius alexandrinus nivosus*) – BLM: Colorado, Utah; State: Colorado

Inland western snowy plovers breed on flat, unbroken, barren to sparsely vegetated ground at alkaline/saline lakes, reservoirs, and ponds; riverine sand bars; and occasionally at man-made structures such as sewage plants, salt-evaporators, and agricultural waste-water ponds. The species winters along the Pacific coast and Gulf of California (Page et al. 1995). Nests are generally located near a conspicuous feature (Page et al. 1985), kelp, driftwood, clam shell, cow dropping, or tumbleweed on a barren landscape. Nests are simple scraped depressions on dry ground and lined with small debris located (Page et al. 1995) within 500 feet of water (Beidleman 2000). Though the snowy plover is present in Wyoming, Colorado, and Utah, in the Project area, the species is only documented from the Flaming Gorge area of Wyoming. There is suitable habitat available throughout the Utah portion of the Project area and migrants may occasionally pass through transmission line alternative routes.

Western Spiny Softshell (*Apalone spinifera hartwegi*) – State: Wyoming

The western spiny softshell is a subspecies of the spiny softshell turtles that are found throughout much of the eastern and central United States. This subspecies is found west of the Mississippi River to Montana and south to Oklahoma. Spiny softshell turtle inhabit rivers with quiet water and a bottom of mud, sand, or gravel. They can also be found in ponds, canals, and irrigation ditches with permanent water (Stebbins 2003). There are no known occurrences of the western spiny softshell in the Project area; however, the extreme northeastern end of the Project area lies in the predicted range of the species according to the Wyoming State Wildlife Action Plan (WGFD 2010a). The Western spiny softshell may occur in the Project area in suitable aquatic habitats in Carbon County, Wyoming.

White-faced Ibis (*Plegadis chihi*) – BLM: Wyoming, Colorado; State: Wyoming

Great Basin populations of white-faced ibis typically nest in stands of hardstem bulrush (*Scirpus acutus*), Olney's bulrush (*S. olneyi*), and alkali bulrush (*S. paludosus*). Colorado populations are found in cattail and giant burreed (*Sparganium eurycarpum*). Foraging areas include adjacent flooded wetlands with short emergent plants (sedges, spikerushes, saltgrass, and greasewood) (Ryder and Manry 1994). The white-faced ibis has also been observed feeding in nearby irrigated crops, particularly alfalfa, in the Great Basin Valley (Bray and Klebenow 1988). The white-faced ibis winters in the southern United States into Central and South America (UDWR 2000). In Wyoming, Colorado, and Utah, the species is locally distributed and moves frequently in response drought and rain. Utah's Great Salt Lake is believed to be the largest breeding colony in the world. In the Project area, breeding has been confirmed in Carbon County, Wyoming (Cerovski et al. 2004); important areas in Colorado during migration include Browns Park National Wildlife Refuge (Little Snake BLM Field Office) and Six and Fifty Reservoir near Mack (BLM Grand Junction Field Office) and potential habitat is present throughout Utah (UDWR 2000). White-faced ibis may occur in the Project area as incidental migrants, but are not likely to breed in the Project area.

White-tailed Prairie Dog (*Cynomys leucurus*) – BLM: Wyoming, Colorado, Utah; State: Utah

The white-tailed prairie dog occurs from south central Montana south to northeastern Utah and western Colorado in arid grasslands and shrub/grassland habitats with less than 12 to 15 percent slopes. The

species is found in intermountain valleys, benches, and plateaus with diverse grass and forb cover (WGFD 2005b). White-tailed prairie dog populations are highly dynamic; however, abundance has greatly decreased since information has been recorded, likely due to changes in wildfire frequency, resource extraction, grazing, disease, predation, and fluctuation in availability of forage (Keinath 2004). Large complexes of white-tailed prairie dogs in Wyoming and northwest Colorado account for between 50 and 75 percent of all white-tailed prairie dogs (Keinath 2004). A large portion of the Project area east of the Wasatch Mountains is located in the range of the species. Numerous prairie dog colonies are located near transmission line alternative routes throughout Utah, Wyoming, and Colorado.

Willow Flycatcher (*Empidonax traillii*) – State: Wyoming

Willow flycatchers breed throughout much of the northern and southwestern United States. There are four or five subspecies that are generally accepted. The southwestern willow flycatcher (*Empidonax traillii extimus*) is discussed in Section E.6.2.1 as it is listed as endangered under the ESA. Willow flycatchers inhabit moist, shrubby areas typically with standing or running water. They primarily feed on insects through aerial capture by hawking or hover-gleaning (Sedgwick 2000). The majority of the Project area lies in the breeding range of the willow flycatcher; however, no known occurrences are located in the Project area. The willow flycatcher may breed and forage in suitable habitats in the Project area.

Wood Frog (*Rana sylvatica*) – State: Wyoming, Colorado

Wood frogs are found from Alaska to Nova Scotia and as far south as Georgia and Alabama, but inhabit very little of the western United States. Disjunct populations are found in southern Wyoming in the Medicine Bow Mountains (Carbon and Albany counties) and in the Bighorn Mountains in northern Wyoming west of Sheridan. Wood frogs inhabit damp and shady woods and forests near clear streams and leafy pools. In colder climates, they may inhabit ponds in open grassy areas bordered by thickets of willow and aspen (Stebbins 2003). There are no known occurrences in the Project area; however, the Project area (Link W18) skirts the edge of the predicted range of the population in the Medicine Bow Mountains in Wyoming (WGFD 2010a). The wood frog may occur in suitable habitats in the Project area.

Wyoming Pocket Gopher (*Thomomys clusius*) – BLM: Wyoming; State: Wyoming

The Wyoming pocket gopher is primarily solitary, with limited distribution. Abundance and population trends of Wyoming pocket gopher populations are unknown due to limited data. Little is known about the Wyoming pocket gopher, but habitat appears to be dry, gravelly, shallow-soil ridge tops in greasewood communities. The species has been found on edges of eroding washes. Wyoming pocket gopher typically occurs on sites with 50 to 80 percent bare ground, little to no grass or litter cover, and where Wyoming big sagebrush is absent (WGFD 2010a). It is highly fossorial, living in underground burrow systems and tunnels (Keinath and Beauvais 2006). It is the only mammal that occurs exclusively in Wyoming where it is known from southeastern Sweetwater County and southwestern Carbon County (WGFD 2010a). Population integrity is directly linked to habitat quality, and local populations are potentially sensitive to habitat disturbance. Diet includes roots, tubers and surface vegetation, and the species is active throughout the year. Pocket gophers are ecologically important as prey items and influence soils, microtopography, habitat heterogeneity, and plant species diversity (NatureServe 2012). Transmission line alternative routes are located in the known range of the Wyoming pocket gopher and contain suitable habitat in Sweetwater and Carbon counties, Wyoming. The Wyoming pocket gopher is likely to occur near transmission line alternative routes.

E.6.2.3 U.S. Forest Service Management Indicator Species

This section includes species accounts for USFS MIS that are not USFS sensitive or assigned another status by federal agencies or states and were carried forward for detailed analysis. Species accounts for

USFS MIS that are also USFS sensitive species or assigned another status by federal agencies or states are included in Sections E.6.2.1 and E.6.2.2.

American Beaver (*Castor canadensis*) – USFS: Uinta National Forest

The American beaver's distribution extends throughout North America except the arctic tundra, peninsular Florida, and much of the desert area of the Southwest, including parts of the northern edge of Mexico. Beavers inhabit permanent water sources and prefer low gradient streams, ponds, and small mud-bottomed lakes with damnable outlets. They occur in artificial ponds, reservoirs, and canals where food is available. Deciduous tree and shrub communities are typical habitats for the American beaver (Anderson 2002). Given the wide distribution of American beaver they are likely to occur in the Project area.

Elk (*Cervus elaphus*) – USFS: Ashley and Manti-La Sal National Forests

Elk were historically widespread in Canada and the United States, now they are mostly restricted to the western states. Elk habitat use varies according to location, as they use areas such as alpine pastures, marshy meadows, river flats, and aspen parkland, as well as coniferous forests, brushy clear cuts or forest edges, and semi-desert. In mountainous regions, elk spend summers in alpine meadows and winters in valleys. On more level terrain, elk seek wooded hillsides in summers and open grasslands in winters (Senseman 2002). Refer to Section 3.2.7.4 for more detailed information about elk in the Project area.

Golden Eagle (*Aquila chrysaetos*) – USFS: Ashley and Manti-La Sal National Forests

Golden eagles are widely distributed in the western United States and can be found in a variety of habitats. For hunting, the species prefers open ground or low hills where visibility is good (Ehrlich et al. 1988; Glinski 1998a). Golden eagles nest most commonly on cliffs, but are also known to nest in trees and manmade structures such as telephone poles (Glinski 1998a). Nests from previous years are frequently reused. The species form strong pair bonds, frequently remaining with the same mate for several years, if not life. The golden eagle feeds primarily on mammals, but also will feed on snakes, birds, and large insects when mammals are unavailable (Ehrlich et al. 1988; Glinski 1998a; Terres 1980). The golden eagle is a year round resident of the Project area and there are numerous known occurrences including nest sites near transmission line alternative routes.

Lincoln's Sparrow (*Melospiza lincolnii*) – USFS: Ashley National Forest

The Lincoln's sparrow is relatively common in the western United States with a breeding range from western and central Alaska across Canada through northern Saskatchewan to Labrador, south to southern California, southwestern United States, southern Alberta, central Saskatchewan, central Michigan, New England, and Nova Scotia. A non-breeding range exists in the southern United States and move south regularly to Honduras, to central Panama; and the West Indies. Terrestrial habitats of the Lincoln's sparrow include herbaceous grassland, old field, chaparral/shrubland, and conifer woodland. Bogs, wet meadows, riparian thickets, shrubby forest edge, marshes, brushy fields and jack plain barrens are all suitable habitats mostly in northern and montane areas. Lincoln's sparrow nests are found on the ground in areas with concealing vegetation or in low shrubs (NatureServe 2011). Due to the wide distribution of the Lincoln's sparrow, it is likely to occur in the Project area.

Macroinvertebrates (aquatic) – USFS: Ashley and Manti-La Sal National Forests

The term macroinvertebrates encompasses a wide variety of benthic organisms. The group includes aquatic insects such as mayflies, caddis flies, daphnia, cyclops, and stoneflies), mollusks, and worms (Smith 2008). These species serve a food for much of the vertebrate life inhabiting the rivers and lakes of the national forests. Aquatic macroinvertebrates are considered a MIS for both the Ashley and Manti-La

Sal National Forests. Macroinvertebrates inhabit all waterways that may be crossed transmission line alternative routes.

Mule Deer (*Odocoileus hemionus*) – USFS: Ashley and Manti-La Sal National Forests

Mule deer occur across most of North America west of the 100 meridian from 23 to 60 degrees north. Mule deer occupy a variety of habitat types in mountains and lowlands, including forests, woodlands, forest edges, shrublands, grasslands with shrubs, and residential areas. Regions with successional vegetation, near agricultural lands are preferred habitat. In winter, mule deer can be found on warmer slopes and areas with minimal snow accumulation (Andersen and Wallmo 1984). Refer to Section 3.2.7.4 for more detailed information about mule deer in the Project area.

Red-naped Sapsucker (*Sphyrapicus nuchalis*) – USFS: Ashley National Forest

As with other sapsuckers, the red-naped sapsucker drills parallel rows of holes (sap wells) into the phloem and xylem of conifers and quaking aspens (*Populus tremuloides*) (Walters et al. 2002). This small woodpecker is a keystone forest species: its abandoned nest holes are used by mountain bluebirds (*Sialia currucoides*), northern saw-whet owls (*Aegoliusacadicus*), and northern flying squirrels (*Glaucomys sabrinus*). A variety of insects and other bird species use its sap wells, either for the sap itself or to feed on the insects drawn to the sap (Floyd et al. 2007; Walters et al. 2002). The rufous hummingbird (*Selasphorus rufus*) is closely associated with the red-naped sapsucker, often nesting near the woodpecker's sap wells, a ready food source (Floyd et al. 2007). The red-naped sapsucker is a MIS for Ashley National Forest. No occurrences of the species are known in or in the vicinity of the Project area.

Song Sparrow (*Melospiza melodia*) – USFS: Ashley National Forest

The song sparrow has a vast breeding range extending throughout North America. Terrestrial habitats of the song sparrow include grassland, old field, shrubland, suburban and orchard, and woodlands; brushy, shrubby, and deep grassy areas along water systems and seacoasts; and marshes (cattail, bulrush, and salt) and are mostly in the northern and eastern portions of the song sparrow's range. Forest edge, bogs, brushy clearings, thickets, hedgerows, and gardens are all typical habitat type (Arcese et al. 2002). The song sparrow is likely to occur along waterways in the Project area.

Warbling Vireo (*Vireo gilvus*) – USFS: Ashley National Forest

The warbling vireo's distribution range extends from British Columbia across the vast majority of the United States excluding Georgia, Florida, and South Carolina, wintering from northern Mexico to Nicaragua. Terrestrial habitat of the warbling vireo includes hardwood forest, mixed forest, savanna, suburban and orchard areas, hardwood woodland, and mixed woodland. During migration periods, open deciduous and mixed deciduous-coniferous woodland, riparian forest and thickets, pine-oak association, orchards, and parks are suitable warbling vireo habitat. In winter, a wide variety of forest, woodland and scrub habitats are utilized (Gardali and Ballard 2000). Given the wide and diverse habitat distribution of the warbling vireo, it is likely to occur in the Project area.

E.7 Seasonal Restrictions for Special Status Plants

Seasonal restrictions to protect special status plants and their pollinators are not typically identified in BLM RMPs or USFS LRMPs. However, the FWS Draft Energy Development Management Guidelines for *Sclerocactus wetlandicus* and *Sclerocactus brevispinus* Core Conservation Areas identifies the following seasonal restriction recommendation in Level 1 *Sclerocactus* Core Conservation Areas:

- Ground-disturbing activities would occur outside of the flowering season, typically late April to mid-May, in *Sclerocactus* core habitat, as defined by the FWS, to avoid adverse impacts on *Sclerocactus* reproductive success related to fugitive dust and pollinator disturbance.

Any seasonal restrictions intended to reduce potential effects on plant species listed under the ESA would be consistent with the conservation measures developed during Section 7 consultation between BLM and FWS.

E.8 Seasonal Restrictions for Wildlife

Seasonal restrictions to protect wildlife are identified in BLM RMPs, USFS LRMPs, state wildlife management plans, and in agency guidelines relevant to the Project area and are described in Selective Mitigation Measure 12 (Section 3.2.7.4.3). Table E-11 summarizes relevant seasonal wildlife restrictions from applicable plans, sometimes with overlapping jurisdiction, by combining the earliest and latest dates identified for each species by applicable agency plans in each state. These dates represent the maximum length that restrictions would be necessary to provide adequate protections to wildlife during sensitive periods and comply with applicable plans and management recommendations. Seasonal restrictions for nesting raptors (Tables E-12 to E-14) were adopted from statewide plans and BLM RMPs. Seasonal restrictions and survey requirements for migratory birds are described in Design Feature 6 and Design Feature 7 (Section 3.2.8.4).

TABLE E-11 SEASONAL RESTRICTIONS IN SENSITIVE HABITATS				
Agency	**Applicable Plan**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
Soils				
Bureau of Land Management (BLM)	Moab Field Office Resource Management Plan (RMP)	For slopes greater than 30 percent in the Bookcliffs	BLM approved ground-disturbing activities are not allowed from November 1 to April 30. This restriction includes heavy equipment traffic on existing roads associated with drilling operations.	**Exception**: An exception could be granted if the operator can provide a plan of development demonstrating that the proposed action would be properly designed and constructed to support the anticipated types and levels of use. Roads must be designed to meet BLM road standards for drainage control and surfaced to support heavy equipment and tractor trailers. Adjustments to the timing restriction could be considered by the Field Manager on a case-by-case basis, depending on current soil and weather conditions. **Modification**: None **Waiver**: None
BLM	Moab Field Office RMP	Saline soils in the Mancos Shale	No ground-disturbing activities are allowed during the period from December 1 to May 31. This restriction includes heavy equipment traffic on existing roads associated with drilling operations.	**Exception**: An exception could be granted if the operator can provide a plan of development demonstrating that the proposed action would be properly designed and constructed to support the anticipated types and levels of use. Roads must be designed to meet BLM road standards for drainage control and surfaced to support heavy equipment and tractor trailers. Adjustments to the timing restriction could be considered by the Field Manager on a case-by-case basis, depending on current soil and weather conditions. **Modification**: None **Waiver**: None
Special Status Plants				
Jones' Cycladenia				
BLM	Moab Field Office RMP	Within 300 feet of plants and suitable habitat	Preclude construction activities from May 15 through June 30 in occupied habitat.	None

TABLE E-11 SEASONAL RESTRICTIONS IN SENSITIVE HABITATS				
Agency	**Applicable Plan**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
Special Status Wildlife				
Colorado River Fishes				
BLM	Little Snake Field Office RMP	All new pipelines and other controlled surface uses crossing any critical or occupied habitat of the Colorado River fishes	No work in the active river channel will take place between July 1 and September 30 to prevent adverse effects from sedimentation during spawning; also, no work will take place when larval fishes are drifting in the river channel.	None
Columbian Sharp-tailed Grouse				
BLM	Rawlins Field Office RMP	Within 0.25 mile of perimeter of occupied Colombian sharp-tailed grouse leks	Disruptive activities are prohibited between 6:00 p.m. and 9:00 a.m. from March 1 to May 20	Exception, waiver, or modification of this limitation in any year may be approved in writing, including documented supporting analysis, by the Authorized Officer.
BLM	Rawlins Field Office RMP	In suitable sharp-tailed grouse nesting and early brood rearing habitat, and within 1 mile of the perimeter of a sharp-tailed grouse lek, or in identified sharp-tailed grouse nesting and early brood rearing habitat	Avoid ground-disturbing and disruptive activities, geophysical surveys, and organized recreational activities (events) that require a special use permit from March 1 to July 15.	Exception, waiver, or modification of this limitation in any year may be approved in writing, including documented supporting analysis, by the Authorized Officer.
BLM	Rawlins Field Office RMP	Delineated sharp-tailed grouse winter concentration areas	Ground-disturbing and disruptive activities are prohibited during the period of November 15 to March 14 for the protection of sharp-tailed grouse winter concentration areas.	Exception, waiver, or modification of this limitation in any year may be approved in writing, including documented supporting analysis, by the Authorized Officer.
BLM	Little Snake Field Office RMP	Within a 0.25 mile radius of a lek site, in mapped Colorado Parks and Wildlife habitat	Nesting habitat will be closed to ground-disturbing activities from March 1 to June 30. Crucial winter habitat will be closed from December 16 to March 15.	Exceptions will be granted according to criteria established in Appendix B of the RMP.

TABLE E-11 SEASONAL RESTRICTIONS IN SENSITIVE HABITATS				
Agency	**Applicable Plan**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
Sage-grouse				
BLM	Instruction Memorandum No. WY-2012-019	Sage-grouse nesting/early brood-rearing habitat in core areas	Surface disturbing and/or disruptive activities are prohibited from March 15 to June 30 to protect sage-grouse nesting and early brood rearing habitat. Apply this restriction to all nesting and early brood-rearing habitats inside core areas regardless of distance from the lek. Where credible data support different timeframes for this seasonal restriction, dates may be expanded by up to 14 days prior to or subsequent to the above dates.	Exceptions to lease stipulations, conditions of approval, and terms and conditions, etc. will continue to be considered on a case-by-case basis consistent with approved RMPs and other BLM policy and regulations as they relate to exceptions.
BLM	Instruction Memorandum No. WY-2012-019	Sage-grouse nesting/early brood-rearing habitat in connectivity areas	Surface disturbing and/or disruptive activities are prohibited from March 15 to June 30 to protect nesting and early brood-rearing habitats within 4 miles of the lek or lek perimeter of any occupied sage-grouse lek in identified connectivity areas. Where credible data support different timeframes for this seasonal restriction, dates may be expanded by up to 14 days prior to or subsequent to the above dates.	Exceptions to lease stipulations, conditions of approval, and terms and conditions, etc. will continue to be considered on a case-by-case basis consistent with approved RMPs and other BLM policy and regulations as they relate to exceptions.
BLM	Instruction Memorandum No. WY-2012-019	Sage-grouse nesting/early brood-rearing habitat outside core or connectivity areas	Surface disturbing and/or disruptive activities are prohibited from March 15 to June 30 to protect sage-grouse nesting and early brood rearing habitats within 2 miles of the lek or lek perimeter of any occupied lek located outside core or connectivity areas. Where credible data support different timeframes for this seasonal restriction, dates may be expanded by up to 14 days prior to or subsequent to the above dates.	Exceptions to lease stipulations, conditions of approval, and terms and conditions, etc. will continue to be considered on a case-by-case basis consistent with approved RMPs and other BLM policy and regulations as they relate to exceptions.
BLM	Instruction Memorandum No. WY-2012-019	Sage-grouse late brood-rearing and winter concentration areas	Surface disturbing and/or disruptive activities in sage-grouse winter concentration areas are prohibited from December 1 to March 14 to protect core	Exceptions to lease stipulations, conditions of approval, and terms and conditions, etc. will continue to be considered on a case-by-case basis consistent with approved RMPs and other

TABLE E-11 SEASONAL RESTRICTIONS IN SENSITIVE HABITATS				
Agency	**Applicable Plan**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
			populations of sage-grouse that use these winter concentration habitats. While the bulk of winter and late brood rearing habitat necessary to support core area populations is available in core population areas, it may be necessary to protect additional areas of winter concentration that are not located in the current core area boundaries. Appropriate seasonal timing restrictions and habitat protection measures must be considered and evaluated where winter concentration areas or important late brood-rearing areas are identified as supporting populations of greater sage-grouse that attend leks in core.	BLM policy and regulations as they relate to exceptions.
State of Wyoming	Executive Order for Greater Sage-grouse in Wyoming, 2011	Outside of the 0.6 mile perimeter of a lek in core areas where breeding, nesting and early brood-rearing habitat is present; unsuitable habitat; winter concentration areas	Activity (Note: production and maintenance activity exempted) will be allowed from July to March 14 outside of the 0.6 mile perimeter of a lek in core areas where breeding, nesting and early brood-rearing habitat is present. In areas used solely as winter concentration areas, exploration and development activity will be allowed March 14 to December 1. Activities in unsuitable habitat may also be approved year-round (including March 15 to June 30) on a case-by-case basis (except in specific areas where credible data shows calendar deviation). Activities may be allowed during seasonal closure periods as determined on a case-by-case basis. While the bulk of winter habitat necessary to support core sage-grouse populations likely	None

TABLE E-11 SEASONAL RESTRICTIONS IN SENSITIVE HABITATS				
Agency	**Applicable Plan**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
			occurs inside Core Population Areas, seasonal stipulations (December 1 to March 14) should be considered in locations outside Core Population Areas where they have been identified as winter concentration areas necessary for supporting biologically significant numbers of sage-grouse nesting in Core Population Areas. All efforts should he made to minimize disturbance to mature sagebrush cover in identified winter concentration areas.	
State of Wyoming	Executive Order for Greater Sage-grouse in Wyoming, 2011	Outside 0.6 miles of the perimeter of occupied sage-grouse leks	New noise levels, at the perimeter of a lek, should not exceed 10 decibels above ambient noise (existing activity included) from 6:00 p.m. to 5:00 am. During the initiation of breeding (March 1 to May 15). Ambient noise levels should be determined by measurements taken at the perimeter of a lek at sunrise.	**Exceptions**: Any exceptions to these general or specific stipulations will be considered on a case by case basis and must show that the exception will not cause declines in sage-grouse populations.
State of Wyoming	Executive Order for Greater Sage-grouse in Wyoming, 2011	Within 4 miles of an occupied lek; unsuitable habitat.	Vegetation removal should be limited to the minimum disturbance required by the project. All topsoil stripping and vegetation removal in suitable habitat will occur between July 1 and March 14 in areas that are within 4 miles of an occupied lek. Initial disturbance in unsuitable habitat between March 15 and June 30 may be approved on a case-by-case basis.	**Exceptions**: Any exceptions to these general or specific stipulations will be considered on a case by case basis and must show that the exception will not cause declines in sage-grouse populations.
Colorado Division of Wildlife	Colorado Greater Sage-grouse Conservation Plan	Breeding habitat; summer-fall habitat; winter habitat	Avoid activities in breeding habitat (March-July), lek habitat (March to mid-May), nesting habitat (April to June), early brood-rearing habitat (mid-May- July), summer-fall habitat (July to September), and winter habitat (October to February)	None
Colorado Division of Wildlife	Colorado Greater Sage-grouse Conservation Plan	Lek habitat	Any activities associated with anthropogenic features, or any other bird-disturbing activities, should be limited between sunset and 2 hours after sunrise.	None

TABLE E-11 SEASONAL RESTRICTIONS IN SENSITIVE HABITATS				
Agency	**Applicable Plan**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
Colorado Division of Wildlife	Conservation Plan for Greater Sage-grouse in Utah, 2013	Sage-grouse lek	Employ seasonal disturbance stipulations as follows: ▪ Implement time-of-day stipulations during the season when the lek is occupied (e.g., no activity from 2 hours before sunrise to 2 hours after sunrise). ▪ Avoid activities (i.e., construction, vehicle noise, etc.) that will disturb lek attendance or breeding from February 15 to May 15. The local Division of Wildlife Resources biologist should be consulted for time and distance determinations based on site-specific conditions.	None
Colorado Division of Wildlife	Conservation Plan for Greater Sage-grouse in Utah, 2013	Nesting and brood-rearing area	Avoid activities (i.e., construction, vehicle noise, etc.) that will disturb nesting or brood-rearing from April 1 to August 15. The local Division of Wildlife Resources biologist should be consulted for time and distance determinations based on site-specific conditions.	None
Colorado Division of Wildlife	Conservation Plan for Greater Sage-grouse in Utah, 2013	Winter habitat	Avoid activities (i.e., construction, vehicle noise, etc.) that will disturb wintering sage-grouse from November 15 to March 15. The local Division of Wildlife Resources biologist should be consulted for time and distance determinations based on site-specific conditions.	None
BLM	Rawlins Field Office RMP	Within 0.25 mile of perimeter of occupied sage-grouse leks	Disruptive activities are prohibited between 6 p.m. and 9 a.m. from March 1 to May 20	Exception, waiver, or modification of this limitation in any year may be approved in writing, including documented supporting analysis, by the Authorized Officer.
BLM	Rawlins Field Office RMP	In suitable greater sage-grouse nesting and early brood rearing habitat within 2 miles of the perimeter of an	Avoid ground-disturbing and disruptive activities, geophysical surveys, and organized recreational activities (events) that require a special use permit from March 1 to July 15.	Exception, waiver, or modification of this limitation in any year may be approved in writing, including documented supporting analysis, by the Authorized Officer.

TABLE E-11 SEASONAL RESTRICTIONS IN SENSITIVE HABITATS				
Agency	**Applicable Plan**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
		occupied greater sage-grouse lek, or in identified greater sage-grouse nesting and early brood rearing habitat		
BLM	Rawlins Field Office RMP	Delineated greater sage-grouse winter concentration areas	Ground-disturbing and disruptive activities are prohibited during the period of November 15 to March 14 for the protection of greater sage-grouse winter concentration areas.	None
BLM	Little Snake Field Office RMP	Within a 4 mile radius of the perimeter of a lek	Avoidance areas for ground-disturbing activities between March 1 and June 30. The actual area to be avoided will be determined on a case-by-case basis, depending on applicable scientific research and site-specific analysis and in coordination with commodity users and other appropriate entities. The use of the following best management practices from the RMP will be encouraged for all ground-disturbing activities, and BLM may require implementation of some of these best management practices. Use of these best management practices becomes even more important once a disturbance affects 10 percent of the nesting habitat within a 4 mile radius of an active lek. As new best management practices are developed, they may be added to this list of best management practices or may replace some of those now listed. ▪ Habitat Reclamation: • Use early and effective reclamation techniques, including interim reclamation, to allow sage-grouse habitat to be	None

TABLE E-11 SEASONAL RESTRICTIONS IN SENSITIVE HABITATS				
Agency	**Applicable Plan**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
			reestablished as soon as possible. This may require multiple reclamation efforts. • Use reclamation seed mixes, consisting of native bunchgrasses, forbs, and subspecies of big sagebrush, that are appropriate for the disturbed site and its potential.	
BLM	Little Snake Field Office RMP	Near active sage-grouse leks	Limit non-ground-disturbing activities during the breeding season, March 1 to May 1, to portions of the day after 9 a.m. and before 4 p.m.	None
BLM	Little Snake Field Office RMP	Crucial winter habitat	Closed from December 16 to March 15	None
BLM	White River Field Office RMP	Sage-grouse nesting habitat; within 2 miles of identified leks	This area encompasses suitable sage grouse nesting habitat associated with Nest Habitat individual leks. This stipulation will not take effect until direct and indirect impacts on suitable nesting cover exceeds 10 percent of the habitat available within 2 miles of identified leks. Further development, after this threshold has been exceeded, will not be allowed from April 15 through July 7. (Note: Development can occur until 10 percent of the habitat associated with a lek is affected, from then on, additional activity can occur from July 8 through April 14).	**Exception:** The Area Manager may grant an exception if an environmental analysis and consultation with the Colorado Division of Wildlife (CDOW) indicates that the proposed action could be conditioned so as not to affect nest attendance, egg/chick survival, or nesting success. An exception could also be granted if the Applicant, BLM, and CDOW negotiate compensation that would satisfactorily offset the anticipated losses of nesting habitat or nesting activities. Actions designed to enhance the long-term utility or availability of suitable nest habitat may be excepted. **Modification**: The Area Manager may modify the size of the timing limitation area if an environmental analysis indicates that the proposed action could be conditioned so as not to affect nest attendance, egg/chick survival, or nesting success. Timeframes may be modified if operations could be conditioned to allow a minimum of 70 percent of nesting attempts to progress through hatch. **Waiver**: This stipulation may be waived if

TABLE E-11 SEASONAL RESTRICTIONS IN SENSITIVE HABITATS				
Agency	**Applicable Plan**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
				CDOW determines that the described lands are incapable of serving the long term requirements of sage grouse nesting habitat and that these ranges no longer warrant consideration as components of sage grouse nesting habitat.
BLM	White River Field Office RMP	Sage Grouse Crucial Winter Habitat	This area encompasses sagebrush habitats that are occupied by wintering concentrations of grouse, or represent the only habitats that remain available for use during periods of heavy snowpack. No development activity will be allowed between December 16 and March 1. The CDOW has indicated that these features exist on public lands in the White River Resource Area but have not yet delineated specific areas that will be subject to this timing restriction.	Exception, modification, and waiver language will be developed in cooperation with the CDOW after the affected areas have been delineated.
BLM	Vernal Field Office RMP	Within 2 miles of active sage-grouse leks	No ground-disturbing activities will be allowed from March 1 through June 15.	None
BLM	Moab Field Office RMP	Within 2.0 miles of a lek	Allow no ground-disturbing activities in occupied nesting and brood rearing habitat from March 15 to July 15	**Exception**: An exception may be granted by the Field Manager if the operator submits a plan that demonstrates that impacts from the proposed action can be adequately mitigated or it is determined the brooding/nesting habitat is not active. **Modification**: The Field Manager may modify the boundaries of the stipulation area if (1) portions of the area do not include brooding/nesting habitat, or (2) the brooding/nesting habitat has been completely abandoned or destroyed, or (3) occupied brooding/nesting habitat occurs outside the current defined area; as determined by the BLM. **Waiver**: A waiver may be granted if there is no

TABLE E-11 SEASONAL RESTRICTIONS IN SENSITIVE HABITATS				
Agency	**Applicable Plan**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
				active brooding/nesting habitat in the leasehold and it is determined the habitat has been completely abandoned or destroyed or occurs outside the current defined area, as determined by the BLM.
BLM	Moab Field Office RMP	Within occupied winter habitat	Allow no ground-disturbing activities in occupied winter habitat from November 15 to March 14.	**Exception**: An exception may be granted by the Field Manager if the operator submits a plan that demonstrates that impacts from the proposed action can be adequately mitigated or it is determined the habitat is not occupied during the winter season. **Modification**: The Field Manager may modify the boundaries of the stipulation area if: ▪ portions of the area do not include winter habitat, or ▪ the brooding/nesting habitat has been completely abandoned or destroyed, or ▪ occupied winter activity occurs outside the current defined area; as determined by the BLM. **Waiver**: A waiver may be granted if the winter habitat in the leasehold has been completely abandoned or destroyed or occurs outside the current defined area, as determined by the BLM.
BLM	Price Field Office RMP	Within 2 miles of a known greater sage-grouse lek.	Allow no ground-disturbing or otherwise disruptive activities between March 15 to July 15	**Exception**: The Authorized Officer may grant an exception if an environmental analysis demonstrates that the action would not impair the function or utility of the habitat for nesting or early brood-rearing activities. **Modification**: Season may be adjusted depending on climatic and habitat conditions. Disturbance could occur if the activity were proposed to occur in the buffer, but would occur in non-sagebrush habitat, (i.e., the

TABLE E-11 SEASONAL RESTRICTIONS IN SENSITIVE HABITATS				
Agency	**Applicable Plan**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
				activity could be allowed if it was not in sage-grouse habitat and did not in some other way disturb nesting or brood-rearing activity). **Waiver**: This stipulation may be waived if, in cooperation with Utah Division of Wildlife Resources (UDWR), it is determined that the site has been permanently abandoned or unoccupied for a minimum of 5 years.
BLM	Price Field Office RMP	Sage-grouse wintering areas; crucial winter habitat	Closed seasonally between December 1 and March 14	**Exception**: Upon review and monitoring, the Authorized Officer may grant exceptions because of climatic and/or habitat conditions if certain criteria are met and if activities would not cause undue stress to wintering greater sage-grouse. **Modification**: Season may be adjusted depending on climatic and habitat conditions. **Waiver**: This stipulation may be waived if, in cooperation with the state wildlife agency, it is determined that the site has been permanently abandoned or unoccupied for a minimum of 5 years.
BLM	Salt Lake Field Office RMP	Within 0.5 mile of sage grouse strutting grounds (leks) and crucial sage grouse nesting habitat; in winter crucial habitat areas	BLM will protect from disturbing activities within 0.5 mile of sage grouse strutting grounds (leks) and crucial sage grouse nesting habitat between March 15 and June 15 each year, and in winter crucial habitat areas December 1 through March 1.	Specific exceptions may be granted by BLM if the proposed activity will not seriously disturb the wildlife habitat values being protected.
Southwestern Willow Flycatcher				
BLM	Moab Field Office RMP	Within occupied southwestern willow flycatcher habitat.	Unavoidable ground disturbing activities in occupied southwestern willow flycatcher habitat should only be conducted when preceded by current year survey, should only occur between August 16 and April 30 (i.e., the period when southwestern willow flycatcher are not likely to	None

TABLE E-11 SEASONAL RESTRICTIONS IN SENSITIVE HABITATS				
Agency	**Applicable Plan**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
			be breeding), and should be monitored to ensure that adverse impacts on southwestern willow flycatcher are minimized or avoided, and to document the success of project-specific mitigation/protection measures. As monitoring is relatively undefined, project-specific requirements must be identified.	
BLM	Moab Field Office RMP	Within 0.25 mile of suitable southwestern willow flycatcher habitat	Habitat disturbances (i.e., organized recreational activities requiring special use permits, drilling activities, etc.) will be avoided within 0.25 mile of suitable southwestern willow flycatcher habitat from May 1 to August 15.	None
BLM	Richfield Field Office RMP	All ground-disturbing activities should be restricted within a 0.25-mile buffer from suitable riparian habitats and permanent surface disturbances should be avoided within 0.5 mile of suitable southwestern willow flycatcher habitat.	Unavoidable ground disturbing activities in occupied southwestern willow flycatcher habitat should only be conducted when preceded by current year survey, should only occur between August 16 and April 30 (i.e., the period when southwestern willow flycatcher are not likely to be breeding), and should be monitored to ensure that adverse impacts on southwestern willow flycatcher are minimized or avoided, and to document the success of project-specific mitigation/protection measures. As monitoring is relatively undefined, project-specific requirements must be identified.	None
Mountain Plover				
BLM	Rawlins Field Office RMP	Potential mountain plover habitat	Ground-disturbing and disruptive activities (including reclamation activities) are not allowed during the reproductive period of April 10 to July 10 for the protection of breeding and nesting mountain plover.	Unless surveys consistent with the plover guidelines or other methods approved by the U.S. Fish and Wildlife Service find that no plovers are nesting in the area. Exception, waiver, or modification of this limitation in any year may be approved in writing, including documented supporting analysis, by the Authorized Officer.

TABLE E-11 SEASONAL RESTRICTIONS IN SENSITIVE HABITATS				
Agency	**Applicable Plan**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
BLM	Rawlins Field Office RMP	Within 0.5 mile of the identified mountain plover-occupied habitat	Traffic will be minimized and Speed limits will be posted at 25 miles per hour (mph) on resources roads and 35 mph on local roads during the brood-rearing period (June 1–July 10).	Exception, waiver, or modification of this limitation in any year may be approved in writing, including documented supporting analysis, by the Authorized Officer.
BLM	Rawlins Field Office RMP	Identified mountain plover-occupied habitat	Traffic speed and traffic volume will be limited during nighttime hours from April 10 to July 10	Exception, waiver, or modification of this limitation in any year may be approved in writing, including documented supporting analysis, by the Authorized Officer.
BLM	Rawlins Field Office RMP	Identified mountain plover-occupied habitat	Work schedules and shift changes will be modified from June 1 to July 10 to avoid the periods of activity from a ½ hour before sunrise to 10:00 a.m. and from 5:00 p.m. to a ½ hour after sunset.	Exception, waiver, or modification of this limitation in any year may be approved in writing, including documented supporting analysis, by the Authorized Officer.
BLM	Little Snake Field Office RMP	Within 0.25 mile of all plover nest sites	Prohibit surface use from April 1 to July 15	The boundaries of the stipulated area may be modified if the Authorized Officer determines that portions of the area are not critical to the mountain plover.
Western Yellow-billed Cuckoo				
BLM	Rawlins Field Office RMP	Within 0.5 mile of identified habitat	Ground-disturbing and disruptive activities potentially disruptive to Western yellow-billed cuckoos are prohibited from April 15 to August 15 for the protection of nesting Western yellow-billed cuckoos.	Exception, waiver, or modification of this limitation in any year may be approved in writing, including documented supporting analysis, by the Authorized Officer.
BLM	Little Snake Field Office RMP	Current yellow-billed cuckoo habitat	Construction of roads, pipelines, and power lines through riparian habitat should not occur from June 1 through August 1.	None
Raptors				
BLM	Moab Field Office RMP	Within spatial buffers (0.25 mile for burrowing owl and 0.5 mile for ferruginous hawk) of known nesting sites.	In habitat for raptor species, no surface disturbances or occupancy will be conducted during the breeding and nesting season (March 1 to August 31 for burrowing owl and March 1 to August 1 for ferruginous hawk).	**Exception**: An exception would be granted if protocol surveys determine that nesting sites, breeding territories, and winter roosting areas are not occupied.

TABLE E-11 SEASONAL RESTRICTIONS IN SENSITIVE HABITATS				
Agency	**Applicable Plan**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
UDWR	Recommended stipulations	Within 0.5 mile of known ferruginous hawk nesting sites.	Restrictions on activities are recommended from February 1 to July1 (UDWR 2013b).	
Migratory Birds				
BLM	Price Field Office RMP	High-value breeding habitat	Migratory bird nesting areas would be closed seasonally. Birds designated as BLM Special Status Species would have the highest priority.	**Exception**: Upon review and monitoring, the Authorized Officer may grant exceptions because of climatic and/or habitat conditions if activities would not cause undue stress to migratory bird populations. **Modification**: Season may be adjusted depending on climatic and range conditions. Distance may be adjusted if natural features provide adequate visual screening. **Waiver**: None
Big Game - General				
BLM	Rawlins Field Office RMP	Big game (i.e., elk, moose, deer, antelope. And bighorn sheep) crucial winter range	Ground-disturbing and disruptive activities in big game crucial winter range will not be allowed during the period of November 15 to April 30.	Exception, waiver, or modification of this limitation in any year may be approved in writing, including documented supporting analysis, by the Authorized Officer.
BLM	Rawlins Field Office RMP	Big game (i.e., elk, bighorn) parturition areas	Ground-disturbing and disruptive activities in big game crucial winter range will not be allowed during the period of May 1 to June 30.	Exception, waiver, or modification of this limitation in any year may be approved in writing, including documented supporting analysis, by the Authorized Officer.
BLM	Little Snake Field Office RMP	Big game (i.e., mule deer, elk, pronghorn antelope, and bighorn sheep)	Crucial winter habitat will be closed to surface disturbing activities from December 1 to April 30. Big game birthing areas will be closed to surface disturbing activities for the following species and during the following periods: elk calving (April 16 to June 30), pronghorn antelope fawning (May 1 to July 15), and bighorn sheep lambing (May 1 to July 15).	This stipulation will be applied after the big game hunting season. In the case that hunting season extends later, exceptions will be applied through normal procedures.
BLM	White River Field Office RMP	Big game severe winter range	No development activity is allowed from December 1 through April 30.	**Exception**: The Area Manager may grant an exception if an environmental analysis indicates that the proposed action could be

TABLE E-11 SEASONAL RESTRICTIONS IN SENSITIVE HABITATS				
Agency	**Applicable Plan**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
				conditioned so as not to interfere with habitat function or compromise animal condition in the project vicinity. An exception may also be granted if the Applicant, BLM, and CDOW negotiate compensation that would satisfactorily offset anticipated impacts on big game winter activities or habitat condition. Under mild winter conditions, when prevailing habitat or weather conditions allow early dispersal of animals from all or portions of a project area, an exception may be granted to suspend the last 60 days of this seasonal limitation. Severity of winter will be determined on the basis of snow depth, snow crusting, daily mean temperatures, and whether animals were concentrated on the winter range during the winter months. Exceptions may also be granted for actions specifically intended to enhance the long term utility or availability of suitable habitat. **Modification**: The Area Manager may modify the size and-timeframes of this stipulation if CDOW monitoring information indicates that current animal use patterns are inconsistent with dates established for animal occupation. Modifications may also be authorized if the proposed action could be conditioned so as not to interfere with habitat function or compromise animal condition. In addition, if the Applicant, BLM, and CDOW agree to habitat compensation that satisfactorily offsets detrimental impacts on activity or habitat condition. **Waiver**: This stipulation may be waived if the CDOW determines that all or specific portions of the area no longer satisfy this functional

TABLE E-11 SEASONAL RESTRICTIONS IN SENSITIVE HABITATS				
Agency	**Applicable Plan**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
				capacity.
Elk				
BLM	Grand Junction Field Office RMP	Elk winter range	▪ No new construction activities will occur; ▪ all activities will be conducted during daylight hours only; and ▪ vehicular access on a daily basis will be limited to a single trip between December 1 and May 1.	None
BLM	Grand Junction Field Office RMP	Elk calving grounds	▪ No new construction activities will occur; ▪ all activities will be conducted during daylight hours only; and ▪ vehicular access on a daily basis will be limited to a single trip between May 15 to June 15.	None
BLM	White River Field Office RMP	Elk production areas	This area encompasses an elk production area. No development is allowed from May 15 through June 30.	**Exception**: The Area Manager may grant an exception if an environmental analysis indicates that the proposed action can be conditioned so as not to interfere with habitat function or compromise animal condition in the project vicinity. An exception may also be granted if the Applicant, BLM, and CDOW negotiate compensation that would satisfactorily offset anticipated impacts on elk production or habitat condition. An exception may also be granted for actions intended to enhance the long term utility or availability of suitable habitat **Modification**: The Area Manager may modify the size and timeframes of this stipulation if CDOW monitoring information indicates that current animal use patterns are inconsistent with dates established for animal occupation. Modifications could be authorized if the proposed action could be conditioned so as not to interfere with critical habitat function or

TABLE E-11 SEASONAL RESTRICTIONS IN SENSITIVE HABITATS				
Agency	**Applicable Plan**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
				compromise animal condition. A modification may also be approved if the Applicant, BLM, and CDOW agree to compensation that satisfactorily offset detrimental impacts on elk production or habitat condition. **Waiver**: This stipulation may be waived if CDOW determines that the area is no longer utilized by elk for production purposes.
BLM	White River Field Office RMP	Elk/Deer summer range	This area is located in deer and elk summer ranges, which due to limited extent, are considered critical habitat in appropriate CDOW game management units. This stipulation will not take effect until direct and indirect impacts on suitable summer range habitats exceed 10 percent of that available in the individual Game Management Units. When this threshold has been reached, no further development activity will be allowed from May 15 through August 15 (Note: Development is allowed until 10 percent of individual game management unit summer habitat has been affected, then additional development is allowed from August 16 through May 14).	**Exception**: The Area Manager may grant an exception if an environmental analysis indicates that the proposed action could be conditioned to have no additional influence on the utility or suitability of summer range habitats. An exception may also be granted if the Applicant, BLM, and CDOW negotiate compensation that would satisfactorily offset anticipated impacts on summer range function or habitat. Exceptions may also be granted for actions specifically intended to enhance the long term utility or availability of suitable habitat. **Modification**: The Area Manager may modify the size and timeframes of this stipulation if CDOW monitoring information indicates that current animal-use patterns are inconsistent with dates established for animal occupation. Modifications may also be authorized if the proposed action could be conditioned to have no additional influence on the utility or suitability of summer range habitats. **Waiver**: This stipulation may be waived if the CDOW determines that all or specific portions of the area no longer satisfy this functional capacity or that these summer ranges no longer merit critical habitat status. Waivers will also be applied to delineated summer range

TABLE E-11 SEASONAL RESTRICTIONS IN SENSITIVE HABITATS				
Agency	**Applicable Plan**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
				occurring below 2,250 meters (7,350 feet) in elevation.
BLM	Vernal Field Office RMP	Elk/deer crucial winter range	Activities that will result in adverse impacts on deer and elk within crucial winter range will not be allowed from December 1 through April 30.	This restriction will not apply if deer and/or elk are not present, or if it is determined through analysis and coordination with UDWR that impacts will be mitigated. Factors to be considered will include snow depth, temperature, snow crusting, location of disturbance, forage quantity and quality, animal condition, and expected duration of disturbance.
BLM	Moab Field Office RMP	Elk/deer winter range	Do not allow ground-disturbing activities from November 15 to April 15.	**Exception**: This stipulation does not apply to the maintenance and operation of existing and ongoing facilities. An exception may be granted by the Field Manager if the operator submits a plan that demonstrates that impacts from the proposed action can be adequately mitigated or it is determined the habitat is not being utilized during the winter period for any given year. **Modification**: The Field Manager may modify the boundaries of the stipulation area (1) if a portion of the area is not being used as winter range by deer/elk or (2) if habitat is being utilized outside of stipulation boundaries as winter range and needs to be protected or (3) if the migration patterns have changed causing a difference in the season of use. **Waiver**: May be granted if the winter range habitat is unsuitable or unoccupied during winter months by deer/elk and there is no reasonable likelihood of future winter range use.

TABLE E-11 SEASONAL RESTRICTIONS IN SENSITIVE HABITATS				
Agency	**Applicable Plan**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
BLM	Moab Field Office RMP	Deer and elk fawning and calving habitat (Bookcliffs and La Sal Wildlife Management Units)	Allow no ground-disturbing activities from May 15 to June 30.	**Exception**: This stipulation does not apply to the maintenance and operation of existing and ongoing facilities. An exception may be granted by the Field Manager if the operator submits a plan that demonstrates that impacts from the proposed action can be adequately mitigated or it is determined the habitat is not being utilized during the critical period for any given year. **Modification**: The Field Manager may modify the boundaries of the stipulation area (1) if a portion of the area is not being used as fawning and calving habitat or (2) if the habitat is being utilized outside of stipulation boundaries and needs to be protected or (3) if the migration patterns have changed causing a difference in the season of use. **Waiver**: May be granted if the fawning and calving habitat is unsuitable or unoccupied during winter months by deer/elk and there is no reasonable likelihood of future winter range use.
BLM	Price Field Office RMP	Elk and mule deer crucial winter habitat	Closed December 1 to April 15	**Exception**: Upon review and monitoring, the Authorized Officer may grant exceptions because of climatic and/or range conditions if certain criteria are met and if activities would not cause undue stress to deer and elk populations or habitats. **Modification**: Season may be adjusted depending on climatic and range conditions. **Waiver**: A waiver may be granted if the winter range habitat is unsuitable for or unoccupied during winter months by deer/elk and there is no reasonable likelihood of future winter range use.

TABLE E-11 SEASONAL RESTRICTIONS IN SENSITIVE HABITATS				
Agency	**Applicable Plan**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
BLM	Price Field Office RMP	Elk calving and mule deer fawning areas located in the crucial summer habitat	Closed May 15 to July 5	**Exception**: Upon review and monitoring, the Authorized Officer may grant exceptions because of climatic and/or range conditions if certain criteria are met and if activities would not cause undue stress to deer and elk populations or habitats. **Modification**: Season may be adjusted depending on climatic and range conditions. **Waiver**: A waiver may be granted if the fawning and calving habitat is unsuitable or unoccupied by deer/elk and there is no reasonable likelihood of future use.
BLM	Salt Lake Field Office RMP	In crucial elk winter range; calving areas	BLM will protect important wildlife habitat values from disturbing activities by restricting seismic work, well development, new road construction, rights-of-way, and other disturbing activities (excluding maintenance activities) from December 1 to April 30, and calving areas May 1 to June 30.	None
UDWR	Recommended stipulations	Elk rut in crucial winter and summer range and calving areas	Restrictions on activities are recommended from September 1 to October 15.	
Mule Deer				
BLM	Grand Junction Field Office RMP	Deer winter range	▪ No new construction activities will occur; ▪ all activities will be conducted during daylight hours only; and ▪ vehicular access on a daily basis will be limited to a single trip between December 1 and May 1.	None
BLM	Vernal Field Office RMP	Mule deer migration corridors in McCook and Monument Ridge	No ground-disturbing activities will be allowed from April 15 through May 31	None
BLM	Salt Lake Field Office RMP	In mule deer winter range	BLM will protect important wildlife habitat values from disturbing activities by restricting	Specific exceptions may be granted by BLM if the proposed activity will not seriously disturb

TABLE E-11 SEASONAL RESTRICTIONS IN SENSITIVE HABITATS				
Agency	**Applicable Plan**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
			seismic work, well development, new road construction, rights-of-way, and other disturbing activities (excluding maintenance activities) from December 1 to April 15.	the wildlife habitat values being protected.
BLM	Salt Lake Field Office RMP	In crucial mule deer summer/fawning habitats	BLM will protect important wildlife habitat values from disturbing activities by restricting seismic work, well development, new road construction, rights-of-way, and other disturbing activities (excluding maintenance activities) from April 15 to July 1.	Specific exceptions may be granted by BLM if the proposed activity will not seriously disturb the wildlife habitat values being protected.
UDWR	Recommended stipulations	Mule deer rut in crucial winter range	Restrictions on activities are recommended from November 1 to November 30	None
UDWR	Recommended stipulations	Mule deer winter range	Restrictions on activities are recommended from November 1 to April 1	None
UDWR	Recommended stipulations	Mule deer parturition in crucial summer range	Restrictions on activities are recommended from May 15 to July 15	None
Pronghorn				
BLM	White River Field Office RMP	Pronghorn production areas	No development activity is allowed in this area between May 1 and June 30. The CDOW has indicated that these features exist on public lands in the White River Resource Area but have not yet delineated specific areas that will be subject to this timing restriction.	Specific exception, modification, and waiver language will be developed in cooperation with the CDOW after the affected areas have been delineated.
BLM	Vernal Field Office RMP	Pronghorn fawning ground in Antelope Flat	Do not allow activities that will result in adverse impacts on antelope from May 1 through June 30.	This restriction does not apply if pronghorn are not present or if impacts will be mitigated through other management actions. This restriction also does not apply to maintenance and operations of existing facilities.
BLM	Moab Field Office RMP	Pronghorn fawning grounds in Cisco Desert and Hatch Point (LaSal Wildlife Management Units)	Allow no ground-disturbing activities from May 1 to June 15.	**Exception**: May be granted to these dates by the Field Manager if the operator submits a plan that demonstrates that impacts from the proposed action can be adequately mitigated or if it is determined the habitat is not being utilized for fawning in any given year.

TABLE E-11 SEASONAL RESTRICTIONS IN SENSITIVE HABITATS				
Agency	**Applicable Plan**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
				Modification: The Field Manager may modify the boundaries of the stipulation area if a portion of the area is not being used as fawning grounds or if habitat is being utilized outside of stipulation boundaries as crucial fawning grounds and needs to be protected. **Waiver**: May be granted if the fawning grounds are determined to be unsuitable or unoccupied and there is no reasonable likelihood of future use of the fawning grounds.
BLM	Salt Lake Field Office RMP	In antelope fawning areas	BLM will protect important wildlife habitat values from disturbing activities by restricting seismic work, well development, new road construction, rights-of-way, and other disturbing activities excluding maintenance activities from April 15 to July 1.	Specific exceptions may be granted by BLM if the proposed activity will not seriously disturb the wildlife habitat values being protected.
Moose				
BLM	Price Field Office RMP	Crucial yearlong moose habitat	Closed seasonally December 1 to April 15	**Exception**: Upon review and monitoring, the Authorized Officer may grant exceptions because of climatic and/or range conditions if certain criteria are met and if activities would not cause undue stress to moose populations or habitats. **Modification**: Season may be adjusted depending on climatic and range conditions. **Waiver**: A waiver may be granted if the winter range habitat is unsuitable or unoccupied during winter months by moose and there is no reasonable likelihood of future winter range use.
Bighorn Sheep				
BLM	Grand Junction Field Office RMP	Bighorn winter range	▪ No new construction activities will occur; ▪ all activities will be conducted during daylight hours only; and	None

TABLE E-11 SEASONAL RESTRICTIONS IN SENSITIVE HABITATS				
Agency	**Applicable Plan**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
			▪ vehicular access on a daily basis will be limited to a single trip between December 1 and May 1.	
BLM	Price Field Office RMP	Desert bighorn sheep and Rocky Mountain bighorn sheep crucial yearlong habitat	Closed seasonally April 15 to June 15	**Exception**: Upon review and monitoring, the Authorized Officer may grant exceptions because of climatic and/or range conditions if certain criteria are met and if activities would not cause undue stress to desert bighorn sheep and Rocky Mountain bighorn sheep populations or habitats. **Modification**: Season may be adjusted depending on climatic and range conditions. **Waiver**: A waiver may be granted if the habitat is determined to be unsuitable for lambing and there is no reasonable likelihood of future use as bighorn lambing grounds.
Wild Horses				
BLM	Little Snake Field Office RMP	Within a 1-mile radius from wild horse water sources	No drilling or development operations will be permitted from March 1 to December 1.	None
BLM	Grand Junction Field Office RMP	Wild horse winter range	▪ No new construction activities will occur; ▪ all activities will be conducted during daylight hours only; and ▪ vehicular access on a daily basis will be limited to a single trip between December 1 and May 1.	None
BLM	Grand Junction Field Office RMP	Wild horse foaling	▪ No new construction activities will occur; ▪ all activities will be conducted during daylight hours only; and ▪ vehicular access on a daily basis will be limited to a single trip between March 1 to July 1.	None

TABLE E-11 SEASONAL RESTRICTIONS IN SENSITIVE HABITATS				
Agency	**Applicable Plan**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
BLM	White River Field Office RMP	Herd management areas	To protect wild horses in this area, intensive development activities may be delayed for a specified 60 day period in the spring foaling period between March 1 and June 15.	None

TABLE E-12 SPATIAL AND SEASONAL BUFFERS FOR BREEDING RAPTORS IN WYOMING				
	Wyoming Ecological Services Field Office		**Bureau of Land Management Rawlins Field Office**	
Common Name	**Spatial Buffer (miles)**	**Seasonal Buffer**	**Spatial Buffer (miles)**	**Seasonal Buffer**
Raptors of Conservation Concern				
Golden eagle	0.50	January 15 to July 31	1.0	February 1 to July 15
Ferruginous hawk	1.0	March 15 to July 31	1.0	March 1 to July 31
Swainson's hawk	0.25	April 1 to August 31	0.75	April 1 to July 31
Bald eagle communal roost areas[1]	–	–	2.0	Surface disturbing or other disruptive activities potentially disruptive to a bald eagle communal roost will be prohibited within 2 miles of the communal roost during the period of February 1 to August 15.
Bald eagle communal winter roost areas	–	–	1.0	Surface disturbing or other disruptive activities potentially disruptive to identified bald eagle communal winter roost sites will be prohibited within 1 mile of the winter roost site from November 1 to April 1. No ground disturbing activities will be permitted within 0.5-mile of active bald eagle communal winter roost sites year-round[2].
Bald eagle	Refer to National Bald Eagle Management Guidelines	See National Bald Eagle Management Guidelines	Refer to National Bald Eagle Management Guidelines	Refer to National Bald Eagle Management Guidelines
Prairie falcon	0.50	March 1 to August 15	0.75	April 1 to July 31
Peregrine falcon	0.50	March 1 to August 15	0.75	March 1 to July 31
Short-eared owl	0.25	March15 to August 1	0.75	March 1 to July 31
Burrowing owl	0.25	April 1 to September 15	0.75	April 1 to September 15
Northern goshawk	0.50	April 1 to August 15	0.75	April 1 to August 31
Additional Wyoming Raptors				
Osprey	0.25	April 1 to August 31	0.75	April 1 to July 31
Cooper's hawk	0.25	March 15 to August 31	0.75	April 1 to July 31
Sharp-shinned hawk	0.25	March 15 to August 31	0.75	April 1 to July 31
Red-tailed hawk	0.25	February 1 to August 15	0.75	February 1 to July 15

TABLE E-12 SPATIAL AND SEASONAL BUFFERS FOR BREEDING RAPTORS IN WYOMING				
	Wyoming Ecological Services Field Office		Bureau of Land Management Rawlins Field Office	
Common Name	Spatial Buffer (miles)	Seasonal Buffer	Spatial Buffer (miles)	Seasonal Buffer
Rough-legged hawk (winter resident only)	–	–	–	–
Northern harrier	0.25	April 1 to August 15	0.75	April 1 to July 31
Merlin	0.50	April 1 to August 15	0.75	April 1 to July 31
American kestrel	0.13	April 1 to August 15	0.75	April 1 to July 31
Common barn owl	0.13	February 1 to September 15	0.75	February 1 to July 15
Northern saw-whet owl	0.25	March 1 to August 31	–	–
Boreal owl	0.25	February 1 to July 31	–	–
Long-eared owl	0.25	February 1 to August 15	0.75	March 1 to July 31
Great horned owl	0.13	December 1 to September 30	0.75	February 1 to July 15
Northern pygmy-owl	0.25	April 1 to August 1	–	–
Eastern screech -owl	0.13	March 1 to August 15	0.75	March 1 to July 31
Western screech-owl	0.13	March 1 to August 15	0.75	March 1 to July 31
Great gray owl	0.25	March 15 to August 31	–	–

SOURCE: Bureau of Land Management 2008b; U.S. Fish and Wildlife Service 2012f

NOTES:

[1]A communal roost is defined as an area usually less than 10 acres in size that contains or has contained more than 6 bald eagles on any given night.

[2]The year-round buffer zone on ground disturbing activities of 0.5 mile of active bald eagle communal winter roost sites may be adjusted based on site-specific information through coordination with (including written concurrence) the U.S. Fish and Wildlife Service, Wyoming Field Office.

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TABLE E-13 RECOMMENDED SPATIAL AND SEASONAL BUFFERS FOR BREEDING RAPTORS IN COLORADO				
	Colorado Department of Wildlife		Bureau of Land Management Field Office[2]	
Common Name	Spatial Buffer (miles)	Seasonal Buffer[1]	Spatial Buffer (miles)	Seasonal Buffer[1]
Raptor nesting sites; listed, proposed, and candidate threatened and endangered and Bureau of Land Management (BLM) sensitive except bald eagle and ferruginous hawks	–	–	0.50	This area encompasses the nests of threatened, endangered, or candidate raptors. No development activities are allowed within 0.5 mile of identified nest sites from February 1 through August 15, or until fledgling and dispersal of young (White River Field Office[3]).

TABLE E-13 RECOMMENDED SPATIAL AND SEASONAL BUFFERS FOR BREEDING RAPTORS IN COLORADO				
Common Name	**Colorado Department of Wildlife**		**Bureau of Land Management Field Office[2]**	
	Spatial Buffer (miles)	**Seasonal Buffer[1]**	**Spatial Buffer (miles)**	**Seasonal Buffer[1]**
Raptor nesting sites; other than threatened and endangered and candidate threatened and endangered species	–	–	0.50	No development activities are allowed within 0.5 mile of identified nests from February 1 through August 15, or until fledgling and dispersal of young (White River Field Office[3]).
Bald eagle nests	0.50	October 15 to July 31	0.25	February 1 to August 15 (No development is allowed within 0.5 mile of identified nests from December 15 to July 15, or until fledgling and dispersal of young in White River Field Office[3]).
Bald eagle concentration areas	–	–	–	Protect bald eagle concentration areas from ground-disturbing activities from December 1 to April 1 (Grand Junction Field Office).
Active bald eagle winter night roost without a direct line of sight	0.25	November 15 to March 15	0.25	February 1 to August 15 (within 0.5 mile of identified roost sites or concentration areas from November 1 to April 15 White River Field Office[3]).
Bald eagle hunting perch	Contact Colorado Department of Wildlife (CDOW)	Contact CDOW	0.25	February 1 to August 15
Ferruginous hawk	0.50	February 1 to July 15	1.0	No development is allowed within 1 mile of identified nests from February 1 through August 15, or until fledgling and dispersal of young (White River Field Office[3]).
Golden eagle	0.50	December 15 to March 15	0.25	February 1 to August 15
Prairie falcon	0.5	March 15 to July 15	0.25	February 1 to August 15
Peregrine falcon	0.5	March 15 to July 31	0.25	February 1 to August 15 (March 15- July 1 in Grand Junction Field Office)
Burrowing owl	150 feet	March 15 to October 31	0.25	February 1 to August 15
Northern goshawk	0.50	March 1 to September 15	0.25	February 1 to August 15
Osprey	0.25	April 1 to August 31	0.25	February 1 to August 15

TABLE E-13
RECOMMENDED SPATIAL AND SEASONAL BUFFERS FOR BREEDING RAPTORS IN COLORADO

Common Name	Colorado Department of Wildlife		Bureau of Land Management Field Office[2]	
	Spatial Buffer (miles)	Seasonal Buffer[1]	Spatial Buffer (miles)	Seasonal Buffer[1]
Red-tailed hawk	0.33	February 15 to July 15	0.25	February 1 to August 15
Swainson's hawk	0.25	April 1 to July 15	0.25	February 1 to August 15
All other raptors	Not applicable	Not applicable	0.25	February 1 to August 15

SOURCE: Bureau of Land Management 2011d; Colorado Parks and Wildlife 2008
NOTES:
[1]Exception, waiver, or modification of this limitation in any year may be approved in writing, including documented supporting analysis, by the Authorized Officer.
[2]Little Snake Field Office unless otherwise noted.
[3]**Exception**: An exception may be granted to these dates by the Area Manager, if authorization is obtained from the U.S. Fish and Wildlife Service (through applicable provisions of the Endangered Species Act, Eagle Protection Act, or Migratory Bird Treaty Act) to harass, harm, wound, or kill in the context of active nesting attempts. An exception can also be granted if an environmental analysis of the proposed action indicates that nature or conduct of the activity could be conditioned so as not to impair the utility of nest for current or subsequent nesting activity or occupancy. The Area Manager may, also grant an exception if the nest is unattended or remains unoccupied by May 15 of the Project year. **Modification**: The Area Manager may modify the size of the stipulation area if an environmental analysis indicates that a portion of the area is nonessential to nest utility or function, or that the proposed action could be conditioned so as not to impair the utility of the nest site for current or subsequent nest activities or occupation. The stipulation may also be modified if the Applicant, BLM, and where necessary, other affected interests, negotiate compensation that satisfactorily offsets anticipated impacts on candidate and BLM sensitive raptor breeding activities and/or habitats. Modifications could also occur if sufficient information is provided that supports the contention that the action would not contribute to the suppression of breeding population densities or the population's production or recruitment regime from a geographic reference area perspective. If a species status is downgraded, or if a species is delisted, the size of the timing limitation area may be reduced. **Waiver**: A waiver may be granted if the species becomes extinct or there is no reasonable likelihood of site occupation over a minimum 10-year period.

TABLE E-14
NESTING PERIODS AND RECOMMENDED BUFFERS FOR RAPTORS IN UTAH

Common Name	All of Utah		Bureau of Land Management Field Office	
	Spatial Buffer (miles)	Seasonal Buffer	Spatial Buffer (miles)	Seasonal Buffer
Known raptor nest sites (within 0.5 mile of nests occupied in the past 3 years) and raptor crucial cliff-nesting complex habitats	–	–	0.50	Closed seasonally between February 1 to July 15 (Price Field Office[1])

TABLE E-14 NESTING PERIODS AND RECOMMENDED BUFFERS FOR RAPTORS IN UTAH				
	All of Utah		**Bureau of Land Management Field Office**	
Common Name	**Spatial Buffer (miles)**	**Seasonal Buffer**	**Spatial Buffer (miles)**	**Seasonal Buffer**
Active and inactive nests; designated as crucial nesting habitat.	–	–	0.25	These areas are classified as Category 2 for fluid mineral leasing, and off-highway vehicle use is limited to existing roads and trails to prevent significant disturbance to nesting raptors from March 1 through June 30 (Fillmore Field Office)
Active raptor nest sites	–	–	0.50	BLM will protect important wildlife habitat values from disturbing activities by restricting seismic work, well development, new road construction, rights-of-way, and other disturbing activities excluding maintenance activities from March 1 to July 15 (Salt Lake Field Office)
Bald eagle	1.0	No surface disturbing activities within 1 mile of identified nest sites from January 1 to August 31	0.50	No surface disturbing activities or development is allowed within 0.5 mile of identified winter roost sites from November 1 through March 31 (Moab Field Office[2])
Golden eagle	0.50	January 1 to August 31	–	–
Northern goshawk	0.50	March 1 to August 15 (March 1 to September 30 in post-fledgling areas USFS[3])	–	–
Northern harrier	0.50	April 1 to August 15	–	–
Cooper's hawk	0.50	March 15 to August 31	–	–
Ferruginous hawk	0.50	March 1 to August 1	–	–
Red-tailed hawk	0.50	March 15 to August 15	–	–
Sharp-shinned hawk	0.50	March 15 to August 31	–	–
Swainson's hawk	0.50	March 1 to August 31	–	–
Turkey vulture	0.50	May 1 to August 15	–	–
Peregrine falcon	1.0	February 1 to August 31	–	–
Prairie falcon	0.25	April 1 to August 31	–	–
Merlin	0.50	April 1 to August 31	–	–
American kestrel	Refer to migratory bird guidelines in Table E-11	April 1 to August 15	–	–
Osprey	0.50	April 1 to August 31	–	–
Boreal owl	0.25	February 1 to July 31	–	–
Burrowing owl	0.25	March 1 to August 31	–	–

TABLE E-14
NESTING PERIODS AND RECOMMENDED BUFFERS FOR RAPTORS IN UTAH

Common Name	All of Utah		Bureau of Land Management Field Office	
	Spatial Buffer (miles)	Seasonal Buffer	Spatial Buffer (miles)	Seasonal Buffer
Flammulated owl	0.25	April 1 to September 30	–	–
Great horned owl	0.25	December 1 to September 31	–	–
Long-eared owl	0.25	February 1 to August 15	–	–
Northern saw-whet owl	0.25	March 1 to August 31	–	–
Short-eared owl	0.25	March 1 to August 1	–	–
Mexican spotted owl	0.50	March 1 to August 31	0.50	For all temporary actions that may impact owls or suitable habitat. If the action occurs entirely outside of the owl breeding season from March 1 through August 31, and leaves no permanent structure or permanent habitat disturbance, the action can proceed without an occupancy survey. If action will occur during a breeding season, survey for owls prior to commencing activity. If owls are found, activity should be delayed until outside of the breeding season (Moab Field Office[4])
Northern pygmy owl	0.25	April 1 to August 15	–	–
Eastern and Western screech owl	0.25	March 1 to August 15	–	–
Common barn-owl	Refer to migratory bird guidelines in Table E-11	February 1 to September 15	–	–

SOURCE: Romin and Muck 2002
NOTES:
[1]**Exception**: The Authorized Officer may grant an exception if the raptor nest in question is deemed to be inactive by May 31 and if the proposed activity would not result in a permanent structure or facility that would cause the subject nest to become unsuitable for nesting in future years. **Modification**: Season may be adjusted depending on climatic and range conditions. Distance may be adjusted if natural features provide adequate visual screening. **Waiver**: This stipulation may be waived if, in cooperation with the Utah Division of Wildlife Resources, it is determined that the site has been permanently abandoned or unoccupied for a minimum of 3 years.
[2]Temporary activities or habitat alterations that may disturb nesting bald eagles will be restricted from January 1 to August 31. Additionally, where daily activities must occur in these spatial buffers, and are approved through subsequent consultation, activities should be properly scheduled to occur after 9 a.m. and terminate at least 1 hour before official sunset to ensure that bald eagles using these roosts are allowed the opportunity to vacate their roost in the morning and return undisturbed in the evening.
[3]USFS LRMP Plan Amendment – Utah Northern Goshawk Project (2000)
[4]Temporary activities are defined as those that are completed prior to the start of the following raptor breeding season, leaving no permanent structures and resulting in no permanent habitat loss.

E.9 Surface Use Restrictions for Biological Resources

Many BLM RMPs, USFS LRMPs, state wildlife management plans, and agency guidelines relevant to the Project area identify restrictions on surface use (e.g., no surface occupancy, conditional surface use, or no surface disturbance) in addition to seasonal restrictions to protect plants, wildlife, and their habitats. Tables E-15 and E-16 summarize restrictions on surface use of lands to protect biological resources and exception criteria, if identified, from agency policies and plans relevant to the Project area.

TABLE E-15 NO SURFACE OCCUPANCY AND NO SURFACE DISTURBANCE RESTRICTIONS FOR BIOLOGICAL RESOURCES FROM APPLICABLE BUREAU OF LAND MANAGEMENT, U.S. FOREST SERVICE, AND OTHER PLANS				
Agency	**Applicable Plan/Policy**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
Wetlands and Riparian Areas				
Bureau of Land Management (BLM)	Utah State Office	Within 100 meters of riparian areas	Utah Riparian Policy states that "No new ground-disturbing activities will be allowed"	**Exception**: An exception could be authorized if: ▪ there are no practical alternatives or, ▪ all long-term impacts can be fully mitigated, or ▪ the activity will benefit and enhance the riparian area.
BLM	Little Snake Field Office Resource Management Plan (RMP)	Up to 0.25 mile from perennial water sources (i.e., streams, rivers, springs, and seeps with perennial flow)	No surface occupancy, if necessary, depending on type and use of the water source, soil type, and slope steepness. Soil/slope characteristics that would initiate this no surface occupancy stipulation include those soils defined as "fragile soils." The following soil/slope characteristics are indicative of a potentially fragile soil: ▪ Soils rated as highly or severely erodible by wind or water, as described in Natural Resources Conservation Service (NRCS) soil survey reports. ▪ Soils on slopes greater than 35 percent, particularly if they have one of the following characteristics: • a surface texture that is sand, loamy sand, very fine sandy loam, fine sandy loam, silty clay, or clay; • a depth to bedrock that is less than 20 inches (51 centimeters); • an erosion hazard rating of high or very high; and • a K-factor (soil erodibility potential) factor greater than 0.32.	None
BLM	Grand Junction Field Office RMP	Riparian areas	No surface disturbance in riparian areas year round	None

TABLE E-15 NO SURFACE OCCUPANCY AND NO SURFACE DISTURBANCE RESTRICTIONS FOR BIOLOGICAL RESOURCES FROM APPLICABLE BUREAU OF LAND MANAGEMENT, U.S. FOREST SERVICE, AND OTHER PLANS				
Agency	**Applicable Plan/Policy**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
BLM	Vernal Field Office RMP	Within 100 year floodplains or within 100 meters of riparian areas. Also, no ground-disturbing activities in public water reserves or within 100 meters of springs.	No ground-disturbing activities	**Exception**: An exception could be authorized if: ▪ there are no practical alternatives; ▪ impacts could be fully mitigated; or ▪ the action is designed to benefit and enhance the resource values. **Modification**: None **Waiver**: None
BLM	Grand Junction Field Office RMP	Riparian areas and Skippers Island	Prohibit surface disturbance in these areas year round.	None
BLM	Moab Field Office RMP	Within 100 meters of riparian areas; within 100-year floodplains, within 100 meters of a natural spring, or in public water reserves.	Ground-disturbing activities are precluded within 100 meters of riparian areas. Allow no surface occupancy and preclude ground-disturbing activities within 100-year floodplains, within 100 meters of a natural spring, or in public water reserves.	None
BLM	Price Field Office RMP	Natural spring	No surface disturbance or occupancy would be maintained around natural springs to protect the water quality of the spring. The distance would be based on geophysical, riparian, and other factors necessary to protect the water quality of the springs. If these factors cannot be determined, a 660-foot buffer zone would be maintained.	**Exception**: An exception could be authorized if ▪ there are no practical alternatives; ▪ impacts could be fully mitigated; or ▪ the action is designed to enhance the riparian resources. **Modification**: None **Waiver**: None
BLM	Price and Richfield Field Office RMPs	Within 100-year floodplain or 100 meters (330 feet) on either side from the centerline of the selected alternative, whichever is greater, along all perennial and intermittent streams,	No new surface disturbance (excluding fence lines)	**Exception**: An exception could be authorized if ▪ there are no practical alternatives; ▪ impacts could be fully mitigated; or ▪ the action is designed to enhance the riparian resources. **Modification**: None **Waiver**: None

TABLE E-15 NO SURFACE OCCUPANCY AND NO SURFACE DISTURBANCE RESTRICTIONS FOR BIOLOGICAL RESOURCES FROM APPLICABLE BUREAU OF LAND MANAGEMENT, U.S. FOREST SERVICE, AND OTHER PLANS				
Agency	**Applicable Plan/Policy**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
		streams with perennial reaches, and riparian areas		
Soils				
BLM	White River Field Office RMP	Landslide areas (i.e., identified soils are considered unstable and subject to slumping and mass movement)	Surface occupancy will not be allowed in such areas delineated from U.S. Department of Agriculture Soil Conservation Service Order III Soil Survey.	Exceptions, modifications, or waivers to this no surface occupancy stipulation may be granted by the Area Manager.
BLM	Grand Junction Field Office RMP	Soil slump hazard areas Baxter-Douglas Pass Plateau Canyon	No surface occupancy stipulation	None
BLM	Grand Junction Field Office RMP	Slopes greater than 40 percent; unstable and slumping soils in the areas of Baxter Pass, Douglas Pass, and Plateau Creek; face of the Bookcliffs	No surface occupancy stipulation; allow other ground-disturbing activities only after analyzing site-specific conditions and potential for safety hazards and reclamation	None
BLM	Vernal Field Office RMP	For slopes greater than 40 percent	No surface disturbance will be allowed unless it is determined that it will cause undue or unnecessary degradation to pursue other placement alternatives.	None
BLM	Price Field Office RMP	For slopes greater than 40 percent	No surface occupancy	**Exception**: If after an environment analysis the Authorized Officer determines that it would cause undue or unnecessary degradation to pursue other placement alternatives, surface occupancy in the area may be authorized. In addition, a plan from the operator and BLM's approval of the plan would be required before construction and maintenance could begin. The plan would have to include: ▪ An erosion control strategy ▪ Geographic information systems modeling ▪ Proper survey and design by a certified engineer. **Modification**: None **Waiver**: None

TABLE E-15 NO SURFACE OCCUPANCY AND NO SURFACE DISTURBANCE RESTRICTIONS FOR BIOLOGICAL RESOURCES FROM APPLICABLE BUREAU OF LAND MANAGEMENT, U.S. FOREST SERVICE, AND OTHER PLANS				
Agency	**Applicable Plan/Policy**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
Special Status Plants				
BLM Sensitive Plants and Remnant Vegetation Associations				
BLM	White River Field Office RMP	In known populations of these plants	No surface occupancy will be allowed.	Exceptions, modifications, or waivers to this no surface occupancy stipulation may be granted by the Area Manager.
Known and Potential Habitat for Listed and Candidate Threatened/Endangered Plant Species or Potential Habitat				
BLM	White River Field Office RMP	On mapped populations of these plants	No surface occupancy will be allowed.	Exceptions, modifications, or waivers to this no surface occupancy stipulation may be granted by the Area Manager.
Special Status Plant Species – General				
Clay Phacelia				
U.S. Forest Service/ U.S. Fish and Wildlife Service (FWS)	Clay phacelia conservation measures	Within 650 feet of known occupied habitat	No new development in known occupied sites or within 650 feet of known occupied sites. Existing sites need to be surveyed to determine site boundaries prior to development site selection if development is to occur close to the 650-foot buffer area.	None
Jones Cycladenia				
BLM	Moab Field Office RMP	Within 300 feet of plants and suitable habitat	Preclude ground-disturbing activities within 300 feet of plants and suitable habitat	None
Spineless Hedgehog Cactus				
BLM	Grand Junction Field Office RMP	Actual sites	Prohibit surface disturbance in these areas year round.	The decision to protect habitats by placing stipulations on disturbance type activities will be implemented by comparing activities proposed with areas identified for protective management. Applicable stipulations will be placed on projects that lie in the protected areas.
Uinta Basin Hookless Cactus				
BLM	Grand Junction Field Office RMP	Actual sites	Prohibit surface disturbance in these areas year round.	The decision to protect habitats by placing stipulations on disturbance type activities will be implemented by comparing activities proposed with areas identified for protective management.

TABLE E-15 NO SURFACE OCCUPANCY AND NO SURFACE DISTURBANCE RESTRICTIONS FOR BIOLOGICAL RESOURCES FROM APPLICABLE BUREAU OF LAND MANAGEMENT, U.S. FOREST SERVICE, AND OTHER PLANS				
Agency	**Applicable Plan/Policy**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
				Applicable stipulations will be placed on projects that lie in the protected areas.
Special Status Wildlife				
Black-footed Ferret				
BLM	Grand Junction Field Office RMP	Actual sites	Prohibit surface disturbance in these areas year round.	The decision to protect habitats by placing stipulations on disturbance type activities will be implemented by comparing activities proposed with areas identified for protective management. Applicable stipulations will be placed on projects that lie in the protected areas.
White-tailed Prairie Dog				
BLM	Moab Field Office RMP	Within 660 feet of white-tailed prairie dog colonies	Do not allow ground-disturbing activities within 660 feet of prairie dog colonies identified in prairie dog habitat (Note: the size of the habitat varies by alternative). No permanent aboveground facilities are allowed within the 660-foot buffer.	**Exception**: An exception may be granted if the Applicant submits a plan that indicates that impacts of the proposed action can be adequately mitigated or, if due to the size of the town, there is no reasonable location to develop a lease and avoid colonies the Field Manager will allow for loss of prairie dog colonies and/or habitat to satisfy terms and conditions of the lease.
BLM	Moab Field Office RMP	Within 660 feet of Gunnison prairie dog colonies	Do not allow ground-disturbing activities within 660 feet of prairie dog colonies identified in prairie dog habitat (Note: the size of the habitat varies by alternative). No permanent aboveground facilities are allowed within the 660-foot buffer.	**Exception**: An exception may be granted if the Applicant submits a plan that indicates that impacts of the proposed action can be adequately mitigated or, if due to the size of the town, there is no reasonable location to develop a lease and avoid colonies the Field Manager will allow for loss of prairie dog colonies and/or habitat to satisfy terms and conditions of the lease.
BLM	Vernal Field Office RMP	Within 660 feet of prairie dog colonies identified in prairie dog habitat in the Coyote Basin Complex (which includes the Coyote Basin, Kennedy Wash, Shiner, and Snake John	Do not allow ground-disturbing activities. No permanent aboveground facilities are allowed within the 660-foot buffer.	**Exception**: An exception may be granted if the Applicant submits a plan that indicates that impacts of the proposed action can be adequately mitigated or, if due to the size of the town, there is no reasonable location to develop a lease and avoid colonies the Field Manager will allow for loss of prairie dog colonies and/or habitat to satisfy terms

TABLE E-15 NO SURFACE OCCUPANCY AND NO SURFACE DISTURBANCE RESTRICTIONS FOR BIOLOGICAL RESOURCES FROM APPLICABLE BUREAU OF LAND MANAGEMENT, U.S. FOREST SERVICE, AND OTHER PLANS				
Agency	**Applicable Plan/Policy**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
		subcomplexes) and the Myton Bench Complex.		and conditions of the lease. **Modification**: The Field Manager may modify the boundaries of the stipulation area if portions of the area does not include prairie dog habitat or active colonies are found outside the current defined area, as determined by the BLM. **Waiver**: May be granted if, in the leasehold, it is determined that habitat no longer exists or has been destroyed.
Colorado River Fishes				
BLM	Little Snake Field Office RMP	In critical or occupied habitat of Colorado pikeminnow (*Ptychocheilus lucius*), razorback sucker (*Xyrauchen texanus*), humpback chub (*Gila cypha*), and bonytail (*Gila elegans*).	Require no surface occupancy stipulations.	Exceptions that could adversely affect listed fish (such as bridge abutments) will require site-specific consultation with the FWS.
BLM	Moab Field Office RMP	Within the 100-year floodplain of the Colorado River, Green River, and at the confluence of the Dolores and Colorado rivers	No ground-disturbing activities will be allowed.	Any exceptions to this requirement will require consultation with the FWS. Restrictions on surface disturbance in this critical habitat will be developed through this consultation process.
Columbian Sharp-tailed Grouse				
BLM	Rawlins Field Office RMP	Within 0.25 mile of perimeter of occupied Colombian sharp-tailed grouse leks east of Wyoming Highway 789, south of Interstate 80, west of Wyoming Highway 71 and Carbon County Road 401, and north of Wyoming Highway 70	Prohibit surface disturbance/occupancy year round	None

TABLE E-15 NO SURFACE OCCUPANCY AND NO SURFACE DISTURBANCE RESTRICTIONS FOR BIOLOGICAL RESOURCES FROM APPLICABLE BUREAU OF LAND MANAGEMENT, U.S. FOREST SERVICE, AND OTHER PLANS				
Agency	**Applicable Plan/Policy**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
BLM	Little Snake Field Office RMP	Within a 0.25-mile radius of a lek site	The no surface occupancy area may be altered depending upon the active status of the lek or the geographical relationship of topographical barriers and vegetation screening to the lek site.	None
Greater Sage-grouse				
State of Wyoming	Executive Order for Greater Sage-grouse in Wyoming, 2011	Within 0.6 miles of the perimeter of occupied sage-grouse leks	No surface occupancy. Other activities may be authorized with the application of appropriate seasonal stipulations, provided the resources protected by the no surface occupancy are not adversely affected.	**Exceptions**: Any exceptions to these general or specific stipulations will be considered on a case-by-case basis and must show that the exception will not cause declines in sage-grouse populations.
State of Wyoming	Executive Order for Greater Sage-grouse in Wyoming, 2011	Outside 0.6 miles of the perimeter of occupied sage-grouse leks	Transportation: Locate main roads used to transport production and/or waste products greater than 1.9 miles from the perimeter of occupied sage-grouse leks. Locate other roads used to provide facility site access and maintenance greater than 0.6 miles from the perimeter of' occupied sage-grouse leks. Construct roads to minimum design standards needed for production activities. Overhead Lines: Bury lines when possible, if not; locate overhead lines at least 0.6 miles from the perimeter of occupied sage-grouse leks. New lines should be raptor proofed if not buried.	**Exceptions**: Any exceptions to these general or specific stipulations will be considered on a case-by-case basis and must show that the exception will not cause declines in sage-grouse populations.
Colorado Parks and Wildlife	Colorado Greater Sage-grouse Conservation Plan	Within a 0.6-mile radius area around a lek	On federal lands, the 0.6-mile radius area around a lek in breeding habitat could be defined as an area of no surface occupancy or avoidance area. Every possible opportunity to avoid or minimize the impact should be exhausted to prevent development in this area, but allowances	None

TABLE E-15 NO SURFACE OCCUPANCY AND NO SURFACE DISTURBANCE RESTRICTIONS FOR BIOLOGICAL RESOURCES FROM APPLICABLE BUREAU OF LAND MANAGEMENT, U.S. FOREST SERVICE, AND OTHER PLANS				
Agency	**Applicable Plan/Policy**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
			are provided. The 4-mile radius is not a no surface occupancy or avoidance area. It is an area of consideration where the disturbance guidelines should be applied when, and if, possible.	
State of Utah	Conservation Plan for Greater Sage-grouse in Utah, 2013	Lek	▪ Avoid disturbance in the lek, if possible. The Applicant must demonstrate why avoidance is not possible. ▪ If avoidance is not possible, use minimization as appropriate to the lek. ▪ If minimization is not sufficient, mitigation is required. Mitigation should be calculated at a minimum of a 4:1 ratio starting with the first acre disturbed. Mitigation must produce lands capable of supporting greater sage-grouse as habitat before the proposed disturbance occurs, though birds do not need to be using the mitigated area. The Applicant of the disturbance must demonstrate that the conditions have been met. ▪ New permanent disturbance, including structures, fences, and buildings, should not be located in the lek itself. ▪ No permanent disturbance within 1 mile of the lek, unless it is not visible to the sage-grouse using the lek. ▪ Fences should not be located adjacent to leks where bird collisions would be expected to occur. If required, the construction of any fences near the lek should follow the standards identified	None

TABLE E-15 NO SURFACE OCCUPANCY AND NO SURFACE DISTURBANCE RESTRICTIONS FOR BIOLOGICAL RESOURCES FROM APPLICABLE BUREAU OF LAND MANAGEMENT, U.S. FOREST SERVICE, AND OTHER PLANS				
Agency	**Applicable Plan/Policy**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
			in the NRCS fence collision risk tool (refer to NRCS/Conservation Effects Assessment Project Conservation Insight Publication *Applying the Sage Grouse Fence Collision Risk Tool to Reduce Bird Strikes*.) ▪ A disturbance outside the lek should not produce noise that rises more than 10 decibels above the background level at the edge of the lek during breeding season.	
BLM	Little Snake Field Office RMP	Within a 0.6-mile radius of a lek site.	No surface occupancy	The no surface occupancy area may be altered depending upon the active status of the lek, habitat characteristics, or the geographical relationship of topographical barriers and vegetation screening to the lek site.
BLM	White River Field Office RMP	Within 0.25 mile of identified lek sites.	No surface occupancy	Exceptions, modifications, or waivers to this no surface occupancy stipulation may be granted by the Area Manager.
BLM	Vernal Field Office RMP	Within 0.25 mile of active sage grouse leks	No ground-disturbing activities year round.	None
BLM	Moab Field Office RMP	Within 0.5 mile of greater sage-grouse leks.	All ground-disturbing activities will be prohibited on a year-round basis.	**Exception**: An exception may be granted by the Field Manager if the operator submits a plan that demonstrates that impacts from the proposed action can be adequately mitigated. **Modification**: The Field Manager may modify the boundaries of the stipulation area if (1) portions of the area do not include lek sites, or (2) the lek site(s) have been completely abandoned or destroyed, or (3) occupied lek site(s) occur outside the current defined area; as determined by the BLM. **Waiver**: A waiver may be granted if there are no active lek site(s) in the leasehold and it is determined the site(s) have been completely abandoned or

TABLE E-15 NO SURFACE OCCUPANCY AND NO SURFACE DISTURBANCE RESTRICTIONS FOR BIOLOGICAL RESOURCES FROM APPLICABLE BUREAU OF LAND MANAGEMENT, U.S. FOREST SERVICE, AND OTHER PLANS				
Agency	**Applicable Plan/Policy**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
				destroyed or occur outside current defined area, as determined by the BLM.
BLM	Price Field Office RMP	Within 0.5 mile of greater sage-grouse leks	No surface occupancy.	The BLM Authorized Officer can except, modify, or waive surface stipulations. BLM will coordinate as necessary with the appropriate agency or entity. A holder of a land-use authorization document can be excepted from the stipulation on a one-time basis. A modification can be a change in the language or provisions of a surface stipulation, either temporarily or permanently. A waiver permanently excepts the surface stipulation.
BLM	Richfield Field Office RMP	Within 0.5 mile of greater sage-grouse leks	No surface occupancy	**Exception**: An exception may be granted by the Field Manager if the operator submits a plan that demonstrates that impacts from the proposed action can be adequately mitigated. **Modification**: The Field Manager may modify the boundaries of the stipulation area if (1) portions of the area do not include lek sites, (2) the lek site(s) have been completely abandoned or destroyed, or (3) occupied lek site(s) occur outside the current defined area, as determined by the BLM. **Waiver**: A waiver may be granted if there are no active lek site(s) in the leasehold and it is determined the site(s) have been completely abandoned or destroyed or occur outside current defined area, as determined by the BLM.
BLM	Moab Field Office RMP	Within 0.5 miles of a lek in sage-grouse habitat	If greater sage-grouse leks are discovered in sage grouse habitat, no ground-disturbing activities will be allowed.	**Exception**: An exception may be granted by the Field Manager if the operator submits a plan that demonstrates that impacts from the proposed action can be adequately mitigated. **Modification**: The Field Manager may modify the boundaries of the stipulation area if (1) portions of the area do not include lek sites, or (2) the lek site(s) have been completely abandoned or destroyed, or (3) occupied lek site(s) occur outside the current defined

TABLE E-15 NO SURFACE OCCUPANCY AND NO SURFACE DISTURBANCE RESTRICTIONS FOR BIOLOGICAL RESOURCES FROM APPLICABLE BUREAU OF LAND MANAGEMENT, U.S. FOREST SERVICE, AND OTHER PLANS				
Agency	**Applicable Plan/Policy**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
				area; as determined by the BLM. **Waiver**: A waiver may be granted if there are no active lek site(s) in the leasehold and it is determined the site(s) have been completely abandoned or destroyed or occur outside current defined area, as determined by the BLM.
BLM	Moab Field Office RMP	Within 0.6 miles of a lek	If Gunnison sage-grouse leks are discovered in sage-grouse habitat, no ground-disturbing activities will be allowed within 0.6 miles of a lek.	**Exception**: An exception may be granted by the Field Manager if the operator submits a plan that demonstrates that impacts from the proposed action can be adequately mitigated. **Modification**: The Field Manager may modify the boundaries of the stipulation area if (1) portions of the area do not include lek sites, or (2) the lek site(s) have been completely abandoned or destroyed, or (3) occupied lek site(s) occur outside the current defined area, as determined by the BLM. **Waiver**: A waiver may be granted if there are no active lek site(s) in the leasehold and it is determined the site(s) have been completely abandoned or destroyed or occur outside current defined area, as determined by the BLM.
Mexican Spotted Owl				
BLM	Little Snake Field Office RMP	All protected activity centers	No surface occupancy will be applied.	None
BLM	Moab Field Office RMP	Within 0.5 mile of identified nest site; in the designated protected activity center	Survey two consecutive years for owls according to established protocol prior to commencing of activity. If owls are found, no permanent actions will occur. If nest site is unknown, no activity will occur in the designated protected activity center.	None
BLM	Price Field Office RMP	Within 0.5 mile of known Mexican spotted owl nests	No surface occupancy.	The BLM Authorized Officer can except, modify, or waive surface stipulations. BLM will coordinate as necessary with the appropriate agency or entity. A

TABLE E-15 NO SURFACE OCCUPANCY AND NO SURFACE DISTURBANCE RESTRICTIONS FOR BIOLOGICAL RESOURCES FROM APPLICABLE BUREAU OF LAND MANAGEMENT, U.S. FOREST SERVICE, AND OTHER PLANS				
Agency	**Applicable Plan/Policy**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
				holder of a land-use authorization document can be excepted from the stipulation on a one-time basis. A modification can be a change in the language or provisions of a surface stipulation, either temporarily or permanently. A waiver permanently excepts the surface stipulation.
BLM	Richfield Field Office RMP	If project activities occur within 0.5 mile of suitable owl habitat, dependent in part on if the action is temporary or permanent. (Note: Temporary activities are defined as those that are completed prior to the start of the following raptor breeding season, leaving no permanent structures and resulting in no permanent habitat loss. Permanent activities continue for more than one breeding season and/or cause a loss of owl habitat or displace owls through disturbances [e.g., creation of a permanent structure including but not limited to well pads, roads, pipelines, electrical power line]).	Temporary: If action occurs entirely outside of the owl breeding season, and leaves no permanent structure or permanent habitat disturbance, action can proceed without an occupancy survey: ▪ If action will occur during a breeding season, survey for owls prior to commencing activity. If owls are found, activity should be delayed until outside of the breeding season. ▪ Eliminate access routes created by a project through such means as raking out scars, revegetation, gating access points, etc. For all permanent actions that may impact owls or suitable habitat ▪ Permanent: Survey two consecutive years for owls according to established protocol prior to commencing of activity. ▪ If owls are found, no actions will occur within 0.5 mile of identified nest site. ▪ If nest site is unknown, no activity will occur in the designated protected activity center. ▪ Avoid placing permanent structures within 0.5 mile of suitable habitat unless surveyed and not occupied.	None

TABLE E-15 NO SURFACE OCCUPANCY AND NO SURFACE DISTURBANCE RESTRICTIONS FOR BIOLOGICAL RESOURCES FROM APPLICABLE BUREAU OF LAND MANAGEMENT, U.S. FOREST SERVICE, AND OTHER PLANS				
Agency	**Applicable Plan/Policy**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
			▪ Reduce noise emissions (e.g., use hospital-grade mufflers) to 45 A-weighted decibels at 0.5 mile from suitable habitat, including canyon rims. Placement of permanent noise-generating facilities should be determined by a noise analysis to ensure noise does not encroach upon a 0.5-mile buffer for suitable habitat, including canyon rims. ▪ Limit disturbances to and in suitable owl habitat by staying on designated routes. ▪ Limit new access routes created by the project. Prior to ground-disturbing activities in Mexican spotted owl protected activity centers, breeding habitats, or designated critical habitat, specific principles should be considered to control erosion.	
Mountain Plover				
BLM	Little Snake Field Office RMP	Within 0.125 mile around all plover nest sites	No surface occupancy stipulations. The boundaries of the stipulated area may be modified if the Authorized Officer determines that surface occupancy will not harm the integrity of the nest or nest location. Implement controlled surface use and timing stipulation during breeding season.	None
Southwestern Willow Flycatcher				
BLM	Moab Field Office RMP	Within 300 feet of suitable riparian habitat	Activities will maintain a 300-foot buffer from suitable riparian habitat year long.	**Exception**: An exception may be granted by the Field Manager if authorization is obtained from FWS (through applicable provisions of the Endangered Species Act [ESA]). The Field Manager may also

TABLE E-15 NO SURFACE OCCUPANCY AND NO SURFACE DISTURBANCE RESTRICTIONS FOR BIOLOGICAL RESOURCES FROM APPLICABLE BUREAU OF LAND MANAGEMENT, U.S. FOREST SERVICE, AND OTHER PLANS				
Agency	**Applicable Plan/Policy**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
				grant an exception if an environmental analysis indicates that the nature of the conduct of the actions, as proposed or conditioned, will not impair the primary constituent element determined necessary for the survival and recovery of the southwestern willow flycatcher, and FWS concurs with this determination. **Modification**: The Field Manager may modify the boundaries of the stipulation area if an environmental analysis indicates, and FWS (through applicable provisions of the ESA) determines that a portion of the area is not being used as southwestern willow flycatcher habitat. **Waiver**: May be granted if the southwestern willow flycatcher is de-listed and if FWS determines it is not necessary for the survival and recovery of the southwestern willow flycatcher.
Western Yellow-billed Cuckoo				
BLM	Little Snake Field Office RMP	Within 0.25 mile of any suitable yellow-billed cuckoo habitat	Prohibit permanent ground-disturbing activities (no surface occupancy)	Exceptions should be evaluated on a case-by-case basis to avoid adverse impacts.
BLM	Moab Field Office RMP	Within 100 meters of yellow-billed cuckoo habitat	No ground-disturbing activities will be conducted within 100 meters of yellow-billed cuckoo habitat (riparian areas) from May 15 through July 20.	**Exception**: An exception may be granted by the Field Manager if authorization is obtained from FWS (through applicable provisions of the ESA). The Field Manager may also grant an exception if an environmental analysis indicates that the nature of the conduct of the actions, as proposed or conditioned, will not impair the primary constituent element determined necessary for the survival and recovery of the yellow-billed cuckoo.
Big Game				
Elk				
BLM	Grand Junction Field Office RMP	Elk calving areas	Prohibit surface disturbance in these areas year round. The decision to protect	None

TABLE E-15 NO SURFACE OCCUPANCY AND NO SURFACE DISTURBANCE RESTRICTIONS FOR BIOLOGICAL RESOURCES FROM APPLICABLE BUREAU OF LAND MANAGEMENT, U.S. FOREST SERVICE, AND OTHER PLANS				
Agency	**Applicable Plan/Policy**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
			habitats by placing stipulation on disturbance type activities will be implemented by comparing activities proposed with areas identified for protective management. Applicable stipulations will be placed on projects that lie in the protected areas.	
Bighorn Sheep				
BLM	Moab Field Office RMP	In desert bighorn lambing grounds and migration corridors	No ground-disturbing activities are allowed	**Exception**: Within migration corridors, pipeline and road construction and geophysical exploration for oil and gas development would be allowed from June 16 through October 14 and from December 16 through March 31. The Field Manager may also grant an exception if the operator submits a plan that demonstrates that impacts from the proposed action can be adequately mitigated. **Modification**: The Field Manager may modify the boundaries of the stipulation area if a portion of the area is (1) not being used as desert bighorn lambing grounds or migration corridors (2) if habitat is being utilized outside of stipulation boundaries for and needs to be protected. **Waiver**: A waiver may be granted if the habitat is determined as unsuitable for lambing or migration and there is no reasonable likelihood of future use as desert bighorn lambing and/or rutting grounds and migration corridors.
Raptors				
Active Nests				
Colorado Parks and Wildlife	Colorado Division of Wildlife Raptor Guidelines 2008	Within 0.25 mile of active raptor nests	No surface occupancy	With the exception of the species listed specifically identified in plan

TABLE E-15 NO SURFACE OCCUPANCY AND NO SURFACE DISTURBANCE RESTRICTIONS FOR BIOLOGICAL RESOURCES FROM APPLICABLE BUREAU OF LAND MANAGEMENT, U.S. FOREST SERVICE, AND OTHER PLANS				
Agency	**Applicable Plan/Policy**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
BLM	Rawlins Field Office RMP	Within 825 feet of active raptor nests	Well locations, roads, ancillary facilities, and other surface structures requiring a repeated human presence will not be allowed. Distance may vary depending on factors such as nest activity, species, natural topographic barriers, and line-of-sight distances.	None
BLM	Little Snake Field Office RMP	Within 0.25 mile of raptor nests	No surface occupancy	The no surface occupancy area could be altered depending upon the active status of the nest site or upon the geographical relationship of topographical barriers and vegetation screening to the nest site.
BLM	Moab Field Office RMP	In the spatial buffer of active raptor nest	Land use activities that would have an adverse impact on an occupied raptor nest, would not be allowed	None
Raptor Nests – Listed and Candidate Threatened/Endangered Species, BLM Sensitive Species				
BLM	White River Field Office RMP	Within 0.25 mile of identified nests	No surface occupancy	Exceptions, modifications, or waivers to this no surface occupancy stipulation may be granted by the Area Manager.
Raptor Nests – Other Than Special Status Raptors				
BLM	White River Field Office RMP	Within 0.125 mile of identified nests	No surface occupancy	Exceptions, modifications, or waivers to this no surface occupancy stipulation may be granted by the Area Manager.
Bald Eagle Nocturnal Roost and/or Concentration Areas				
BLM	Little Snake Field Office RMP	Within a 0.25-mile radius of roost sites and both occupied and unoccupied nests	Year-round no surface occupancy will be applied	None
BLM	Little Snake Field Office RMP	Within 100-meter radius of abandoned nests	No surface occupancy within a 100-meter radius of abandoned nests (unoccupied for 5 consecutive years, but with all or part of the nest remaining)	None
BLM	Little Snake Field Office RMP	Winter conservation areas	Prohibit any activity on BLM lands that has the potential to kill perch trees or impede use of foraging areas.	None

TABLE E-15 NO SURFACE OCCUPANCY AND NO SURFACE DISTURBANCE RESTRICTIONS FOR BIOLOGICAL RESOURCES FROM APPLICABLE BUREAU OF LAND MANAGEMENT, U.S. FOREST SERVICE, AND OTHER PLANS				
Agency	**Applicable Plan/Policy**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
BLM	White River Field Office RMP	Bald eagle roost/concentration areas within 0.25 mile of designated features	No surface occupancy	Exceptions, modifications, or waivers to this no surface occupancy stipulation may be granted by the Area Manager.
BLM	Moab Field Office RMP	Within 1.0 mile of bald eagle nest sites or within 0.5 mile of bald eagle winter concentration areas	No permanent infrastructure. Permanent activities continue for more than one breeding season and/or cause a loss of habitat or displace individuals through disturbance (e.g., creation of a permanent structure including but not limited to well pads, roads, pipelines, electrical power line).	None
BLM	Moab and Richfield Field Office RMP	Bald eagle conservation measures	Power lines will be built to standards and guidelines identified by the Avian Protection Plan Guidelines.	None
BLM	Richfield Field Office RMP	Within 1 mile of bald eagle nest sites or within 0.5 mile of bald eagle winter concentration areas (roosts)	No permanent structures	None
Golden Eagle				
BLM	Moab Field Office RMP	Golden eagle nest sites and territories	No ground-disturbing activities will be allowed within a 0.5-miles radius of documented golden eagle nest sites in nesting territories from February 1 to July 15 or until fledgling and dispersal of young. Any access created by the action will be outside of nesting season and will be eliminated once action is complete.	**Exception**: An exception may be granted by the Field Manager if authorization is obtained from FWS and Utah Division of Wildlife Resources. The Field Manager may also grant an exception if an environmental analysis indicates that the nature or the conduct of the actions, as proposed or conditioned, will not impair the primary constituent element determined necessary for the survival and recovery of the golden eagle. **Modification**: The Field Manager may modify the boundaries of the stipulation area if an environmental analysis indicates and FWS and Utah Division of Wildlife Resources determine a portion of the area is not being used as golden eagle nesting territories.

TABLE E-15 NO SURFACE OCCUPANCY AND NO SURFACE DISTURBANCE RESTRICTIONS FOR BIOLOGICAL RESOURCES FROM APPLICABLE BUREAU OF LAND MANAGEMENT, U.S. FOREST SERVICE, AND OTHER PLANS				
Agency	**Applicable Plan/Policy**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
				Waiver: A waiver may be granted if an individual golden eagle nest has been inactive (unoccupied) for at least a period of 3 years. Nest-monitoring data for a 3-year period will be required before the waiver could be granted.
Ferruginous Hawk				
Colorado Parks and Wildlife	Colorado Division of Wildlife Raptor Guidelines 2008	Within 0.5 mile of ferruginous hawk nests	No surface occupancy	None
BLM	Rawlins Field Office RMP	Within 1,200 feet of active ferruginous nests	Well locations, roads, ancillary facilities, and other surface structures requiring a repeated human presence will not be allowed. Distance may vary depending on factors such as nest activity, species, natural topographic barriers, and line-of-sight distances.	None
Mexican Spotted Owl				
BLM	Little Snake Field Office RMP	All protected activity centers	No surface occupancy will be applied	None
BLM	Moab Field Office RMP	Within 0.5 mile of an identified site; in the designated current and historic protected activity center.	If owls are found, no disturbing actions will occur within 0.5 mile of an identified site. If nest site is unknown, no activity will occur in the designated current and historic protected activity center.	None
Northern Goshawk				
Colorado Parks and Wildlife	Colorado Division of Wildlife Raptor Guidelines 2008	Within 0.5 mile of northern goshawk nests	No surface occupancy	None

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Agency	**Applicable Plan/Policy**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
Red-tailed Hawk				
Colorado Parks and Wildlife	Colorado Division of Wildlife Raptor Guidelines 2008	Within 0.33 mile of red-tailed hawk nests	No surface occupancy	None
Peregrine Falcon				
Colorado Parks and Wildlife	Colorado Division of Wildlife Raptor Guidelines 2008	Within 0.5 mile of peregrine falcon nests	No surface occupancy	None
BLM	Little Snake Field Office RMP	Within a 0.25 mile radius of cliff nesting complexes	No surface occupancy will be allowed.	No surface occupancy areas may be altered depending upon the active status of the nesting complex or upon the geographical relationship of topographical barriers and vegetation screening.
Prairie Falcon				
Colorado Parks and Wildlife	Colorado Division of Wildlife Raptor Guidelines 2008	Within 0.5 mile of prairie falcon nests.	No surface occupancy	None
Waterfowl				
Waterfowl and Shorebird Significant Production Areas				
BLM	Little Snake Field Office RMP	Waterfowl habitat management areas and rookeries	No surface occupancy will be allowed on significant production areas, such as waterfowl habitat management areas and rookeries.	No surface occupancy areas may be altered, depending upon the active status of the production areas or upon the geographical relationship of topographical barriers and vegetation screening.
BLM	Salt Lake Field Office RMP	In waterfowl habitat (i.e., marsh and wetland areas)	BLM will protect important wildlife habitat values from disturbing activities by restricting seismic work, well development, new road construction, rights-of-way, and other disturbing activities, excluding maintenance activities.	Specific exceptions may be granted by BLM if the proposed activity will not seriously disturb the wildlife habitat values being protected.

TABLE E-16 CONDITIONAL SURFACE USE RESTRICTIONS FOR BIOLOGICAL RESOURCES FROM APPLICABLE BUREAU OF LAND MANAGEMENT, U.S. FOREST SERVICE, AND OTHER PLANS				
Agency	**Applicable Plan/Policy**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
Wetlands and Riparian Areas				
Bureau of Land Management (BLM)	Rawlins Field Office Resource Management Plan (RMP)	▪ Identified 100-year floodplains; ▪ areas within 500 feet of perennial waters, springs, and wetland and riparian areas; and ▪ areas within 100 feet of the inner gorge of ephemeral channels.	Ground-disturbing activities will be avoided.	Exceptions to this will be granted by the BLM based on an environmental analysis and site-specific engineering and mitigation plans. Only those actions in areas that cannot be avoided and that provide protection for the resource identified will be approved.
BLM	Grand Junction Field Office RMP	Palisade and Grand Junction municipal watersheds and the Jerry Creek Reservoirs	Limit ground-disturbing activities	None
BLM	Salt Lake Field Office RMP	Within 1,200 feet of riparian/aquatic habitats	Avoid to the maximum extent possible: Lands within 1,200 feet of riparian/aquatic habitats.	Specific exceptions may be granted by BLM if the proposed activity will not seriously disturb the wildlife habitat values being protected.
Soils				
BLM	White River Field Office RMP	Fragile soils on slopes greater than 35 percent and saline soils derived from Mancos shale	Ground-disturbing activities will be allowed in these areas only after an engineered construction/reclamation plan is submitted by the operator and approved by the Field Manager. The following items must be addressed in the plan: ▪ how soil productivity will be restored; and ▪ how surface runoff will be treated to avoid accelerated erosion such as riling, gullying, piping, and mass wasting.	**Exception**: An exception may be granted by the Field Manager if an environmental analysis of the proposed action identifies that the scale of the operation would not result in any long term decrease in site productivity or increased erosion. An exception may also be granted by the Field Manager if a more detailed soil survey determines that soil properties associated with the disturbance do not meet fragile soil criteria. **Modification**: None. **Waiver**: None.

TABLE E-16 CONDITIONAL SURFACE USE RESTRICTIONS FOR BIOLOGICAL RESOURCES FROM APPLICABLE BUREAU OF LAND MANAGEMENT, U.S. FOREST SERVICE, AND OTHER PLANS				
Agency	**Applicable Plan/Policy**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
BLM	Price Field Office RMP	Slopes between 20 and 40 percent	In ground-disturbing proposals regarding construction on slopes of 20 percent to 40 percent, include an approved erosion control strategy and topsoil segregation/restoration plan. Such construction must be properly surveyed and designed by a certified engineer and approved by the BLM prior to project implementation, construction, or maintenance.	**Exception**: If after an environment analysis the Authorized Officer determines that it would cause undue or unnecessary degradation to pursue other placement alternatives; surface occupancy in the area may be authorized. In addition, a plan from the operator and BLM's approval of the plan would be required before construction and maintenance could begin. The plan must include: • An erosion control strategy • GIS modeling • Proper survey and design by a certified engineer. **Modification**: Modifications also may be granted if a more detailed analysis, e.g., Order I soil survey conducted by a qualified soil scientist, finds that surface disturbance activities could occur on slopes between 20 and 40 percent while adequately protecting areas from accelerated erosion. **Waiver**: None
BLM	Rawlins Field Office RMP		Avoid construction with frozen material or during periods when the soil material is saturated or when watershed damage is likely to occur.	Exception, waiver, or modification of this limitation may be approved in writing, including documented supporting analysis, by the Authorized Officer.

TABLE E-16 CONDITIONAL SURFACE USE RESTRICTIONS FOR BIOLOGICAL RESOURCES FROM APPLICABLE BUREAU OF LAND MANAGEMENT, U.S. FOREST SERVICE, AND OTHER PLANS				
Agency	**Applicable Plan/Policy**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
Special Status Plants				
Rare Plant and Rare Plant Community Occurrences in Natural Systems				
BLM	Little Snake Field Office RMP	Rare plant and rare plant community in Limestone Ridge and Lookout Mountain	Avoidance areas for ground-disturbing activities: All disruptive activities will be delayed until specific protective measures are developed and implemented, if appropriate.	BLM
BLM	Grand Junction Field Office RMP	Significant known sites	The decision to protect habitats by placing stipulations on disturbance type activities will be implemented by comparing activities proposed with areas identified for protective management. Applicable stipulations will be placed on projects that lie in the protected areas.	None
Clay Phacelia				
U.S. Forest Service (USFS)/U.S. Fish and Wildlife Service (FWS)	Clay phacelia conservation measures	Within 200 feet of suitable habitat	No mechanical vegetation treatments	None
USFS/FWS	Clay phacelia conservation measures	Within 650 feet of suitable habitat	No construction of roads or disturbance from construction of poles, pads, towers, and other permanent features	If avoidance of suitable habitat is not possible, cumulative disturbance will not exceed 10 percent. Mitigation measures will be necessary for any disturbance in clay phacelia suitable habitat. The following measures will also be followed for any disturbance in clay phacelia suitable habitat: ▪ Clearance surveys should be conducted following the development of the construction footprint and prior to construction in order to determine species presence.

TABLE E-16 CONDITIONAL SURFACE USE RESTRICTIONS FOR BIOLOGICAL RESOURCES FROM APPLICABLE BUREAU OF LAND MANAGEMENT, U.S. FOREST SERVICE, AND OTHER PLANS				
Agency	**Applicable Plan/Policy**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
				▪ All project employees, especially contractors, brought onsite for the duration of a project will be informed of the occurrence of clay phacelia in the project area and of the endangered status of the species. All project employees shall be advised as to the potential penalties (up to $200,000 in fines and one year in prison) for damaging, destroying or removing and possessing a plant species on federal lands listed under the Act. A qualified biologist is required to perform this instruction. ▪ A qualified botanist should be on-site during all ground disturbing activities to ensure plants are identified and avoided in suitable habitat. If any activity, development, or ground disturbance (even if temporary) occurs in clay phacelia modeled habitat, the following measures shall be considered: ▪ Acquisition of occupied habitat and placement into permanent conservation ▪ Successful introduction of clay phacelia into new sites on USFS land (up to 5 sites where presence of flowering adults occurs for a period of 5 years)

TABLE E-16 CONDITIONAL SURFACE USE RESTRICTIONS FOR BIOLOGICAL RESOURCES FROM APPLICABLE BUREAU OF LAND MANAGEMENT, U.S. FOREST SERVICE, AND OTHER PLANS				
Agency	**Applicable Plan/Policy**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
				▪ Fencing of existing and suitable sites to protect from herbivores ▪ Contribution to a fund for ongoing management of populations and protection (e.g., fencing, caging, control of herbivores) of occupied habitat The following measures will be considered and weighted into the final mitigation calculation: ▪ Amount of modeled habitat disturbed and proximity to occupied habitat ▪ Type of disturbance: permanent development, temporary development, temporary construction activity, intermittent activity ▪ Amount of time of disturbance: 1 month or less, up to 6 months, up to 1 year, more than 1 year or continuous ▪ Habitat fragmentation: Location and spacing of transmission lines from each other and other development.
USFS/FWS	Clay phacelia conservation measures	Within 2,500 feet of suitable habitat	No on-the-ground herbicide treatments. No aerial herbicide treatments.	None

TABLE E-16 CONDITIONAL SURFACE USE RESTRICTIONS FOR BIOLOGICAL RESOURCES FROM APPLICABLE BUREAU OF LAND MANAGEMENT, U.S. FOREST SERVICE, AND OTHER PLANS				
Agency	**Applicable Plan/Policy**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
USFS/FWS	Clay phacelia conservation measures	In clay phacelia suitable habitat	No ground disturbance from the stringing of wire between towers. Wire should be strung between towers aerially. A vegetation management plan should be developed that outlines methods for control of invasive, exotic species in greater detail while protecting clay phacelia and its habitat. A wildfire mitigation plan should be developed to prevent suitable habitat from being impacted by emergency fire operations in the event of a wildfire. All equipment should be cleaned and inspected for presence of invasive, non-native plants and seeds before being brought in suitable habitat.	None
Jones' Cycladenia				
BLM	Moab Field Office RMP	Potential, suitable, and occupied habitat. Potential, suitable, and occupied habitat are defined as follows: Potential habitat is defined as areas that satisfy the broad criteria of the species habitat description; usually determined by preliminary, in-house assessment. Suitable habitat is defined as areas that contain or exhibit the specific components or constituents necessary for plant persistence; determined by field inspection and/or surveys; may or may not contain clay reed-mustard; habitat descriptions can be found in the *Federal Register* Notice and species recovery plan links at	Current avoidance and minimization measures include the following: ▪ Pre-project habitat assessments will be completed across 100 percent of the project disturbance area in potential habitat prior to any ground disturbing activities to determine if suitable Jones cycladenia habitat is present. ▪ Site inventories will be conducted in suitable habitat to determine occupancy. Where standard surveys are technically infeasible and otherwise hazardous due to topography, slope, etc., suitable habitat will be assessed and mapped for avoidance (hereafter, "avoidance areas"); in such cases, in general, 300-foot buffers will be maintained between surface disturbance and avoidance areas. However, site-specific	None

TABLE E-16 CONDITIONAL SURFACE USE RESTRICTIONS FOR BIOLOGICAL RESOURCES FROM APPLICABLE BUREAU OF LAND MANAGEMENT, U.S. FOREST SERVICE, AND OTHER PLANS				
Agency	**Applicable Plan/Policy**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
		http://www.fws.gov/endangered/wildlife.html>. Occupied habitat is defined as areas currently or historically known to support clay reed-mustard; synonymous with "known habitat."	distances will need to be approved by FWS and BLM when disturbance will occur upslope of the habitat. Where conditions allow, inventories: • Must be conducted by qualified individual(s) and according to BLM- and FWS-accepted survey protocols; • Will be conducted in suitable and occupied habitat for all areas proposed for surface disturbance prior to initiation of project activities and in the same growing season, at a time when the plant can be detected (usually May 15 to June 30, however, surveyors should verify that the plant is flowering by contacting a BLM or FWS botanist or demonstrating that the nearest known population is in flower); • Will occur within 300 feet from the centerline of the proposed right-of-way for surface pipelines or roads; and within 300 feet from the perimeter of disturbance for the proposed well pad including the well pad; • Will include, but not be limited to, plant species lists and habitat characteristics; and • Will be valid until May 1 the following year. ▪ Design project infrastructure to minimize impacts in suitable habitat: • Where standard surveys are technically infeasible, infrastructure and activities will avoid all suitable habitat (avoidance areas) and incorporate 300-foot buffers, in general; however, site specific distances will need to be approved by FWS and BLM when disturbance will occur upslope of habitat;	

TABLE E-16 CONDITIONAL SURFACE USE RESTRICTIONS FOR BIOLOGICAL RESOURCES FROM APPLICABLE BUREAU OF LAND MANAGEMENT, U.S. FOREST SERVICE, AND OTHER PLANS				
Agency	**Applicable Plan/Policy**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
			• Reduce well pad size to the minimum needed, without compromising safety; • Where technically and economically feasible, use directional drilling or multiple wells from the same pad; • Limit new access routes created by the project; • Roads and utilities should share common right-of-ways where possible; • Reduce the width of right-of-ways and minimize the depth of excavation needed for the road bed; where feasible, use the natural ground surface for the road in habitat; • Place signing to limit off-road travel in sensitive areas; • Stay on designated routes and other cleared/approved areas; and • All disturbed areas will be revegetated with native species comprised of species indigenous to the area and non-native species that are not likely to invade other areas. ▪ In occupied habitat, project infrastructure will be designed to avoid direct disturbance and minimize indirect impacts on populations and to individual plants: • Follow the above recommendations for Project design in suitable habitats; • To avoid water flow and/or sedimentation into occupied habitat and avoidance areas, silt fences, hay bales, and similar structures or practices will be incorporated into the project design; appropriate placement of fill is encouraged;	

TABLE E-16 CONDITIONAL SURFACE USE RESTRICTIONS FOR BIOLOGICAL RESOURCES FROM APPLICABLE BUREAU OF LAND MANAGEMENT, U.S. FOREST SERVICE, AND OTHER PLANS				
Agency	**Applicable Plan/Policy**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
			• Construction of roads will occur such that the edge of the right of way is at least 300 feet from any plant and 300 feet from avoidance areas; • Roads will be graveled in occupied habitat; the operator is encouraged to apply water for dust abatement to such areas from May 15 to June 30 (flowering period); dust abatement applications will be comprised of water only; • The edge of the well pad should be located at least 300 feet away from plants and avoidance areas, in general; however, site specific distances will need to be approved by FWS and BLM when disturbance will occur upslope of habitat; • Surface pipelines will be laid such that a 300-foot buffer exists between the edge of the right of way and plants and 300 feet between the edge of right of way and avoidance areas; use stabilizing and anchoring techniques when the pipeline crosses suitable habitat to ensure pipelines don't move towards the population; site specific distances will need to be approved by FWS and BLM when disturbance will occur upslope of habitat; • Construction activities will not occur from May 15 through June 30 in occupied habitat; • Before and during construction, areas for avoidance should be visually identifiable in the field, e.g., flagging, temporary fencing, rebar, etc.; • Place produced oil, water, or condensate	

TABLE E-16 CONDITIONAL SURFACE USE RESTRICTIONS FOR BIOLOGICAL RESOURCES FROM APPLICABLE BUREAU OF LAND MANAGEMENT, U.S. FOREST SERVICE, AND OTHER PLANS				
Agency	**Applicable Plan/Policy**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
			tanks in centralized locations, away from occupied habitat; and • Minimize the disturbed area of producing well locations through interim and final reclamation. Reclaim well pads following drilling to the smallest area possible. ▪ Occupied Jones cycladenia habitats within 300 feet of the edge of the surface pipelines' right of ways, 300 feet of the edge of the roads' right of ways, and 300 feet from the edge of the well pad shall be monitored for a period of 3 years after ground disturbing activities. Monitoring will include annual plant surveys to determine plant and habitat impacts relative to project facilities. Annual reports shall be provided to the BLM and FWS. To ensure desired results are being achieved, minimization measures will be evaluated and may be changed after a thorough review of the monitoring results and annual reports during annual meetings between the BLM and the FWS. ▪ Reinitiation of Section 7 consultation with the FWS will be sought immediately if any loss of plants or occupied habitat for the Jones' cycladenia is anticipated as a result of project activities. Additional site-specific measures may also be employed to avoid or minimize effects on the species. These additional measures will be developed and implemented in consultation with the FWS to ensure continued compliance with the Endangered Species Act (ESA).	

TABLE E-16 CONDITIONAL SURFACE USE RESTRICTIONS FOR BIOLOGICAL RESOURCES FROM APPLICABLE BUREAU OF LAND MANAGEMENT, U.S. FOREST SERVICE, AND OTHER PLANS				
Agency	**Applicable Plan/Policy**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
Ute Ladies'-tresses				
BLM	Little Snake Field Office RMP	0.25 miles from any known Ute ladies'-tresses orchid habitat	All proposed right-of-way projects (power lines, pipelines, roads, etc.) will be designed and locations selected to minimize disturbances. If avoidance of adverse effects is not possible, the BLM will re-initiate consultation with the FWS.	None
BLM	Little Snake Field Office RMP	In occupied or suitable habitat	Ground-disturbing activities would be preceded by a current year survey and a separate Section 7 consultation.	None
BLM	Richfield Field Office RMP	Occupied Ute ladies'-tresses habitats within 300 feet of the edge of the surface pipelines' rights-of-way, 300 feet of the edge of the roads' rights-of-way, and 300 feet from the edge of the well pad	Occupied habitat shall be monitored for a period of 3 years after ground-disturbing activities. Monitoring will include annual plant surveys to determine plant and habitat impacts relative to project facilities. Habitat impacts include monitoring any changes in hydrology due to Project-related activities. Annual reports shall be provided to the BLM and FWS. To ensure desired results are being achieved, minimization measures will be evaluated and may be changed after a thorough review of the monitoring results and annual reports during annual meetings between the BLM and FWS.	None
Special Status Wildlife Species				
BLM	Grand Junction Field Office RMP	Standard designs for power line projects	Structure holes left open overnight shall be covered. Covers shall be secure and strong enough to prevent livestock or wildlife from falling into holes.	None
BLM	Grand Junction Field Office RMP	Standard designs for power line projects	Holder shall not blade or excavate to prepare a structure framing pad. If a structure cannot be framed on the natural ground, aerial framing or off-site framing will be necessary.	None
BLM	Little Snake Field Office RMP	All special status wildlife	▪ Minimize width of field surface roads. ▪ Avoid engineered and graveled roads when possible to reduce the footprint.	None

TABLE E-16 CONDITIONAL SURFACE USE RESTRICTIONS FOR BIOLOGICAL RESOURCES FROM APPLICABLE BUREAU OF LAND MANAGEMENT, U.S. FOREST SERVICE, AND OTHER PLANS				
Agency	**Applicable Plan/Policy**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
			▪ Reduce the long-term footprint of facilities to the smallest practical space. ▪ Design and construct roads to minimize duplication of them. ▪ Cluster development of roads, pipelines, electric lines, and other facilities, and use existing, combined corridors where possible.	
BLM	Richfield Field Office RMP	Standard designs for power line projects	▪ Ensure rights-of-way and utility corridors use areas adjoining or adjacent to previously disturbed areas whenever possible. • Stabilize disturbed areas in road rights-of-way and utility corridors with vegetation practices designed to hold soil in place and minimize erosion. Reestablish vegetation cover to increase infiltration and provide additional protection from erosion. • Construct sediment barriers when needed to slow runoff, allow deposition of sediment, and prevent transport from the site. Straining or filtration mechanisms may also be employed for the removal of sediment from runoff.	None
BLM	Fillmore Field Office RMP	Standard designs for power line projects	▪ The road or highway in the right-of-way corridor shall be used to the maximum extent possible for construction and maintenance of new rights-of-way. ▪ Roads that are needed for construction of a new right-of-way shall be temporary and fully rehabilitated. ▪ All land disturbed by new rights-of-way except authorized new access roads shall be rehabilitated to as close to natural conditions as possible.	None

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			▪ Transmission line rights-of-way shall bead adjacent to each other or as close as possible. ▪ New rights-of-way shall be limited to below the surface of the ground uses only. ▪ Existing transmission line access roads shall be used, and only the roads to new tower sites shall be constructed for new right-of-way. ▪ All rights-of-way must comply with the applicable Visual Resource Management classes.	
BLM	Salt Lake Field Office RMP	Standard designs for power line projects	Rights-of-way, whether inside or outside a corridor, will avoid the following areas to the maximum extent possible: ▪ Lands within 0.5 mile of sage grouse strutting grounds if the disturbance would adversely impact the effectiveness of the lek. ▪ Lands within 1,200 feet of riparian/aquatic habitats. ▪ Lands in Visual Resource Management Class II and III areas. ▪ Lands in wilderness study areas. ▪ Lands where an above-ground right-of-way would be an obvious visual or physical intrusion such as ridge tops or narrow drainages. ▪ Lands with slopes greater than 30 percent. ▪ Lands with known or suspected hazardous materials. In addition, construction activities would not be allowed in the crucial seasons and habitats for mule deer, elk, pronghorn, bald eagles, and other raptors.	Exceptions may be permitted based on consideration of the following criteria: ▪ a type and need for facility proposed and economic impact of facility; ▪ conflicts with other resource values and uses; and ▪ availability of alternative routes and/or mitigation

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Black-footed Ferret				
BLM	Rawlins Field Office RMP	Within 164 feet (50 meters) of a prairie dog town	If prairie dog towns/complexes suitable as black-footed ferret habitat are present, attempts will be made to avoid locating ground-disturbing activities.	None
BLM	Little Snake Field Office RMP	Active white-tailed prairie dog colonies in the black-footed ferret reintroduction area.	Avoidance areas for ground-disturbing activities. Right-of-ways on public land with the potential to disturb occupied black-footed ferret habitat will be rerouted to avoid those prairie dog towns.	None
BLM	Little Snake Field Office RMP	Prairie dog towns	Rights-of-way on public land with the potential to disturb occupied black-footed ferret habitat will be rerouted to avoid those prairie dog towns.	None
BLM	Little Snake Field Office RMP	Potential habitat	In areas where black-footed ferret occupancy is suspected or where surveys have not cleared the area, spotlighting surveys would be required prior to ground disturbing activities.	None
BLM	Little Snake Field Office RMP	Occupied black-footed ferret habitat	Avoidance areas for new rights-of-way	None
BLM	White River Field Office RMP	Ferret reintroduction area	Prior to authorizing activities in this area, the Area Manager will confer or consult with the FWS as required by Section 7 of the ESA. Depending on the scope of the proposed action, a plan of development may be required that demonstrates how the proposed activities would be conducted or conditioned to: ▪ avoid the direct or indirect loss of black-footed ferrets; or ▪ avoid affecting the capability of the site to achieve reestablishment objectives. The Area Manager may impose land use measures and limitations derived from a site specific ferret reintroduction and management plan. The	**Exception:** The Area Manager may authorize surface disturbance or use in these areas if an environmental analysis, and associated biological assessment, finds that the activity as proposed of conditioned, would not adversely influence ferret recovery, or conflict with the ferret reintroduction and conditioned, would not adversely influence ferret recovery, or conflict with the ferret reintroduction and management plan. **Modification:** The Area Manager may modify the terms of the

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			measures and limitations would be designed to avoid, or reduce to acceptable levels, the short and long term adverse effects on ferret survival, behavior, reproductive activities, and/or the area's capacity to sustain ferret population objectives. Examples of measures and limitations include: ▪ relocation of surface 'activities more than 200 meters; ▪ deferring activities longer than 60 days; ▪ limiting access to designated roads and trails; ▪ modifications to project design to discourage raptor perching and prohibit the disruption of certain or all prairie dog burrow systems; ▪ limit surface disturbance to certain seasons and times of day; and ▪ require participation in ferret surveys and/or efforts to offset loses of, or expand suitable prairie dog habitats to compensate for unavoidable habitat loss or adverse habitat modification.	controlled-surface use if the proposed action is shown to be compatible with ferret recovery goals and/or, the ferret reintroduction and management plan. **Waiver:** The Area Manager may grant a waiver if extirpation of wild, free roaming ferret populations culminates in the discontinuance of the species recovery program, or local reintroduction efforts are otherwise abandoned.
White-tailed Prairie Dog				
BLM	Rawlins Field Office RMP	In white-tailed and black-tailed prairie dog towns	Ground-disturbing and disruptive activities will be avoided.	None
BLM	Rawlins Field Office RMP	In prairie dog towns	Placement of power poles will be avoided; however, in the event that power poles are required to be placed in these towns, raptor anti-perch devices will be required.	None
BLM	White River Field Office RMP	Prairie dog towns	Lands in this lease parcel involve prairie dog ecosystems that constitute potential habitat for wild or reintroduced populations of the federally endangered black-footed ferret. Conservation and recovery efforts for the black-footed ferret are authorized by the ESA (as amended). The successful lessee may be required to perform special	None

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			conservation measures prior to and during lease development. These measures may include one or more of the following: ▪ Performing site-specific habitat analysis and/or participating in ferret surveys. ▪ Participating in the preparation of a surface use plan of operations with BLM, FWS, and Colorado Division of Wildlife, which integrate and coordinate long-term lease development with measures necessary to minimize adverse impacts on black-footed ferrets or their habitat. ▪ Abiding by special daily and seasonal activity restrictions on construction, drilling, product transport, and service activities. ▪ Incorporating special modifications to facility siting, design, construction, and operation. ▪ Providing in-kind compensation for habitat loss and/or displacement (e.g, special on-site rehabilitation/revegetation measures or off-site habitat enhancement).	
Colorado River Fishes				
BLM	White River Field Office RMP	Colorado River cutthroat trout habitat	This is a controlled surface use area for protecting aquatic habitats occupied by candidate populations of Colorado River cutthroat trout. Prior to authorizing surface disturbance of occupied stream reaches or in watersheds contributing to occupied habitats, the Area Manager may require the Applicant to submit a plan of development that would demonstrate that the proposed action would not: ▪ increase stream gradient; ▪ result in a net increase in sediment contribution; ▪ decrease stream channel sinuosity;	**Exception**: The Area Manager may authorize surface disturbance in these areas if an environmental analysis indicates that the project would have no adverse influence on identified stream characteristics. **Modification**: Short term transgressions of the stream characteristics listed above may be allowed if the Area Manager determines, through environmental analysis, that short term deviations will have no adverse consequences

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			▪ increase the channel width to depth ratio; ▪ increase water temperature; ▪ decrease vegetation derived stream shading; and ▪ degrade existing water quality parameters, including specific conductance, turbidity, organic/inorganic contaminant levels, and dissolved oxygen in occupied reaches or contributing perennial or intermittent tributaries. If approvals are granted and development results in these standards being exceeded, additional measures would be required to correct the deficiencies. The Applicant may be required to monitor stream/channel responses throughout the life of the project.	on affected channel reaches beyond the construction phase of the project. **Waiver**: In the event the population status of Colorado River cutthroat trout warrants downgrading, this stipulation may be replaced by less stringent criteria.
BLM	Little Snake Field Office RMP	All new pipelines and other controlled surface uses crossing any critical or occupied habitat of the Colorado River fishes	Controlled-surface uses crossing any critical or occupied habitat of the Colorado River fishes will require separate Section 7 consultation.	None
BLM	Little Snake Field Office RMP	All new pipelines and other controlled surface uses crossing any critical or occupied habitat of the Colorado River fishes	After construction, the stream bed will be returned to preconstruction contours	None
BLM	Moab and Richfield Field Office RMP	Within 0.25 mile of the channel centerline of the Colorado, Green, Duchesne, Price, White, and San Rafael rivers	Ground-disturbing activities will be restricted.	None
BLM	Moab Field Office RMP	In floodplains or riparian areas	Ground-disturbing activities will be avoided unless there is no practical alternative or the development would enhance riparian/aquatic values. If activities must occur in these areas, construction will be designed to include mitigation efforts to maintain, restore, and/or improve riparian and aquatic conditions. If conditions could	None

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			not be maintained, offsite mitigation strategies should be considered.	
Columbian Sharp-tailed Grouse				
BLM	Rawlins Field Office RMP	Within 0.25 to 1 mile of an occupied sharp-tailed grouse lek	High-profile structures (e.g., buildings, storage tanks, overhead power lines, wind turbines, towers, windmills) will be authorized on a case-by-case basis.	None
Greater Sage-grouse				
State of Wyoming	Executive Order for Greater Sage-grouse in Wyoming, 2011	Suitable sage-grouse habitat	Surface disturbance will be limited to 5 percent of suitable sage-grouse habitat per an average of 640 acres. The density of disturbance calculation tool process will be used to determine the level of disturbance. Distribution of disturbance may be considered and approved on a case-by-case basis. Unsuitable habitat should be identified in a seasonal and landscape context, on a case-by-case basis, outside the 0.6-mile buffer around leks.	**Exceptions**: Any exceptions to these general or specific stipulations will be considered on a case by case basis and must show that the exception will not cause declines in sage-grouse populations.
Colorado Parks and Wildlife	Colorado Greater Sage-grouse Conservation Plan	Lek habitat	Power lines (transmission, service lines) – Whenever possible, avoid the construction of power lines in lek habitat. If impractical, power lines in lek habitat should be retro-fitted to deter raptor perching. If practical, power lines should be constructed to reduce the likelihood of grouse-wire collisions. Similar adjustments should be applied to existing power lines where grouse mortality issues have been identified. Roads and Trails – Avoid constructing roads and trails in lek habitat. If unavoidable, roads should be placed so they, and their associated traffic, are not in direct line-of-sight of strutting males. Vehicles should not exceed 30 to 40 mph during the strutting period to avoid grouse-vehicle collisions. Roads should be minimally developed and seasonal closures should be developed.	None

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Colorado Parks and Wildlife	Colorado Greater Sage-grouse Conservation Plan	Breeding habitat – nesting and early brood-rearing habitat, summer-fall habitat, and winter habitat	Power lines – If possible, power lines should be avoided in these seasonal habitats. If not possible, consider burying power lines, placing raptor perching deterrents, and avoiding areas where sage-grouse concentrate, riparian areas, or areas where collisions or predatory events from perching raptors have been documented. Roads and Trails – Vehicles should not exceed 30 to 40 mph on local or unpaved roads.	None
State of Utah	Conservation Plan for Greater Sage-grouse in Utah, 2013	Transmission corridors	▪ Apply mitigation standards based on habitat type as discussed in the Management Protocol, and best management practices accepted by industry and state and federal agencies. ▪ For electrical transmission lines, and where feasible and consistent with federally required electrical separation standards, site new linear transmission features in existing corridors, or at a minimum, in concert with existing linear features in greater sage-grouse habitat. Siting linear features accordingly shall be deemed to be mitigation for the siting.	None
State of Utah	Conservation Plan for Greater Sage-grouse in Utah, 2013	Nesting and brood-rearing area (i.e., habitat within a 3-mile radius of the lek; and winter habitat; and other habitat [Note: Other habitat refers to habitat in sage-grouse management areas that is not part of the lek, nesting, or wintering areas).	• Avoid disturbance in nesting and brood-rearing area, if possible. The Applicant must demonstrate why avoidance is not possible. • If avoidance is not possible, use minimization as appropriate in the nesting and brood rearing area. • If minimization is not sufficient, mitigation is required. Mitigation should be calculated at a minimum of a 4:1 ratio starting with the first acre disturbed. Mitigation must produce lands capable of supporting sage-grouse as habitat before the proposed disturbance occurs, though birds do not need to be using	None

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			the mitigated area. The Applicant of the disturbance must demonstrate that the conditions have been met. • Cumulative new permanent disturbance in the sage-grouse management area should not exceed 5 percent of the spatial extent of the nesting habitat in the sage-grouse management area. Allowances must be made to include the temporal effects of any temporary disturbance, if any such effects are expected.	
BLM	Rawlins Field Office RMP	Within 0.25 mile to 1.0 mile of an occupied greater sage-grouse lek	High-profile structures (e.g., buildings, storage tanks, overhead power lines, wind turbines, towers, windmills) will be authorized on a case-by-case basis.	None
BLM	Vernal Field Office RMP	Within 0.5 mile of known active leks	The best available technology will be used to reduce noise (e.g., installation of multi-cylinder pumps, hospital sound-reducing mufflers, and placement of exhaust systems).	None
BLM	Fillmore Field Office RMP	Within 2.0 miles of active sage-grouse strutting ground	Sagebrush manipulation will be prohibited in that zone and a seasonal off-highway vehicle restriction will be implemented.	None
Mexican Spotted Owl				
BLM	Vernal Field Office RMP	If owls are found, no actions will occur within 0.5 mile of identified nest site. If nest site is unknown, no activity will occur in the designated protected activity center.	For all permanent actions that may impact owls or suitable habitat, survey two consecutive years for owls according to accepted protocol prior to commencing activities. Avoid drilling and permanent structures within 0.5 mile of suitable habitat unless surveyed and not occupied.	BLM
BLM	Moab Field Office RMP	Mexican spotted owl protected activity centers, breeding habitat, or designated critical habitat	▪ BLM will place restrictions on all authorized (permitted) activities that may adversely affect the Mexican spotted owl in identified protected	**Exception:** An exception may be granted by the Field Manager if authorization is obtained from FWS

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			activity centers, breeding habitat, or designated critical habitat to reduce the potential for adverse impacts on the species. Restrictions and procedures have been adapted from guidance published in the *Utah Field Office Guidelines for Raptor Protection from Human and Land-use Disturbances*, as well as coordination between the BLM and FWS. Measures include:
			• Surveys, according to FWS protocol, will be required prior to any disturbance-related activities that have been identified to have the potential to affect Mexican spotted owl, unless current species' occupancy and distribution information is complete and available. All surveys must be conducted by FWS certified individuals and approved by the BLM Authorized Officer.
			• Assessment of habitat suitability for both nesting and foraging using accepted habitat models in conjunction with field reviews. Apply the appropriate conservation measures below if Project activities occur within 0.5 mile of suitable owl habitat, dependent in part on if the action is:
			  o **Temporary:** activities completed prior to the start of the following raptor breeding season, leaving no permanent structures, and resulting in no permanent habitat loss.
			  o **Permanent:** activities that continue for more than one breeding season and/or cause a loss of owl habitat or displaces owls through disturbances (e.g., creation of a permanent structure including but not limited to well pads,
				(through applicable provisions of the ESA). The Field Manager may also grant an exception if an environmental analysis indicates the nature or the conduct of the actions would not impair the primary constituent element determined necessary for the survival and recovery of the Mexican spotted owl and FWS concurs with this determination.
				Modification: The Field Manager may modify the boundaries of the stipulation area if an environmental analysis indicates and FWS (through applicable provisions of the ESA) determines a portion of the area is not being used as critical habitat.
				Waiver: A waiver may be granted if the Mexican spotted owl is de-listed and the Critical Habitat is determined by FWS as not necessary for the survival and recovery of the Mexican spotted owl.

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			roads, pipelines, electrical power line). **For all temporary actions that may affect owls or suitable habitat:** • If action occurs entirely outside of the owl breeding season, and leaves no permanent structure or permanent habitat disturbance, action can proceed without an occupancy survey. • If action will occur during a breeding season, conduct surveys for owls prior to commencing activity. If owls are found, activity should be delayed until outside of the breeding season. • Eliminate access routes created by the Project through such means as raking out scars, revegetation, gating access points, etc. **For all permanent actions that may affect owls or suitable habitat:** • Survey two consecutive years for owls according to established protocol prior to commencement of activity. • If owls are found, no actions will occur within 0.5 mile of an identified nest site. • If a nest site is unknown, no activity will occur in the designated protected activity center. • Avoid placing permanent structures within 0.5 mile of suitable habitat unless surveyed and not occupied. • Reduce noise emissions (e.g., use hospital-grade mufflers) to 45 decibels (A-weighted	

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			scale) at 0.5 mile from suitable habitat, including canyon rims. Placement of permanent noise-generating facilities should be determined by a noise analysis to ensure noise does not encroach upon a 0.5-mile buffer for suitable habitat, including canyon rims. • Limit disturbances to and in suitable owl habitat by staying on designated routes. • Limit new access routes created by the Project. BLM will, as a condition of approval on any project proposed within identified protected activity centers, designated critical habitat, or within spatial buffers for Mexican spotted owl nests (0.5 mile); ensure the Project Applicant is notified as to their responsibilities for rehabilitation of temporary access routes and other temporary surface disturbances created by the Project, according to individual BLM field office standards and procedures, or those determined in the Project-specific Section 7 Consultation. ▪ The BLM will require monitoring of activities in designated critical habitat, identified protected activity centers, or breeding habitats where it has been determined there is a potential for take. If any adverse impacts are observed to occur in a manner, or to an extent that was not considered in the Project-specific Section 7 Consultation, then consultation must be reinitiated.	

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			▪ Monitoring results should document what, if any, impacts on individuals or habitat occur during Project construction/implementation. In addition, monitoring should document successes or failures of any impact minimization or mitigation measures. Monitoring results would be considered an opportunity for adaptive management, and as such, would be carried forward in the design and implementation of future projects. For all survey and monitoring actions: • Reports must be provided to affected field offices within 15 days of completion of survey or monitoring efforts. • Report any detection of Mexican spotted owls during survey or monitoring to the Authorized Officer within 48 hours. ▪ The BLM will, in areas of designated critical habitat, ensure that any physical or biological factors (i.e., the primary constituent elements), as identified in determining and designating such habitat, remains intact during implementation of any BLM-authorized activity. ▪ For all BLM actions that may adversely affect the primary constituent elements in any suitable Mexican spotted owl habitat, BLM will implement measures as appropriate to minimize habitat loss or fragmentation, including rehabilitation of access routes created by the Project through such means as raking out scars, revegetation, gating access points, etc.	

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Agency	**Applicable Plan/Policy**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
			▪ Where technically and economically feasible, use directional drilling from single drilling pads to reduce surface disturbance and minimize or eliminate needing to drilling in canyon habitats suitable for Mexican spotted owl nesting. ▪ Prior to surface-disturbing activities in Mexican spotted owl protected activity centers, breeding habitats, or designated critical habitat, specific principles should be considered to control erosion. These principles include: • Conduct long-range transportation planning for large areas to ensure roads will serve future needs. This will result in less total surface disturbance. • Avoid surface disturbance in areas with high erosion hazards to the greatest extent possible. Avoid mid-slope locations, headwalls at the source of tributary drainages, inner valley gorges, and excessively wet slopes such as those near springs. In addition, avoid areas where large cuts and fills would be required. • Locate roads to minimize roadway drainage areas and to avoid modifying the natural drainage areas of small streams. ▪ Project developments should be designed and located to avoid direct or indirect loss or modification of Mexican spotted owl nesting and/or identified roosting habitats. ▪ Water production associated with BLM-authorized actions should be managed to ensure maintenance or enhancement of riparian habitats.	

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BLM	Price Field Office RMP	Designated critical habitat	Any surface use or occupancy in designated critical habitat would be strictly controlled through close scrutiny of any surface use plan filed to protect habitat values and the use of the area by Mexican spotted owls. Modifications to the Surface Use Plan of Operations may be required for the protection of these resources. This limitation may apply to operation and maintenance of producing wells.	**Exception**: The Authorized Officer may grant an exception if an environmental analysis demonstrates that the action would not impair the function or utility of the site for nesting or other owl-sustaining activities. **Modification**: The Authorized Officer may modify the conditional surface use area in extent if an environmental analysis finds that a portion of the area is nonessential to site utility or function or if natural features provide adequate visual or auditory screening. **Waiver**: A waiver may be granted if the species is de-listed and the critical habitat is determined as not necessary for the survival and recovery of the species.
Mountain Plover				
BLM	Rawlins Field Office RMP	Within 0.5 mile of identified mountain plover-occupied habitat	Power lines will be buried or poles will include a perch-inhibitor in their design.	None
BLM	Rawlins Field Office RMP	Within 0.5 mile of identified mountain plover-occupied habitat	Road-killed animals will be promptly removed.	None
Southwestern Willow Flycatcher				
BLM	Moab Field Office RMP	Within a 0.25-mile buffer from suitable riparian habitats; within 0.5 mile of suitable southwestern willow flycatcher habitat	All ground-disturbing activities should be restricted within a 0.25-mile buffer from suitable riparian habitats and permanent surface disturbances should be avoided within 0.5 mile of suitable southwestern willow flycatcher habitat.	None
BLM	Moab Field Office RMP	Southwestern willow flycatcher habitat (riparian areas)	In areas that contain riparian habitat in the range for the southwestern willow flycatcher, actions will be avoided or restricted that may cause stress	**Exception**: An exception may be granted by the Field Manager if authorization is obtained from FWS

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			and disturbance during nesting and rearing of their young. Appropriate measures will depend on whether the action is temporary or permanent, and whether it occurs inside or outside the nesting season. A temporary action is completed prior to the following breeding season leaving no permanent structures and resulting in no permanent habitat loss. A permanent action continues for more than one breeding season and/or causes a loss of habitat or displaces flycatchers through disturbances (i.e., creation of a permanent structure). Current avoidance and minimization measures include the following: ▪ Surveys will be required prior to operations unless species occupancy and distribution information is complete and available. All surveys must be conducted by qualified individual(s) and be conducted according to protocol. ▪ Activities will require monitoring throughout the duration of the project. To ensure desired results are being achieved, minimization measures will be evaluated and, if necessary, Section 7 consultation reinitiated. ▪ Water production will be managed to ensure maintenance or enhancement of riparian habitat. ▪ Activities will maintain a 300 feet buffer from suitable riparian habitat year long. ▪ Activities within 0.25 mile of occupied breeding habitat will not occur during the breeding season of May 1 to August 15. ▪ Ensure that water extraction or disposal practices do not result in change of hydrologic regime that will result in loss or degradation of	(through applicable provisions of the ESA). The Field Manager may also grant an exception if an environmental analysis indicates that the nature of the conduct of the actions, as proposed or conditioned, will not impair the primary constituent element determined necessary for the survival and recovery of the southwestern willow flycatcher and FWS concurs with this determination. **Modification**: The Field Manager may modify the boundaries of the stipulation area if an environmental analysis indicates, and FWS (through applicable provisions of the ESA) determines that a portion of the area is not being used as southwestern willow flycatcher habitat. **Waiver**: May be granted if the southwestern willow flycatcher is de-listed and if FWS determines it is not necessary for the survival and recovery of the southwestern willow flycatcher.

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			riparian habitat. ▪ Revegetate with native species all areas of surface disturbance in riparian areas and/or adjacent land. ▪ Additional measures to avoid or minimize effects on the species may be developed and implemented in consultation with the FWS between the lease sale stage and lease development stage to ensure continued compliance with the ESA.	
Western Yellow-billed Cuckoo				
BLM	Little Snake Field Office RMP	Current western yellow-billed cuckoo habitat	Construction of roads, pipelines, and power lines through riparian habitat should be placed near the edge of the current yellow-billed cuckoo habitat. Roads, new trails, and rights-of-way should be combined where possible, and stream crossings should be at right angles to yellow-billed cuckoo habitat to minimize impacts.	None
BLM	Little Snake Field Office RMP	Current western yellow-billed cuckoo habitat	To avoid direct impacts on or changes in riparian habitat, do not modify stream channel morphology.	None
Boreal Toad				
BLM	Rawlins Field Office RMP	In known western boreal toad habitat	Any action that would result in stream channel instability, erosion, and sedimentation will be avoided.	None
Big Game				
Mule Deer				
BLM	Vernal Field Office RMP	Deer crucial winter range	No more than 10 percent of such habitat will be subject to surface disturbance and remain un-reclaimed at any given time.	None

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Bighorn Sheep				
BLM	Salt Lake Field Office RMP	In bighorn sheep crucial winter and lambing areas	Once these ranges have been established by the reintroduced animals, appropriate dates and crucial habitats will be delineated.	Specific exceptions may be granted by BLM if the proposed activity will not seriously disturb the wildlife habitat values being protected.
Raptors				
Unoccupied Raptor Nests – Other Than Special Status Raptors				
BLM	Moab Field Office RMP; Price Field Office RMP	In spatial buffer of unoccupied nest	Ground-disturbing activities, occurring outside of the breeding season (seasonal buffer), but in the spatial buffer, would be allowed during a minimum 3-year nest monitoring period, as long as the activity would not cause the nest site to become unsuitable for future nesting, as determined by a wildlife biologist. Facilities and other permanent structures would be allowed, if they meet the above criteria.	None
Active Nests				
BLM	Grand Junction and White River Field Office RMPs	Standard designs for power line projects	Unless otherwise agreed upon in writing, power lines shall be constructed according to standards as outlined in *Suggested Practices for Raptor Protection on Power Lines, Raptor Research Foundation, Inc., 1981*. Industry officials shall assume the burden and expense of proving that pole designs not shown in publications are eagle safe. Such proof shall be provided by a raptor expert approved by the Authorized Officer. The BLM reserves the right to require modifications or additions to all power line structures placed on this right-of-way, should they be necessary to ensure the safety of large perching birds. Such modifications and/or additions shall be made by the holder without liability or expense to the BLM.	None

TABLE E-16 CONDITIONAL SURFACE USE RESTRICTIONS FOR BIOLOGICAL RESOURCES FROM APPLICABLE BUREAU OF LAND MANAGEMENT, U.S. FOREST SERVICE, AND OTHER PLANS				
Agency	**Applicable Plan/Policy**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
Bald Eagle Nocturnal Roost and/or Concentration Areas				
BLM	Little Snake Field Office RMP	Winter conservation areas	All new power line construction should comply with the Avian Power Line Interaction Committee's publication, *Suggested Practices for Raptor Protection on Power Lines: The State of the Art in 1996* (Edison Electric Institute/Raptor Research Foundation 1996).	None
BLM	White River Field Office RMP	Bald eagle nest, roost, and perch substrate	This is a controlled surface use area for maintaining the long term suitability, utility and development opportunities for specialized habitat features involving nest, roost and perch substrate on federal lands. Prior to authorizing surface disturbance in this area, and pending conferral or consultation with the FWS as required by the ESA, the Area Manager may require the Applicant to submit a plan of development that would demonstrate that: ▪ involvement of cottonwood stands or cottonwood regeneration areas have been avoided to the extent practicable; ▪ special reclamation measures or design features are incorporated that would accelerate recovery and/or reestablishment of affected cottonwood communities; ▪ the predevelopment potential of affected floodplains to develop or support riverine cottonwood communities has not been diminished; and ▪ the current/future utility of such cottonwood substrate for bald eagle use would not be impaired.	**Exception**: The Area Manager may grant an exception to this stipulation if an environmental analysis indicates that the proposed or conditioned activities would not affect the long-term suitability or utility of habitat features or diminish opportunities for natural floodplain functions. Surface disturbance and occupation may indicate that the proposed or conditioned activities would not affect the long-term suitability or utility of habitat features or diminish opportunities for natural floodplain functions. Surface disturbance and occupation may also be authorized in the event that established impacts on habitat values would be compensated or offset to the satisfaction of the BLM in consultation with FWS and Colorado Parks and Wildlife. **Modification**: Integral with exception and stipulation **Waiver**: None

TABLE E-16 CONDITIONAL SURFACE USE RESTRICTIONS FOR BIOLOGICAL RESOURCES FROM APPLICABLE BUREAU OF LAND MANAGEMENT, U.S. FOREST SERVICE, AND OTHER PLANS				
Agency	**Applicable Plan/Policy**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
BLM	Moab Field Office RMP	Nest sites and winter roost areas in habitat for bald eagles	In areas that contain habitat for the bald eagle, actions will be avoided or restricted that may cause stress and disturbance during nesting and rearing of their young. Appropriate measures will depend on whether the action is temporary or permanent, and whether it occurs inside or outside the bald eagle breeding or roosting season. A temporary action is completed prior to the following breeding or roosting season leaving no permanent structures and resulting in no permanent habitat loss. A permanent action continues for more than one breeding or roosting season and/or causes a loss of eagle habitat or displaces eagles through disturbances (i.e., creation of a permanent structure). Current avoidance and minimization measures include the following: ▪ 1. Surveys will be required prior to operations unless species occupancy and distribution information is complete and available. All surveys must be conducted by qualified individual(s), and be conducted according to protocol. ▪ Lease activities will require monitoring throughout the duration of the project. To ensure desired results are being achieved, minimization measures would be evaluated. ▪ Water production will be managed to ensure maintenance or enhancement of riparian habitat. ▪ Temporary activities within 1.0 mile of nest sites will not occur during the breeding season of January 1 to August 31, unless the area has been surveyed according to protocol and determined to be unoccupied.	**Exception**: An exception may be granted by the Field Manager if authorization is obtained from FWS (through applicable provisions of the ESA). The Field Manager may also grant an exception if an environmental analysis indicates that the nature of the conduct of the actions, as proposed or conditioned, will not impair the primary constituent element determined necessary for the survival and recovery of the bald eagles and FWS and Utah Division of Wildlife Resources (UDWR) concur with this determination. **Modification**: The Field Manager may modify the boundaries of the stipulation area if an environmental analysis indicates, and FWS and UDWR (through applicable provisions of the ESA) determine that a portion of the area is not being used as bald eagle nesting territories. **Waiver**: May be granted if bald eagles are de-listed and if FWS and UDWR determine it is not necessary to protect nesting territories according to the ESA and The Bald Eagle Protection Act or if there is no reasonable likelihood of site occupancy over a minimum 10-year period.

TABLE E-16 CONDITIONAL SURFACE USE RESTRICTIONS FOR BIOLOGICAL RESOURCES FROM APPLICABLE BUREAU OF LAND MANAGEMENT, U.S. FOREST SERVICE, AND OTHER PLANS				
Agency	**Applicable Plan/Policy**	**Area to Which Restriction Applies**	**Restriction**	**Exception**
			▪ Temporary activities within O.5 mile of winter roost areas (e.g., cottonwood galleries) will not occur during the winter roost season of November 1 to March 31, unless the area has been surveyed according to protocol and determined to be unoccupied. ▪ No permanent infrastructure will be placed within 1.0 mile of nest sites. ▪ No permanent infrastructure will be placed within 0.5 miles of winter roost areas. ▪ Remove big game carrion to 100 feet from on lease roadways occurring in bald eagle foraging range. ▪ Avoid loss or disturbance to large cottonwood gallery riparian habitats. ▪ All areas of surface disturbance in riparian areas and/or adjacent uplands should be re-vegetated with native species.	

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E.10 References

Aldrich, J.W. 1946. New Subspecies of Birds from Western North America. *Proceedings of the Biological Society of Washington* 59:129-136.

Aldrich, J.W. 1963. Geographic Orientation of North American Tetraonidae. *Journal of Wildlife Management* 27:529–545.

Aldrich, J.W. and A.J. Duvall. 1955. *Distribution of American Gallinaceous Game Birds*. U.S. Government Printing Office, Washington, D.C.

Aldridge, C.L. and R.M. Brigham. 2002. Sage-grouse Nesting and Brood Habitat Use in Southern Canada. *Journal Wildlife Management* 66:433-444.

Aldridge, C.L., S.E. Nielsen, H.L. Beyer, M.S. Boyce, J.W. Connelley, S.T. Knick, and M. Schroeder. 2008. Range-Wide Patterns of Greater Sage-grouse Persistence. *Diversity and Distributions* 14:983-994.

Allen, T. 2013. Personal communication between Traci Allen, Bureau of Land Management Biologist, Salt Lake Field Office, and Reid Persing, EPG Biologist, concerning three-toed woodpecker sightings in the Project area in October 2013.

American Ornithologists' Union (AOU). 1998. *Check-list of North American Birds*. 7th edition. American Ornithologists' Union, Washington, D.C.

AmphibiaWeb. 2012. AmphibiaWeb: Information on Amphibian Biology and Conservation. Berkeley, California. Available at: http://amphibiaweb.org/, accessed Fall 2012.

Andersen, A.E. and O.C. Wallmo. 1984. *Odocoileus hemionus*. *Mammalian Species* 219:1-9.

Anderson, J.G.T. 1991. Foraging Behavior of the American White Pelican (*Pelecanus erythrorhyncos*) in Western Nevada. *Colonial Waterbirds* 14(2):166-172.

Anderson, R. 2002. (*Castor canadensis*) American Beaver. Animal Diversity Web. Available at: http://animaldiversity.ummz.umich.edu/site/accounts/information/Castor_canadensis.html, accessed November 09, 2011.

Arcese, P., M.K. Sogge, A.B. Marr, and M.A. Patten. 2002. Song Sparrow (*Melospiza melodia*). The Birds of North America Online. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/704doi:10.2173/bna.704, accessed November 18, 2011.

Arp, G. 1972. A Revision of *Pediocactus*. *Cactus and Succulent Journal* 44:118-122.

Atwood, J.L. and B.W. Massey. 1988. Site Fidelity of Least Terns in California. *Condor* 90:389-394.

Atwood, N.D. 1975. A Revision of the *Phacelia Crenulatae* Group (*Hydrophyllaceae*) for North America. *Great Basin Naturalist* 35(2):127-190.

Atwood, N.D. and S.L. Welsh. 2007. New Taxa of *Camissonia (Onagraceae)*: *Erigeron, Hymenoxys*, and *Tetradymia* (Compositae); *Lepidium* and *Physaria (Cruciferae)* from Arizona, New Mexico, and Utah. *Rhodora* 109:395-414.

Austin, J.E., C.M. Custer, and A.D. Afton. 1998. Lesser Scaup (*Aythya affinis*). The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/338.

Austin, J.E. and M.R. Miller. 1995. Northern Pintail (*Anas acuta*). The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/163.

Autrienth, R.E. 1981. Sage-grouse Management in Idaho. Idaho Department of Fish and Game, Boise.

Arizona Game and Fish Department (AZGFD). 2001. *Gila elegans*. Phoenix, Arizona.

Bailey, C.L., K.W. Wilson, and M.E. Andersen. 2005. Conservation Agreement and Strategy for the Least Chub (*Iotichthys phlegethontis*) in the State of Utah. Publication No. 05-24. Utah Division of Wildlife Resources, Salt Lake City.

Bailey, C.L., K.W. Wilson, and M.E. Andersen. 2006. Conservation Agreement and Strategy for Columbia Spotted Frog (*Rana luteiventris*) in the State of Utah. Utah Division of Wildlife Resources, Salt Lake City.

Baker, M.F., R.L. Eng, J.S. Gashwiler, M.H. Schroeder, and C.E. Braun. 1976. Conservation Committee Report on Effects of Alteration of Sagebrush Communities on the Associated Avifauna. *The Wilson Bulletin* 88(1):165-171.

Barbour, R.W. and W.H. Davis. 1969. *Bats of America*. The University Press of Kentucky, Lexington.

Bat Conservation International. 2009a. Species and profiles: Big Brown Bat (*Eptesicus fuscus*). Available at: http://www.batcon.org/index.php/education/article-and-information/species-profiles.html?task=detail&species=1890&country=43&state=all&family=all&limitstart=0, accessed February 17, 2009.

___. 2009b. Species and profiles: *Myotis lucifigus*. Available at: http://www.batcon.org/index.php/education/article-and-information/species-profiles.html?task=detail&species=2040&country=43&state=all&family=all&start=25, accessed February 24, 2009.

___. 2009c. Species and profiles: *Myotis volans*. Available at: http://www.batcon.org/index.php/education/article-and-information/species-profiles.html?task=detail&species=2415&country=43&state=all&family=all&start=25, accessed February 24, 2009.

___. 2009d. Species and Profiles: Pallid Bat (*Antrozous pallidus*). Available at: http://www.batcon.org/index.php/education/article-and-information/species-profiles.html?task=detail&species=2181&country=43&state=all&family=all&limitstart=0, accessed Februrary 25, 2009.

___. 2009e. Species and profiles: *Myotis ciliolabrum*. Available at: http://www.batcon.org/index.php/education/article-and-information/species-profiles.html?task=detail&species=1779&country=43&state=all&family=all&start=25, accessed February 25, 2009.

Batterson, W.M. and W.B. Morse. 1948. Oregon Sage-grouse. Oregon Fauna Series 1, Oregon Game Commission, Portland.

Beacham, W., F.V. Castronova, and S. Sessine. 2005. Beacham's Guide to the Endangered Species of North America. Available at: http://www.accessmylibrary.com/coms2/summary_0193-8477_ITM, accessed January, 2009.

Beason, J.R., R. Levad, and T. Leukering. 2005. Monitoring Colorado's Birds: The 2004 Field Season Report. Rocky Mountain Bird Observatory, Brighton, Colorado.

Beason, J., R. Sparks, J. Blakesley, C. White, A. Panjabi, and D. Hanni. 2008. Monitoring Colorado's Birds: 2007 Field Season Report. Rocky Mountain Bird Observatory, Brighton, Colorado.

Bechard, M.J., and J.K. Schmutz. 1995. Ferruginous Hawk (*Buteo regalis*). The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/172.

Beck, T.D.I. 1977. Sage-grouse Flock Characteristics and Habitat Selection in Winter. *Journal Wildlife Management* 41:18-26.

Beecham, J.J., C.P. Collins, and T.D. Reynolds. 2007. Rocky Mountain Bighorn Sheep (*Ovis canadensis*): A Technical Conservation Assessment. Prepared for U.S. Department of Agriculture Forest Service, Rocky Mountain Region. Prepared by TREC, Inc., Rigby, Idaho.

Beidleman, C.A. 2000. Colorado Partners in Flight Conservation Plan. Estes Park, Colorado.

Belica, L.T., N.P. Nibbelink, and D. McDonald. 2006. Mountain Sucker (*Catostomus platyrhynchus*): A Technical Conservation Assessment. U.S. Forest Service, Rocky Mountain Region. Available at: http://www.fs.fed.us/r2/projects/scp/assessments/mountainsucker.pdf, accessed Fall 2012.

Benson, L. 1966. A Revision of *Sclerocactus*. *Cactus and Succulent Journal* 38: 50-57, 100-106.

Bent, A.C. 1942. *Life Histories of North American Flycatchers: Larks, Swallows, and their Allies*. Smithsonian Institution United States National Museum Bulletin. Dover Publications, New York, New York.

Bergerud, A.T. 1988. Survival and Breeding Strategies of Grouse. In *Adaptive Strategies and Population Ecology on Northern Grouse*, edited by A.T. Bergerud and M.W. Gratson, pp. 578-685. University of Minnesota Press, Minneapolis, Minnesota.

Berry, J.D. and R.L. Eng. 1985. Interseasonal Movements and Fidelity to Seasonal Use Areas by Female Sage-grouse. *Journal Wildlife Management* 49:237-240.

Biggins, D.E. 2006. The Symposium in Context. In *Recovery of the Black-footed Ferret: Progress and Continuing Challenges*, edited by J.E. Roelle, B.J. Miller, J.L. Godbey, and D.E. Biggins, pp. 3-5. U.S. Geological Survey, Fort Collins, Colorado.

Birds of North America. 2005. The Birds of North America Online Database, edited by A. Poole. Cornell Laboratory of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/BNA/.

Blomquist, F. 2012. Personal communication between Frank Blomquist, BLM Botanist Rawlins Field Office, and Alison Pruett, EPG Biologist, concerning occurance of Cedar Rim thistle in Carbon and Sweetwater counties. February 7, 2012.

Bosworth, W.R., III. 2003. Vertebrate Information Compiled by the Utah Natural Heritage Program: A Progress Report. Publication No. 03-45. Utah Division of Wildlife Resources, Salt Lake City.

Boyle, S. 2006. North American River Otter (*Lontra canadensis*): A Technical Conservation Assessment. Prepared for U.S. Department of Agriculture Forest Service, Rocky Mountain Region, Species Conservation Project. Prepared by BIO-Logic Environmental, Montrose, Colorado.

Bozek, M.A., L.J. Paulson, and D.E. Deaco. 1984. Factors Affecting Reproductive Success of Bonytail Chubs and Razorback Suckers in Lake Mohave. Technical Report No. 12. Lake Mead Limnological Research Center, University of Nevada, Las Vegas.

Bradbury, J.W., R.M. Gibson, C.E. McCarthy, and S.L. Vehrencamp. 1989. Dispersion of Displaying Male Sage-grouse II: The Role of Female Dispersion. *Behavioral Ecology and Sociobiology* 24:15-24.

Bradley, P.V., M.J. O'Farrell, J.A. Williams, and J.E. Newmark. 2006. The Revised Nevada Bat Conservation Plan. Nevada Bat Working Group, Reno, Nevada.

Braun, C.E. 1979. Evolution of the Effects of Changes in Hunting Regulations on Sage-grouse Populations. Game Research Report, Project W-37-R-32. Job 9a. Colorado Division of Wildlife, Denver.

Braun, C.E. 1998. Sage-grouse declines in western North America: what are the problems? Colorado Division of Wildlife, Wildlife Research Center, Fort Collins.

Bray, M.P. and D.A. Klebenow. 1988. Feeding Ecology of White-Faced Ibises in a Great Basin Valley. *Colonial Waterbirds* 11(1):24-31.

Buehler, D.A. 2000. Bald Eagle (*Haliaeetus leucocephalus*). The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/506.

Bureau of Land Management (BLM). 2004. National Sage-Grouse Habitat Conservation Strategy. Washington Office, Washington, D.C.

___. 2008a. Rawlins Field Office Record of Decision and Approved Resource Management Plan. Rawlins, Wyoming.

___. 2008b. Vernal Field Office Record of Decision and Approved Resource Management Plan. Vernal, Utah.

___. 2008c. Moab Field Office Record of Decision and Approved Resource Management Plan. Moab, Utah.

___. 2008d. Price Field Office Record of Decision and Approved Resource Management Plan. Price, Utah.

___. 2008e. Richfield Field Office Record of Decision and Approved Resource Management Plan. Richfield, Utah.

___. 2009a. Environmental Assessment Invasive Plant Management. Kemmerer, Pinedale, and Rock Springs Field Offices, Wyoming.

BLM. 2009b. Colorado BLM State Director's Sensitive Species List (Animals and Plants). Colorado State Office. Available at: http://www.blm.gov/co/st/en/BLM_Programs/botany/Sensitive_Species_List_.html, accessed November 20, 2009.

___. 2010a. BLM Wyoming Sensitive Species Policy and List. Wyoming State Office, Cheyenne.

___. 2010b. Gunnison and Greater Sage-grouse Management Considerations for Energy Development. Washington Office Instruction Memorandum No. 2010-071, Washington, D.C.

___. 2011a. Interim Bureau of Land Management Sensitive Plant Species List for Utah. Utah State Office, Salt Lake City.

___. 2011b. GIS shapefiles depicting occurrences and habitat of special status plants in the BLM White River Field Office. GIS data received November 2011 from BLM White River Field Office, Meeker, Colorado.

___. 2011c. Greater Sage-Grouse Interim Management Policies and Procedures. Washington Office Instruction Memorandum No. 2012-043, Washington, D.C.

___. 2011d. Little Snake Field Office Record of Decision and Approved Resource Management Plan. Craig, Colorado.

___. 2012a. Grand Junction Field Office Noxious Weed Inventory Map. Available at: http://www.blm.gov/pgdata/etc/medialib/blm/co/field_offices/grand_junction_field/maps.Par.27265.File.dat/Weed_Inventory.pdf, accessed November 2, 2012.

___. 2012b. GIS shapefiles depicting occurrences and habitat of special status plants in the BLM Vernal Field Office. GIS data received January 2013 from BLM Vernal Field Office, Vernal, Utah.

___. 2012c. Greater Sage-Grouse Habitat Management Policy on Wyoming Bureau of Land Management Administered Public Lands Including the Federal Mineral Estate. Wyoming Instruction Memorandum No. 2012-019, Washington Office, Washington, D.C.

___. 2012d. Ferruginous Hawk. Rawlins Field Office. Rawlins, Wyoming. Available at: http://www.blm.gov/wy/st/en/field_offices/Rawlins/wildlife/hawks.html, accessed January 30, 2012.

Burger, J. and M. Gochfeld. 1990. Nest Site Selection in Least Terns (*Sterna antillarum*) in New Jersey and New York. *Colonial Waterbirds* 13(1):31-40.

___. 2009. Franklin's Gull (*Leucophaeus pipixcan*). The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/116.

Canadian Wildlife Service and U.S. Fish and Wildlife Service. 2007. International Recovery Plan for the Whooping Crane (*Grus americana*). Third Revision. Albuquerque, New Mexico.

Cardiff, S.W. and D.L. Dittmann. 2001. Ash-throated Flycatcher (*Myiarchus cinerascens*). In *The Birds of North America*, edited by A. Poole, pp. 664. The Birds of North America, Inc., Philadelphia, Pennsylvania.

Casey, D. 2000. Partners in Flight: Bird Conservation Plan: Montana, Version 1.1. American Bird Conservancy, Kalispell, Montana.

Cerovski, A.O., T. Gorges, K.D. Byer, and D. Felley. 2001. Wyoming Bird Conservation Plan, Version 1.0. Wyoming Partners in Flight, Wyoming Game and Fish Department, Lander.

Cerovski, A.O., M. Grenier, B. Oakleaf, L. Van Fleet, and S. Patla. 2004. Atlas of Birds, Mammals, Amphibians, and Reptiles in Wyoming. Wyoming Game and Fish Department, Nongame Program, Lander.

Christ, L. 1990. A Study–Monitor Plan for Least Chub (*Iotichthys phlegethontis*) in Snake Valley, Utah. Utah Division of Wildlife Resources, Salt Lake City.

Clark, T.W. 1986. Technical Introduction. In *Great Basin Naturalist Memoirs No. 8. The Black-footed Ferret*, edited by S.L. Wood, pp. 8-10. Brigham Young University, Provo, Utah.

___. 1989. Conservation Biology of the Black-Footed Ferret (*Mustela nigripes*). Wildlife Preservation Trust, Special Scientific Report No. 3.

Clayton, C. 2012. Personal communication between Creed Clayton, U.S. Fish and Wildlife Service Biologist, and Reid Persing, EPG Biologist, concerning Mexican spotted owl habitat. June 11, 2012.

Colorado Department of Wildlife (CDOW). 2006. Colorado's Comprehensive Wildlife Conservation Strategy and Wildlife Action Plans.

Colorado Natural Heritage Program (CNHP). 1997. Colorado Rare Plant Field Guide. Colorado State University. Fort Collins.

___. 1999. Conservation Status Handbook: Colorado's Animals, Plants, and Plant Communities of Special Concern. Colorado State University. Fort Collins.

___. 2002. Colorado Rare Plant Field Guide Update. Colorado State University. Fort Collins.

___. 2011. GIS shapefiles depicting locations of special status species in Colorado. GIS data received on November 18, 2011 from M. Menefee, Fort Collins, Colorado.

Colorado Department of Agriculture. 2012. Noxious Weed List. Colorado Department of Agriculture Conservation Services. Available at: http://www.colorado.gov/cs/Satellite/ag_Conservation/CBON/1251618874438, accessed October 1, 2012.

Colorado Greater Sage-grouse Steering Committee. 2008. Colorado Greater Sage-grouse Conservation Plan. Colorado Division of Wildlife, Denver.

Colorado Parks and Wildlife (CPW). 2008. Recomended Buffer Zones and Seasonal Restrictions for Colorado Raptors.

___. 2010. Threatened and Endangered Species Lists. Available at: http://wildlife.state.co.us/WildlifeSpecies/SpeciesOfConcern/ThreatenedEndangeredList/ListOfThreatenedAndEndangeredSpecies.htm, accessed October 16, 2009.

CPW. 2012a. GIS shapefiles depicting sage-grouse preliminary priority and preliminary general habitats in Colorado. GIS data received on March 21, 2012 from Colorado Parks and Wildlife, Denver.

___. 2012b. GIS shapefiles depicting greater sage-grouse leks in Colorado. GIS data received December 2012 from Colorado Parks and Wildlife, Denver.

Colorado Partners in Flight. 2012. Colorado Partners in Flight Physiographic Areas. Available at: http://www.rmbo.org/pif/bcp/intro/exsum.htm, accessed Fall 2012.

Connelly, J.W. 1982. An Ecological Study of Sage-grouse in Southeastern Idaho. PhD Dissertation. Washington State University, Pullman.

Connelly, J.W. and C.E. Braun. 1997. Long-term Changes in Sage-grouse (*Centrocercus urophasianus*) Populations in Western North America. *Wildlife Biology* 3:229-234.

Connelly, J.W., H.W. Browers, and R.J. Gates. 1988. Seasonal Movements of Sage-grouse in Southeastern Idaho. *Journal Wildlife Management* 52:116-122.

Connelly, J.W., S.T. Knick, C.E. Braun, W.L. Baker, E.A. Beever, T. Christiansen, K.E. Doherty, E.O. Garton, C.A. Hagen, S.E. Hanser, D.H. Johnson, M. Leu, R.F. Miller, D.E. Naugle, S.J. Oyler-McCance, D.A. Pyke, K.P. Reese, M.A. Schroeder, S.J. Stiver, B.L. Walker, and M.J. Wisdom. 2011. Conservation of Greater Sage-grouse: A Synthesis of Current Trends and Future Management. In *Greater Sage-Grouse: Ecology of a Landscape Species and its Habitats*, edited by S.T. Knick and J.W. Connelly, pp. 549-563. Cooper Ornithological Union, University of California Press, Berkeley.

Connelly, J.W., S.T. Knick, M.A. Schroeder, and S.J. Stiver. 2004. Conservation Assessment of Greater Sage-grouse and Sagebrush Habitats. Unpublished Report, Western Association of Fish and Wildlife Agencies, Cheyenne, Wyoming.

Connelly, J.W., K.P. Reese, and M.A. Schroeder. 2003. Monitoring of Greater Sage-grouse Habitats and Populations. College of Natural Resources Experiment Station Publication No. 979. University of Idaho, Moscow.

Connelly, J.W., M.A. Schroeder, A.R. Sands, and C.E. Braun. 2000. Guidelines to Manage Sage-grouse Populations and their Habitats. *Wildlife Society Bulletin* 28(4):967-985.

Conway, C.J. 1995. Virginia Rail (*Rallus limicola*). The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/173.

Cook, A.G. 1984. Birds of the Desert Region of Uintah County, Utah. *Western North American Naturalist* 44(4):584-620.

Corman, T.E. and C. Wise-Gervais. 2005. *Arizona Breeding Bird Atlas*. University of New Mexico Press, Albuquerque.

Crawford, J.A., R.A. Olson, N.E. West, J.C. Mosley, M.A. Schroeder, T.D. Witson, R.F. Miller, M.A. Gregg, and C.S. Boyd. 2004. Ecology and management of sage-grouse and sage-grouse habitat. *Journal Range Management* 57:2-19.

Curry, R.L., A.T. Peterson, and T.A. Langen. 2002. Western Scrub-Jay (*Aphelocoma californica*). The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/712.

Cuthbert, F.J. and L.R. Wires. 1999. Caspian Tern (*Hydroprogne caspia*). The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/403.

Cypher, B.L. 2003. Foxes *Vulpes* species, *Urocyon* species, and *Alopex* species. In *Wild Mammals of North America*, edited by G.A. Feldhamer, B.C. Thompson, and J.A. Chapman, pp. 511-546. Johns Hopkins University Press, Baltimore, Maryland and London, England.

Dalke, P.D., D.B. Pyrah, D.C. Stanton, J.E. Crawford, and E.F. Schlatterer. 1960. Seasonal Movements and Breeding Behavior of Sage-grouse in Idaho. *Transactions of North American Wildlife and Natural Resource Conference* 25:396-407.

Dalke, P.D., D.B. Pyrah, D.C. Stanton, J.E. Crawford, and E.F. Schlatterer. 1963. Ecology, Productivity, and Management of Sage-Grouse in Idaho. *Journal of Wildlife Management* 27:811-841.

Daw, S.K. and S. DeStefano. 2001. Forest Characteristics of Northern Goshawk Nest Stands and Post-fledging Areas in Oregon. *Journal of Wildlife Management* 65(1):59-65.

Degenhardt, W.G., C.W. Painter, and A.H. Price. 1996. *Amphibians and Reptiles of New Mexico*. University of New Mexico Press, Albuquerque.

Doherty, K.E. 2008. Sage-grouse and Energy Development: Integrating Science with Conservation Planning to Reduce Impacts. PhD Dissertation. University of Montana, Missoula.

Drut, M.S., J.A. Crawford, and M.A. Gregg. 1994. Brood Habitat Use by Sage-grouse in Oregon. *Great Basin Naturalist* 54:170-176.

Dryer, M.P. and A.J. Sandvol. 1993. Recovery Plan for the Pallid Sturgeon (*Scaphirhynchus albus*). U.S. Fish and Wildlife Service, Mountain-Prairie Region (6), Denver, Colorado.

Dunn, P.O. and C.E. Braun. 1986. Summer Habitat Use by Female and Juvenile Sage-grouse. *Journal of Wildlife Management* 50:228-235.

Ehrlich, P.R., D.S. Dobkin, and D. Wheye. 1988. *The Birder's Handbook: A Field Guide to the Natural History of North American Birds*. Simon & Schuster, New York, New York.

___. 1992. *Birds in Jeopardy*. Stanford University Press, Stanford, California.

Elliott-Smith, E. and S.M. Haig. 2005. Piping Plover (*Charadrius melodus*). The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/002.

Ellis, K.L., J.R. Murphy, and G.H. Richins. 1987. Distribution of Breeding Male Sage-Grouse in Northeastern Utah. *Western Birds* 18:117-121.

Eng, R.L. and P. Schladweiler. 1972. Sage-grouse Winter Movements and Habitat Use in Central Montana. *Journal Wildlife Management* 36:141-146.

Epanchin-Niell, R., J. Englin, and D. Nalle. 2009. Investing in Rangeland Restoration in the Arid West, USA: Countering the Effects of an Invasive Weed on the Long-term Fire Cycle. *Journal of Environmental Management* 91:370-379.

Esch, K.L., G.P. Beauvais, and D.A. Keinath. 2005. Species Conservation Assessment for Black-footed Ferret (*Mustela nigripes*) in Wyoming. Wyoming Natural Diversity Database, University of Wyoming, Laramie.

Estes-Zumpf, W.A. and J.L. Rachlow. 2009. Natal Dispersal by Pygmy Rabbits (*Brachylagus idahoensis*). *Journal of Mammalogy* 902:363-372.

Evans, J.W. 1939. Sclerocactus franklinii. *Cactus and Succulents Journal* 11:74.

Fahrig, L. 2003. Effects of Habitat Fragmentation on Biodiversity. *Annual Review of Ecology, Evolution, and Systematics* 34:487-515.

Fertig, W., C. Refsdal, and J. Whipple. 1994. Wyoming Rare Plant Field Guide. Northern Prairie Wildlife Research Center Online, Jamestown, North Dakota, Wyoming Rare Plant Technical Committee. Cheyenne, Wyoming. Available at: http://www.npwrc.usgs.gov/resource/plants/wyplant/index.htm, accessed December 7, 2011.

Fertig, W. and R. Thurston. 2003. Modeling the Potential Distribution of BLM Sensitive and U.S. Fish and Wildlife Service Threatened and Endangered Plant Species in Wyoming. Wyoming Natural Diversity Database, University of Wyoming, Laramie.

Fischer, R.A., A.D. Apa, W.L. Wakkinen, and K.P. Reese. 1993. Nesting-area Fidelity of Sage-grouse in Southeastern Idaho. *Condor* 95:1038-1041.

Fischer, R.A., K.P. Reese, and J.W. Connelly. 1996. An Investigation of Fire Effects Within Xeric Sage-grouse Brood Habitat. *Journal Range Management* 49:194-198.

Flora of North America Editorial Committee. 1993+. *Flora of North America North of Mexico*. 16+ vols. New York, New York and Oxford, England.

Florida Museum of Natural History. 2012. Stonecat (*Noturus flavus*). Available at: http://www.flmnh.ufl.edu/catfish/ictaluridae/stonecat.htm.

Floyd, T., C.S. Elphick, C. Graham, K. Mack, R.G. Elston, E.M. Ammon, and J.D. Boone. 2007. *Atlas of the Breeding Birds of Nevada*. University of Nevada Press, Reno.

Forrest, S.C., D.E. Biggens, L. Richardson, T.W. Clark, T.M. Campbell, III, K.A. Fagerstone, and E.T. Thorne. 1988. Population Attributes for the Black-footed Ferret (*Mustela nigripes*) at Meeteetse, Wyoming, 1981-1985. *Journal of Mammology* 69(2):261-273.

Franklin, M.A. 1992. Report for 1991 Challenge Cost Share Project. Bureau of Land Management. Target species: *Schoenocrambe argillacea* (Welsh & Atwood) Rollins. p.10.

___. 2005. Plant Information Compiled by the Utah Natural Heritage Program: A Progress Report. Utah Department of Natural Resources, Salt Lake City.

Fuller, P. and M. Neilson. 2012. *Etheostoma exile* (Iowa darter). USGS Nonindigenous Aquatic Species Database. Gainesville, Florida. Available at: http://nas.er.usgs.gov/queries/FactSheet.aspx?SpeciesID=812, accessed January 9, 2012.

Ganey, J.L. 1998. Spotted Owl. In *The Raptors of Arizona*, edited by R.L. Glinski, pp. 220. University of Arizona Press, Tucson.

Gardali, T. and G. Ballard. 2000. Warbling Vireo (*Vireo gilvus*). The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/551doi:10.2173/bna.551.

Garton, E.O., J.W. Connelly, J.S. Horne, C.A. Hagen, A. Moser, and M. Schroeder. 2011. Greater Sage-grouse Population Dynamics and Probability of Persistence. In *Greater Sage-grouse Population Dynamics and Probability of Persistence*, edited by S.T. Knick and J.W. Connelly, pp. 293-381. Cooper Ornithological Union, University of California Press, Berkeley.

Gibson, R.M. 1996. A Re-evaluation of Hotspot Settlement in Lekking Sage-Grouse. *Animal Behaviour* 52:993-1005.

Giesen, K.M. and J.W. Connelly. 1993. Guidelines for Management of Columbian Sharp-tailed Grouse Habitats. *Wildlife Society Bulletin* 21:325-333.

Gill, R.B. 1965. Distribution and Abundance of a Population of Sage-grouse in North Park, Colorado. Ms. Thesis. Colorado State University, Fort Collins.

Gill, R.B. and F.A. Glover. 1965. Daily and Seasonal Movements of Sage-Grouse. Colorado Cooperative Wildlife Research Unit Technical Paper 3, Fort Collins.

Glennon, J. 2012. Personal communication between Jim Glennon, BLM Botanist Rock Springs Field Office, and Alison Pruett, EPG Biologist, concerning suitable habitat for Rock Springs Field Office rare plants. February 14, 2012.

Glinski, R.L. 1998a. Golden Eagle, *Aquila chrysaetos*. In *The Raptors of Arizona*, edited by R.L. Glinski, pp. 220. The University of Arizona Press, Tucson.

Glinski, R.L. 1998b. Short-eared Owl, *Asio flammeus*. In *Raptors of Arizona*, edited by R.L. Glinski, pp. 178-181. The University of Arizona Press, Tucson.

Glinski, R.L. and R.S. Hall. 1998. Swainson's Hawk, *Buteo swainsoni*. In *Raptors of Arizona*, edited by R.L. Glinski, pp. 92-95. The University of Arizona Press, Tucson.

Gordon, C.E. 2000. Movement Patterns of Wintering Grassland Sparrows in Arizona. *The Auk* 117(3):748-759.

Gorell, J.V., M.E. Andersen, K.D. Bunnell, M.F. Canning, A.G. Clark, D.E. Dolsen, and F.P. Howe. 2005. Utah Comprehensive Wildlife Conservation Strategy. Utah Division of Wildlife Resources, Salt Lake City.

Gorman, O.T. and D.M. Stone. 1999. Ecology of Spawning Humpback Chub, *Gila cypha*, in the Little Colorado River Near Grand Canyon, Arizona. *Environmental Biology of Fishes* 55(1-2):115-133.

Gough, G.A., J.R. Sauer, and I.M. Patuxent. 1998. Breeding Bird Survey Report and Christmas Bird Count Report. Bird Identification Infocenter. Version 97.1. Patuxent Wildlife Research Center. Laurel, Maryland. Available at: http://www.mbr-pwrc.usgs.gov/id/framlst/infocenter.html

Greer, R. 1990. Sage-grouse Habitat Requirements and Development. Habitat Extension Bulletin Number 31. Habitat Extension Services, Wyoming Game and Fish Department, Laramie.

Gutierrez, R.J., A.B. Franklin, and W.S. Lahaye. 1995. Spotted Owl (*Strix occidentalis*). The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/179.

Hagen, C.A., J.W. Connelly, and M.A. Schroeder. 2007. A Meta-Analysis of Greater Sage-grouse *Centrocercus urophasianus* Nesting and Brood-Rearing Habitats. *Wildlife Biology* 13(Supplement 1):42-50.

Hamman, R.L. 1982. Spawning and Culture of Humpback Chub. *Progressive Fish-Culture* 44:213-216.

Hansen, H.A., P.K. Shepherd, J.G. King, and W.A. Troyer. 1971. The Trumpeter Swan in Alaska. *Wildlife Monograph* 26:3-83.

Harrison, H.H. 1979. *A Field Guide to Western Birds' Nests*. Houghton Mifflin Company, Boston, Massachusetts.

Hausleitner, D. 2003. Population Dynamics, Habitat Use and Movements of Greater Sage-grouse. Masters Thesis. University of Idaho, Moscow.

Heidel, B. and W. Fertig. 2003. State species abstract for *Astragalus racemosus* var. *treleasei* (Trelease's racemose milkvetch), *Fabaceae*. Wyoming Natural Diversity Database, Laramie.

Heil, K.D., B. Armstrong, and D. Schleser. 1981. A Review of the Genus *Pediocactus*. *Cactus and Succulent Journal* 53:17-39.

Hickman, J.C. 1993. *The Jepson Manual Higher Plants of California*. University of California Press, Berkeley and Los Angeles.

Hillman, C.N. and T.W. Clark. 1980. *Mustela nigripes*. *Mammalian Species* 126:1-3.

Hirsch, C.L., S.E. Albeke, and T.P. Nesler. 2006. Range-Wide Status of Colorado River Cutthroat Trout (*Oncorhynchus clarkii pleuriticus*). Colorado River Cutthroat Trout Conservation Team Report. Colorado Division of Wildlife, Fort Collins.

Hoffman, R.W. and A.E. Thomas. 2007. Columbian Sharp-tailed Grouse (*Tympanuchus phasianellus columbianus*): A Technical Conservation Assessment. U.S. Department of Agriculture Forest Service, Rocky Mountain Region, Denver, Colorado.

Hogrefe, T., C. Bailey, P. Thompson, and B. Nadolski. 2005. Boreal Toad (*Bufo boreas boreas*) Conservation Plan. Publication Number 5-37. Utah Division of Wildlife Resources, Salt Lake City.

Holloran, M.J. 1999. Sage-grouse (*Centrocercus urophasianus*) Seasonal Habitat Use near Casper, Wyoming. Masters Thesis. University of Idaho, Moscow.

___. 2005. Greater Sage-grouse (*Centrocercus urophasianus*) Population Response to Natural Gas Field Development in Western Wyoming. PhD Thesis. Department of Zoology and Physiology, University of Wyoming, Laramie.

Holloran, M.J., B.J. Heath, A.G. Lyon, S.J. Slater, J.L. Kuipers, and S.H. Anderson. 2005. Greater Sage-grouse Nesting Habitat Selection and Success in Wyoming. *Journal Wildlife Management* 69:639-649.

Homer, C., C. Huang, L. Yang, B. Wylle, and M. Coan. 2004. Development of a 2001 National Land-Cover Database for the United States. *Photogrammetric Engineering & Remote Sensing* 70(7):829-840.

Hothem, R.L., B.E. Brussee, and W.E. Davis. 2010. Black-crowned Night-heron (*Nycticorax nycticorax*). The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/074.

Hughes, J.M. 1999. Yellow-billed Cuckoo (*Coccyzus americanus*). The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/418.

Hupp, J.W. and C.E. Braun. 1991. Geographic Variation Among Sage-grouse in Colorado. *Wilson Bulletin* 103:255-261.

Intergovernmental Panel on Climate Change. 2007. Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Geneva, Switzerland.

Johnsgard, P.A. 1988. *North American Owls: Biology and Natural History*. Smithsonian Institution Press, Washington, D.C.

Johnson, D.J., M.J. Holloran, J.W. Connelly, S.E. Hanser, C.L. Amundson, and S.T. Knick. 2011. Influences of Environmental and Anthropogenic Features on Greater Sage-Grouse Populations, 1997-2007. In *Greater Sage-Grouse: Ecology and Conservation of a Landscape Species and its Habitats. Studies in Avian Biology*, edited by S.T. Knick and J.W. Connelly, pp. 407-450. University of California Press, Berkeley.

Johnson, G.D. and M.S. Boyce. 1990. Feeding Trials with Insects in the Diet of Sage-grouse Chicks. *Journal Wildlife Management* 54:89-91.

Johnson, J.B., T.E. Dowling, and M.C. Belk. 2004. Neglected Taxonomy of Rare Desert Fishes: Congruent Evidence for Two Species of Leatherside Chub. *Systematic Biology* 53(6):841-855.

Johnson, R.E. 2002. Black Rosy-Finch (*Leucosticte atrata*). The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/678.

Johnson, R.E., P. Hendricks, D.L. Pattie, and K.B. Hunter. 2000. Brown-capped Rosy-Finch (*Leucosticte australis*). The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/536.

Jones, F.L. and J.F. Cahlan. 1975. Water: a History of Las Vegas. Volume 1. Las Vegas Valley Water District, Las Vegas, NV.

Jorgensen, J. 2013. Personal communication between Jenna Jorgensen, U.S. Forest Service Biologist, and Reid Persing, EPG Biologist. Utah Section 7 meeting summary January 27, 2013; additional communication October 2013.

Kaeding, L.R., B.D. Burdick, P.A. Schrader, and W.R. Noonan. 1986. Recent Capture of a Bonytail (*Gila elegans*) and Observations of this Nearly Extinct Cyprinid from the Colorado River. *Copeia* 4(4):1021-1023.

Kahn, N.W., C.E. Braun, J.R. Young, S. Wood, D.R. Mata, and T.W. Quinn. 1999. Molecular Analysis of Genetic Variation Among Large- and Small-bodied Sage-grouse Using Mitochondrial Control-region Sequences. *Auk* 116(3):819-824.

Keinath, D. and M. McGee. 2005. Boreal Toad (*Bufo boreas boreas*): A Technical Conservation Assessment. Prepared for U.S. Department of Agriculture Forest Service, Rocky Mountain Region. Prepared by Wyoming Natural Diversity Database, Laramie Wyoming and EPO Biology, Boulder, Colorado.

Keinath, D.A. 2004. Species Assessment for White-tailed Prairie Dog (*Cynomys leucurus*) in Wyoming. Bureau of Land Management, Wyoming State Office, Cheyenne.

Keinath, D.A. and G.P. Beauvais. 2006. Wyoming Pocket Gopher (*Thomomys clusius*): A Technical Conservation Assessment. Pepared for U.S. Department of Agriculture Forest Service, Rocky Mountain Region. Prepared by Wyoming Natural Diversity Database, University of Wyoming, Laramie, Wyoming.

Kingery, H.E. and C.K. Ghalambor. 2001. Pygmy Nuthatch (*Sitta pygmaea*). The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/567.

Klebenow, D.A. 1969. Sage-grouse Nesting and Brood Habitat in Idaho. *Journal Wildlife Management* 33:649-662.

Klebenow, D.A. and G.M. Gray. 1968. Food Habits of Juvenile Sage-grouse. *Journal Range Management* 21:80-83.

Knapp, P.A. 1996. Cheatgrass (*Bromus tectorum* L.) Dominance in the Great Basin Desert: History, Persistence, and Influences to Human Activities. *Global Environmental Change* 6:37-52.

Knick, S.T. and J.W. Connelly. 2011. Greater Sage-grouse and Sagebrush: An Introduction to the Landscape. In *Greater Sage-Grouse: ecology and conservation of a landscape species and its habitats*, edited by S.T. Knick and J.W. Connelly, pp. 1-9. Cooper Ornithological Union, University of California Press, Berkeley.

Knick, S.T., S.E. Hanser, R.F. Miller, D.A. Pyke, M.J. Wisdom, S.P. Finn, E.T. Rinkes, and C.J. Henny. 2011. Ecological Influence and Pathways of Land Use in Sagebrush. In *Greater Sage-Grouse: Ecology of a Landscape Species and its Habitats*, edited by S.T. Knick and J.W. Connelly, pp. 203-252. Cooper Ornithological Union, University of California Press, Berkeley.

Knopf, F.L. 1979. Spatial and Temporal Aspects of Colonial Nesting of White Pelicans. *The Cooper Ornithological Society* 81:353-363.

Knopf, F.L. and B.J. Miller. 1994. *Charadrius montanus*: Montane, Grassland, or Bare-Ground Plover? *Auk* 111(2):504-506.

Knopf, F.L. and J.R. Rupert. 1995. Habits and Habitats of Mountain Plovers in California. *The Condor* 97:743-751.

Knorr, O.A. 1961. The Geographical and Ecological Distribution of the Black Swift in Colorado. *The Wilson Bulletin* 73(2):155-170.

Knowles, C.J. and C.J. Stoner. 1982. Selective Use of Black-tailed Prairie Dog Towns by Mountain Plovers. *The Condor* 84:71-74.

Laymon, S.A. 1998. Yellow-billed Cuckoo (*Coccyzus americanus*). In *The Riparian Bird Conservation Plan: A Strategy for Reversing the Decline of Riparian-Associated Birds in California*. California Partners in Flight.

Leach, H.R. and A.L. Hensley. 1954. The Sage-Grouse in California with Special Reference to Food Habitats. *California Fish and Game* 40:385-394.

Leonard, D.L. 2001. American Three-toed Woodpecker (*Picoides dorsalis*). The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/588.

Lewis, J.C. 1995. Whooping Crane (*Grus americana*). The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at:

Linder, R.L., M.E. Andersen, E.M. Brigham, C.N. Hillman, D.L. Lengkeek, A.L. Lovaas, J.K. McDowell, and W.W. Paintner. 1978. Black-footed Ferret Recovery Plan. U.S. Fish and Wildlife Service, Mountain-Prarie Region (6), Denver, Colorado.

Livingston, S.A., C.S. Todo, W.B. Krohn, and R.B. Owen. 1990. Habitat Models for Nesting Bald Eagles in Maine. *The Journal of Wildlife Management* 54(4):644-653.

Lower Colorado River Multi-Species Conservation Program. 2004. Lower Colorado River Multi-Species Conservation Program, Volume II: Habitat Conservation Plan. Final. December 17. (J&S 00450.00) Sacramento, California.

Lowry, J.H., Jr., R.D. Ramsey, K. Boykin, D. Bradford, P. Comer, S. Falzarano, W. Kepner, J. Kirby, L. Langs, J. Prior-Magee, G. Manis, L. O'Brien, T. Sajwaj, K.A. Thomas, W. Rieth, S. Schrader, D. Schrupp, K. Schulz, B. Thompson, C. Velaszquez, C. Wallace, E. Waller, and B. Wolk. 2005. Southwest Regional Gap Analysis Project: Final Report on Land Cover Mapping Methods. RS/GIS Laboratory, Utah State University, Logan.

Lowther, P., A.F. Poole, J.P. Gibbs, S. Melvin, and F.A. Reid. 2009. American Bittern (*Botaurus lentiginosus*). The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/018.

Luce, R. and D. Keinath. 2003. Species Assessment for Baird's Sparrow (*Ammodramus bairdii*) in Wyoming. Bureau of Land Management, Wyoming State Office, Cheyenne.

___. 2007. Spotted Bat (*Euderma maculatum*): A Technical Conservation Assessment. U.S. Department of Agriculture Forest Service, Rocky Mountain Region, Species Conservation Project, Denver, Colorado.

Marín, M. 1997. Some Aspects of the Breeding Biology of the Black Swift. *The Wilson Bulletin* 109(2):290-306.

Marsh, P.C., M.E. Douglas, W.L. Minckley, and R.J. Timmons. 1991. Rediscovery of Colorado Squawfish, *Ptychocheilus lucius* (Cyprinidae), in Wyoming. *Copeia* 1991(4):1091-1092.

Martin, J.W. and B.A. Carlson. 1998. Sage Sparrow (*Amphispiza belli*). The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/326.

Mccallum, D.A. 1994. Flammulated Owl (*Otus flammeolus*). The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/093.

McNicholl, M.K., P.E. Lowther, and J.A. Hall. 2001. Forster's Tern (*Sterna forsteri*). The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/595.

Miller, R.F., S.T. Knick, D.A. Pyke, C.W. Meinke, S.E. Hanser, M.J. Wisdom, and A.L. Hild. 2011. Characteristics of Sagebrush Habitats and Limitations to Long-term Conservation. In *Greater Sage-Grouse: Ecology of a Landscape Species and its Habitats*, edited by S.T. Knick and J.W. Connelly, pp. 145-184. Cooper Ornithological Union, University of California Press, Berkeley.

Miller, R.R. 1961. Man and Changing Fish Fauna of the American Southwest. *Papers of the Michigan Academy of Science, Arts, and Letters* 46:365-404.

Miller, W.J., D.E. Rees, R.J. Carr, and D.S. Berube. 2005. Hornyhead Chub (*Nocomis biguttatus*): A Technical Conservation Assessment. Prepared for U.S. Department of Agriculture U.S. Forest Service, Rocky Mountain Region, Denver, Colorado. Prepared by Miller Ecological Consultants, Inc., Fort Collins, Colorado.

Minckley, W.L., P.C. Marsh, J.E. Brooks, J.E. Johnson, and B.L. Jensen. 1991. Management Towards Recovery of the Razorback Sucker. In *Battle Against Extinction: Native Fish Management in the American West*, edited by W.L. Minckley and J.E. Deacon, pp. 303–317. University of Arizona Press, Tucson.

Minckley, W.L., P.C. Marsh, J.E. Deacon, T.E. Dowling, P.W. Hedrick, W.J. Matthews, and G. Mueller. 2003. A Conservation Plan for Native Fishes of the Lower Colorado River. *BioScience* 53(3):219-234.

Mitchell, C.D. 2010. Trumpeter Swan (*Cygnus buccinator*). The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/105.

Murphy, E.C. and W.A. Lehnausen. 1998. Density and Foraging Ecology of Woodpeckers Following a Stand-Replacement Fire. *Journal of Wildlife Management* 62(4):1359-1372.

National Geographic Society. 1999. *Field Guide to the Birds of North America*. 3rd edition, Washington, D.C.

___. 2002. *Field Guide to Birds of North America*. 4th edition, Washington, D.C.

Natural Resource Conservation Service (NRCS). 2013a. Juab County Noxious Weeds. Available at: http://plants.usda.gov, accessed April 22, 2013.

___. 2013b. Utah County Noxious Weeds. Available at: http://plants.usda.gov, accessed April 22, 2013.

___. 2013c. Narrow-Stem Gilia (*Gilia stenothrysa*). Available at: www.plants.usda.gov, accessed April 717, 2013.

NatureServe. 2008a. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.0. Arlington, Virginia. Available at: http://www.natureserve.org/explorer, accessed January 19, 2009.

___. 2008b. NatureServe Explore: An online encyclopedia of life [web application]. Version 7.0. Arlington, Virginia. Available at: http://www.natureserve.org/explorer, accessed December 1, 2008.

___. 2008c. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.0. Arlington, Virginia. Available at: http://www.natureserve.org/explorer, accessed November 20, 2008.

NatureServe. 2009. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.0. Arlington, Virginia. Available at: http://www.natureserve.org/explorer, accessed January 12, 2009.

___. 2011. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. Arlington, Virginia. Available at: http://www.natureserve.org/explorer, accessed November 2, 2011.

___. 2012. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. Arlington, Virginia. Available at: http://www.natureserve.org/explorer, accessed November 30, 2012.

___. 2013. NatureServe Explorer: An online encyclopedia of life [web application]. Version 7.1. Arlington, Virginia. Available at: http://www.natureserve.org/explorer, accessed August 9, 2013.

Naugle, D.E., K.E. Doherty, B.L. Walker, H.E. Copeland, M.J. Holloran, and J.D. Tack. 2011. Sage-grouse and Cumulative Impacts of Energy Development. In *Energy Development and Wildlife Conservation in Western North America*, edited by D.E. Naugle, pp. 55-70. Island Press, Washington, D.C.

Neel, L.A. 1980. Sage-grouse Response to Grazing Management in Nevada. Masters Thesis. University of Nevada, Reno.

Nevada Department of Wildlife. 2007. Programmatic Safe Harbor Agreement for Voluntary Enhancement/Restoration Activities Benefitting Razorback Sucker and Bonytail Chub within Clark County, Nevada. U.S. Fish and Wildlife Service, Mountain-Prairie Region (6), Denver, Colorado.

Oliver, G.V. 2000. The Bats of Utah - A Literature Review. Utah Natural Heritage Program, Utah Division of Wildlife Resources, Publication Number 00-14, Salt Lake City.

Oliver, G.V. and W.R.I. Bosworth. 1999. Rare, Imperiled, and Recently Extinct or Extirpated Mollusks of Utah - A Literature Review. Utah Division of Wildlife Resources, Publication Number 99-29, Salt Lake City.

Oyler-McCance, S.J., N.W. Kahn, K.P. Burnham, C.E. Braun, and T.W. Quinn. 1999. A Population Genetic Comparison of Large- and Small-bodied Sage-grouse in Colorado Using Microsatellite and Mitochondrial DNA Markers. *Molecular Ecology* 8:1457-1465.

Oyler-McCance, S.J., S.E. Taylor, and T.W. Quinn. 2005. A Multilocus Population Genetic Survey of the Greater Sage-grouse Across Their Range. *Molecular Ecology* 14:1293-1310.

Page, G.W., L.E. Stenzel, and C.A. Ribic. 1985. Nest Site Selection and Clutch Predation in the Snowy Plover. *The Auk* 102:347-353.

Page, G.W., M.A. Stern, and P.W.C. Paton. 1995. Differences in Wintering Areas of Snowy Plovers from Inland Breeding Sites in Western North America. *The Condor* 79:258-262.

Pampush, G.J. and R.G. Anthony. 1993. Nest Success, Habitat Utilization and Nest-Site Selection of Long-Billed Curlews in the Columbia Basin, Oregon. *Condor* 95:957–967.

Paquet, P.C. and L.N. Carbyn. 2003. Gray Wolf *Canis lupus* and Allies. In *Wild Mammals of North America*, 2nd edition, edited by G.A. Feldhamer, B.C. Thompson, and J.A. Chapman, pp. 482-510. The Johns Hopkins University Press, Baltimore, Maryland and London, England.

Parrish, J.R., F. Howe, and R. Norvell. 2002. Utah Partners in Flight Avian Conservation Strategy. Version 2.0. Utah Division of Wildlife Resources, Publication Number 02-27, Salt Lake City.

Parsons, K.C. and T.L. Master. 2000. Snowy Egret (*Egretta thula*). The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/489.

Patterson, R.L. 1952. *The Sage grouse in Wyoming*. Wyoming Game and Fish Commission and Sage Books, Denver, Colorado.

Peterson, J.G. 1970. The Food Habits and Summer Distribution of Juvenile Sage-grouse in Central Montana. *Journal Wildlife Management* 34:147-155.

Phillips, A.R. 1948. Geographic Variation in *Empidonx traillii*. *Auk* 65:507-514.

Phillips, A.R., J. Marshall, and G. Monson. 1964. *The Birds of Arizona*. University of Arizona Press, Tucson.

Porter, D.K., M.A. Strong, J.B. Giezentanner, and R.A. Ryder. 1975. Nest Ecology, Productivity, and Growth of the Loggerhead Shrike on the Shortgrass Prairie. *The Southwestern Naturalist* 19(4):429-436.

Powell, R.A., S.A. Buskirk, and W.J. Zielinski. 2003. Fisher and Marten *Martes pennanti and Martes americana*. In *Wild Mammals of North America*, 2nd edition, edited by G.A. Feldhamer, B.C. Thompson, and J.A. Chapman, pp. 636-649. The Johns Hopkins Univeristy Press, Baltimore, Maryland and London, England.

Probert, R.B. 2013. Personal communication by R. Probert, BLM Fillmore Field Office, concerning the presence of blue flowering lettuce and squarrose knapweed occurring at the BLM Fillmore Field Office. February 2013.

Pyke, D.A. 2011. Restoring and Rehabilitating Sagebrush Habitats. In *Greater Sage-Grouse: Ecology of a Landscape Species and its Habitats*, edited by S.T. Knick and J.W. Connelly, pp. 531-563. Cooper Ornithological Union, University of California Press, Berkeley.

Rahel, F.J. and L.A. Thel. 2004. Plains Topminnow (*Fundulus sciadicus*): A Technical Conservation Assessment. Prepared for U.S. Department of Agriculture Forest Service, Rocky Mountain Region. Prepared by University of Wyoming Department of Zoology and Physiology, Laramie, Wyoming.

Rassmussen, D.I. and L.A. Griner. 1938. Life History and Management Studies of the Sage-grouse in Utah, with Special Reference to Nesting and Feeding Habits. *Transactions of the North American Wildlife and Natural Resources Conference* 3:852-864.

Reaser, J.K. and D.S. Pilliod. 2005. Columbia Spotted Frog (*Rana luteiventris*) In *Amphibian Declines: The Conservation Status of United States Species*, edited by M. Lannoo, pp. 559-563. University of California Press, Berkeley.

Redder, A.J., B.E. Smith, and D.A. Keinath. 2006. Smooth Green Snake (*Opheodrys vernalis*): A Technical Conservation Assessment. U.S. Department of Agriculture Forest Service, Rocky Mountain Region, Denver, Colorado.

Remington, T.E. and C.E. Braun. 1985. Sage-grouse Food Selection in Winter, North Park, Colorado. *Journal Wildlife Management* 49:1055-1061.

Reynolds, T.D., T.D. Rich, and D.A. Stephens. 1999. Sage Thrasher (*Oreoscoptes montanus*). The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/463doi:10.2173/bna.463.

Ridgely, R.S., T.F. Allnutt, T. Brooks, D.K. McNicol, D.W. Mehlman, B.E.Young, and J.R. Zook. 2007. Digital Distribution Maps of the Birds of the Western Hemisphere, Version 3.0. NatureServe. Arlington, Virginia. Available at: http://www.natureserve.org/getData/birdMaps.jsp, accessed March 2007.

Robertson, M.D. 1991. Winter Ecology of Migratory Sage-grouse and Associated Effects of Prescribed Fire in Southern Idaho. Masters Thesis. University of Idaho, Moscow.

Rodriguez, R. 2012. Life History and Analysis of Endangered, Threatened, Candidate, Sensitive, and Management Indicator Species of the Dixie National Forest. Version 5.0. 102 pp. Cedar City, Utah.

Romin, L.A. and J.A. Muck. 2002. Utah Field Office Guidelines for Raptor Protection from Human and Land Use Disturbances. U.S. Fish and Wildlife Service, Utah Ecological Services, West Valley City.

Rotenberry, J.T., M.A. Pattern, and K.L. Preston. 1999. Brewer's Sparrow (*Spizella breweri*). The Birds of North American Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/390.

Rowland, M.M., L.H. Suring, and M.J. Wisdom. 2010. Assessment of Habitat Threats to Shrublands in the Great Basin: A Case Study. In *Environmental Threat Assessment and Application to Forest and Rangeland Management*, edited by J.M. Pye, H.M. Rauscher, Y. Sands, D.C. Lee, and J.C. Beatty, pp. 673-685. U.S. Forest Service, General Technical Report PNW-GTR-802, Bozeman, Montana.

Ryder, R.A. and D.E. Manry. 1994. White-faced Ibis (*Plegadis chihi*). The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/130.

Sansom, T. and B. Elliott. 2012. Jones' Cycladenia Study (*Cycladenia humilis* var. *jonesii*) Including Habitat Model and Survey Report. Prepared for Bureau of Land Management, Price Field Office, Price, Utah. Prepared by JG Management Systems, Inc., Grand Junction, Colorado.

Savage, D.E. 1969. The Relationship of Sage-grouse to Upland Meadows in Nevada. *Transactions of the Annual Meeting, California-Nevada Section of The Wildlife Society* 16:8-17.

Schmidly, D.J. 1991. *The Bats of Texas*. Texas A&M University Press, College Station, Texas.

Schroeder, M.A. 1997. Unusually High Reproductive Effort by Sage Grouse in a Fragmented Habitat in North-Central Washington. *Condor* 99:933-941.

Schroeder, M.A., C.L. Aldridge, A.D. Apa, J.R. Bohne, C.E. Braun, S.D. Bunnell, J.W. Connelly, P.A. Deibert, S.C. Gardner, M.A. Hilliard, G.D. Kobriger, S.M. McAdam, C.W. McCarthy, J.J. McCarthy, D.L. Mitchell, E.V. Rickerson, and J. Stiver. 2004. Distribution of Sage-grouse in North America. *Condor* 106:363-376.

Schroeder, M.A., J.R. Young, and C.E. Braun. 1999. Greater Sage-Grouse (*Centrocercus urophasianus)*. The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/425doi:10.2173/bna.425.

Sedgwick, J.A. 2000. Willow Flycatcher (*Empidonax traillii*). The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/533.

Senseman, R. 2002. *Cervus elaphus*. Animal Diversity Web. Available at: http://animaldiversity.ummz.umich.edu/site/accounts/information/Cervus_elaphus.html, accessed November 9, 2011.

Shackelton, D.M. 1985. Ovis canadensis. *Mammalian Species* 230:1-9.

Shane, T.G. 2000. Lark Bunting (*Calamospiza melanocorys*). The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/542.

Sipes, S.D. and V.J. Tepedino. 1995. Reproductive Biology of the Rare Orchid, Spiranthes Diluvialis: Breeding System, Pollination and Implications for Conservation. *Conservation Biology* 9(4):929-938.

Sloane, S.A. 2001. Bushtit (*Psaltriparus minimus*). The Birds of North America Online, edited by A. Poole Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/598.

Smith, B. 2008. Wildlife Report on Manti-La Sal National Forest Management Indicator Species and Migratory Birds for the North Paradox Range Allotment. U.S. Department of Agriculture Forest Service, Price, Utah.

Smith, B.E. and N.T. Stephens. 2003. Conservation Assessment of the Pale Milk Snake in the Black Hills National Forest, South Dakota and Wyoming. U.S. Department of Agriculture Forest Service, Rocky Mountain Region, Denver, Colorado, Black Hills National Forest, Custer, South Dakota.

Smith, J.W. and R.B. Renken. 1991. Least Tern Nesting Habitat in the Mississippi River Valley Adjacent to Missouri. *Journal of Field Ornithology* 62:497-504.

Smith, R.L. 1963. Some Ecological Notes on the Grasshopper Sparrow. *The Wilson Bulletin* 75(2):159-165.

Smithsonian. 2011. North American Mammals Online Database. Smithsonian Institution. Washington, D.C. Available at: http://www.mnh.si.edu/mna/main.cfm, accessed Fall 2011.

Sogge, M.K., R.M. Marshall, S.J. Sferra, and T.J. Tibbitts. 1997. A Southwestern Willow Flycatcher Natural History Summary and Survey Protocol. Technical Report NPS/NAUCPRS/NRTR-97/12. U.S. Department of the Interior, National Park Service, Colorado Plateau Research Station, Flagstaff, Arizona.

Sovada, M.A., R.O. Woodward, and L.D. Igl. 2011. Historical Range, Current Distribution, and Conservation Status of the Swift Fox, *Vulpes velox*, in North America. U.S. Geological Survey, Northern Prairie Wildlife Research Center, Jamestown, North Dakota.

Spackman, S. and D.G. Anderson. 2002. Colorado Rare Plant Field Guide: 2002 Update. Colorado Natural Heritage Program. Fort Collins.

Speiser, R. and T. Bosakowski. 1987. Nest Site Selection by Northern Goshawks in Northern New Jersey and Southeastern New York. *The Condor* 89:387-394.

State of Wyoming. 2003. Greater Sage-Grouse Conservation Plan for Wyoming.

State of Wyoming: Office of the Governor. 2011. Greater Sage-Grouse Core Area Protection. State of Wyoming Executive Department, Cheyenne, Wyoming.

Stebbins, R.C. 2003. *A Field Guide to Western Reptiles and Amphibians*. 3rd edition. Houghton Mifflin Company, Boston, Massachusetts.

Stehn, T. 2007. Whooping Cranes and Wind Farms - Guidance for Assessment of Impacts. U.S. Fish and Wildlife Service, Unpublished draft.

Stiver, S.J., A.D. Apa, J.R. Bohne, S.D. Bunnell, P.A. Deibert, S.C. Gardner, M.A. Hilliard, C.W. McCarthy, and M.A. Schroeder. 2006. Greater Sage-Grouse: Comprehensive Conservation Strategy. Western Association of Fish and Wildlife Agencies, Cheyenne, Wyoming.

Tacha, T.C., S.A. Nesbitt, and P.A. Vohs. 1992. Sandhill Crane (*Grus canadensis*). The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/031.

Taylor, S.E. and J.R. Young. 2006. A Comparative Behavioral Study of Three Greater Sage-grouse Populations. *The Wilson Journal of Ornithology* 118:36-41.

Terres, J.K. 1980. *The Audubon Society Encyclopedia of North American Birds*. Alfred A. Knopf and Random House Publishers, New York, New York.

Thompson, B.C., A. Jerome, J.A. Jackson, J. Burger, L.A. Hill, E.M. Kirsch, and J.L. Atwood. 1997. Least Tern (*Sternula antillarum*). The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/290doi:10.2173/bna.290.

Thompson, K.M., M.J. Holloran, S.J. Slater, J.L. Kuipers, and S.H. Anderson. 2006. Early Brood-Rearing Habitat use and Productivity of Greater Sage-grouse in Wyoming. *Western North American Naturalist* 66:332-342.

Thompson, T.R. 2012. Dispersal Ecology of Greater Sage-grouse in Northwestern Colorado: Evidence from Demographic and Genetic Methods. PhD Dissertation. University of Idaho, Moscow.

Tobalske, B.W. 1997. Lewis's Woodpecker (*Melanerpes lewis*). The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/284.

Tuttle, M.D. 2006. The Life and Times of the Little Brown Myotis. *Bat Conservation International* 24(1):1-5.

Tyus, H.M. and C.W. McAda. 1984. Migration, Movements and Habitat Preferences of Colorado Squawfish, *Ptychocheilus lucius*, in the Green, White, and Yampa Rivers, Colorado and Utah. *The Southwestern Naturalist* 29(3):289-299.

University of Idaho. 2010. Northwest Gap Analysis Program. U.S. Geological Survey, Moscow, Idaho.

University of Idaho. 2012. Northwest Gap Analysis Program. U.S. Geological Survey, Moscow, Idaho.

U.S. Fish and Wildlife Service (FWS). 1982. Clay Phacelia (*Phacelia argillacea*) Atwood Recovery Plan. Mountain-Prarie Region (6), Denver, Colorado.

___. 1988. Black-footed Ferret Recovery Plan. Mountain-Prairie Region (6), Denver, Colorado.

___. 1990a. Uinta Basin Hookless Cactus (*Sclerocactus glaucus*) Recovery Plan. Mountain-Prairie Region (6), Denver, Colorado.

___. 1990b. Humpback Chub Recovery Plan. Mountain-Prairie Region (6), Denver, Colorado.

___. 1990c. Recovery Plan for the Interior Population of the Least Tern (*Sterna antillarum*).

___. 1993. Barneby Ridge-Cress (*Lepidium barnebyanum*) Recovery Plan. Mountain-Prairie Region (6), Denver, Colorado.

___. 1994a. Utah reed-mustards: Clay reed-mustard (*Schoenocrambe argillacea*), Barneby reed-mustard (*Schoenocrambe barnebyi*), Shrubby reed-mustard (*Schoenocrambe suffrutescens*) recovery plan. Mountain-Prairie Region (6), Denver, Colorado.

___. 1994b. Endangered and Threatened Wildlife and Plants; Determination of Critical Habitat for the Colorado River Endangered Fishes: Razorback Sucker, Colorado Squawfish, Humpback Chub, and Bunytail Chub. *Federal Register* 59(54):13374-13400.

___. 1995a. Utah Pediocactus: San Rafael Cactus (*Pediocactus despainii*) and Winkler Cactus (*Pediocactus winkleri*) Recovery Plan. Mountain-Prairie Region (6), Denver, Colorado.

FWS. 1995b. Ute Ladies'-tresses (*Spiranthes diluvialis*) Recovery Plan. Mountain-Prairie Region (6), Denver, Colorado.

___. 1996. *Platanthera praeclara* (Western prairie fringed orchid) Recovery Plan. Ft. Snelling, Minnesota. vi+ 101 pp.

___. 1999a. June Sucker (*Chasmistes liorus*) Recovery Plan. Mountain-Prairie Region, Denver, Colorado.

___. 1999b. Endangered and Threatened Wildlife and Plants; Final Rule To Remove the American Peregrine Falcon From the Federal List of Endangered and Threatened Wildlife, and To Remove the Similarity of Appearance Provision for Free-Flying Peregrines in the Conterminous United States. *Federal Register* 64(50) 46542-46557.

___. 2002a. Colorado Pikeminnow (*Ptychocheilus lucius*) Recovery Goals: Amendment and Supplement to the Colorado Pikeminnow Recovery Plan. Mountain-Prairie Region (6), Denver, Colorado.

___. 2002b. Razorback Sucker (*Xyrauchen texanus*) Recovery Goals: Amendment and Supplement to the Razorback Sucker Recovery Plan. Mountain-Prairie Region (6), Denver, Colorado.

___. 2002c. Bonytail (*Gila elegans*) Recovery Goals: Amendment and Supplement to the Bonytail Chub Recovery Plan. Mountain-Prairie Region (6), Denver, Colorado.

___. 2002d. Humpback Chub (*Gila cypha*) Recovery Goals: Amendment and Supplement to the Humpback Chub Recovery Plan. Mountain-Prairie Region (6), Denver, Colorado.

___. 2002e. Final Recovery Plan Southwestern Willow Flycatcher (*Empidonax taillii extimus*). Southwest Region (2), Albuquerque, New Mexico.

___. 2005. Final Environmental Assessment - Designation of Critical Habitat for the Southwestern Willow Flycatcher.

___. 2007a. Recovery Outline for San Rafael Cactus (*Pediocactus despainii*) and Winkler Cactus (*Pediocactus winkleri*). Utah Ecological Services, West Valley City.

___. 2007b. Species Assessment and Listing Priority Assignment Form - *Penstemon scariosus* var. *albifluvis*. Mountain-Prairie Region (6), Denver, Colorado.

___. 2007c. Pallid Sturgeon (*Scaphirhynchus albus*) 5-Year Review: Summary and Evaluation. Montana Ecological Services Office, Billings.

___. 2008a. Wright Fishhook Cactus (*Sclerocactus wrightiae*), 5-Year Review: Summary and Evaluation. Utah Ecological Services, West Valley City.

___. 2008b. Black-footed Ferret (*Mustela nigripes*) 5-Year Status Review: Summary and Evaluation. South Dakota Field Office, Pierre.

___. 2008c. Recovery Outline for the Jones Cycladenia (*Cycladenia humilis* var. *jonesii*). Utah Ecological Services, West Valley City.

___. 2008d. FWS Biological Opinion for BLM Resource Management Plan (RMP), Price Field Office. Utah Ecological Services, West Valley City.

FWS. 2008e. 5-year Review Short Form Summary - Uinta Basin Hookless Cactus (*Sclerocactus glaucus*). Mountain-Prairie Region (6), Denver, Colorado.

___. 2009a. Western prairie fringed orchid (*Platanthera praeclara*) 5-Year Review: Summary and Evaluation. Ft. Snelling, Minnesota. ii+ 36 pp.

___. 2009b. Piping Plover (*Charadrius melodus*) 5-Year Review: Summary and Evaluation. Northeast Region (5) and Midwest Region (3), Hadley, Massachusetts and Bloomington, Minnesota.

___. 2009c. Donations Triple Reward for Information on Shooting of Whooping Crane Near Cayuga, Indiana. U.S. Fish and Wildlife Service News, Midwest Region (3), Bloomington, Minnesota.

___. 2009d. Whooping Cranes and Wind Development - An Issue Paper. Southwest Region (2) and Mountain-Prarie Region (6), Albuquerque, New Mexico and Denver, Colorado.

___. 2010. *Schoenocrambe suffrutescens* (Shrubby Reed-mustard) 5-Year Review: Summary and Evaluation. Available at: http://ecos.fws.gov/docs/five_year_review/doc3578.pdf, accessed November 3, 2011.

___. 2011a. Federal Endangered, Threatened, and Candidate Species and Designated Critical Habitats that Occur in or May Be Affected by Projects in Carbon County, Wyoming. Wyoming Ecological Services, Cheyenne.

___. 2011b. Federal Endangered, Threatened, and Candidate Species and Designated Critical Habitats that Occur in or May Be Affected by Projects in Sweetwater County, Wyoming. Wyoming Ecological Services, Cheyenne.

___. 2011c. Colorado Field Office County List. Mountain-Prairie Region (6), Denver, Colorado.

___. 2011d. Endangered, Threatened, Proposed, and Candidate Species - Utah Counties. Utah Ecological Services, West Valley City.

___. 2011e. *Lepidium barnebyanum* (Barneby ridge-cress) 5-Year Review: Summary and Evaluation. Utah Ecological Services, West Valley City.

___. 2011f. Federally Listed and Proposed Endangered, Threatened and Candidate Species and Critical Habitat in Utah – Species List by County. Utah Ecological Services, West Valley City.

___. 2011g. U.S. Fish and Wildlife Service Species Assessment and Listing Priority Assignment Form: *Penstemon scariosus* var. *albifluvis*. Available at: http://ecos.fws.gov/docs/candidate/assessments/2012/r6/Q2QI_P01.pdf, accessed November 2, 2012.

___. 2011h. GIS shapefiles depicting *Physaria obcordata* Section 7 range. GIS data received on October 14, 2011, from the U.S. Fish and Wildlife Service.

___. 2011i. *Schoenocrambe argillacea* (clay reed-mustard) 5-Year Review: Summary and Evaluation. Utah Ecological Services, West Valley City.

___. 2011j. *Astragalus deserticus* Desert Milk-vetch 5-Year Review: Summary and Evaluation. Utah Ecological Services, West Valley City.

FWS. 2012a. National Wetlands Inventory. Available at: http://www.fws.gov/wetlands/, accessed August 22, 2013.

___. 2012b. Birds of Conservation Concern. Available at: http://www.nabci-us.org/map.html, accessed Fall 2012.

___. 2012c. U.S. Fish and Wildlife Service Species Reports: Listed Plants. Environmental Conservation Online System. Available at: http://ecos.fws.gov/tess_public/pub/listedPlants.jsp, accessed October 30, 2012.

___. 2012d. June Sucker (*Chamistes liorus*) History of Decline in Utah Lake and Tributaries. Available at: http://ecos.fws.gov/docs/federal_register/fr853.pdf, accessed Fall 2012.

___. 2012e. Recovery plan for the Mexican spotted owl. Southwest Region (2), Albuquerque, New Mexico.

___. 2012f. Species of Concern: Raptors in Wyoming. Wyoming Ecological Services, Cheyenne.

U.S. Fish and Wildlife Service, Bureau of Land Management, U.S. Forest Service, U.S. Geological Survey, and EPG. 2013. Summary of meeting, the purpose of which was to discuss issues and approaches for addressing clay phacelia (*Phacelia agrillacea*) in relation to the Energy Gateway South Transmission Project. February 28, 2013.

U.S. Forest Service (USFS). 1986a. Land and Resource Management Plan for the Ashley National Forest. Vernal, Utah.

___. 1986b. Land and Resource Management Plan Manti-LaSal National Forest. Price, Utah.

___. 2003. Final Environmental Impact Statement for Uinta National Forest Land and Resource Management Plan. Salt Lake City, Utah.

___. 2013a. GIS shapefiles depicting occurrences of noxious weeds in the Ashley, Mant-La Sal, and Uinta National Forests. GIS data received April 2013 from Terry Miller, USFS Botanist.

___. 2013b. Intermountain Region (R4) Threatened, Endangered, Proposed, and Sensitive Species: Known and Suspected Distribution by Forest. Ogden, Utah.

U.S. Geological Survey (USGS). 2004. Nonindigenous Aquatic Species Database. Gainesville, FL. Available at: http://nas.er.usgs.gov/.

___. 2008. Southwestern Willow Flycatcher. USGS Forest and Rangeland Ecosystem Science Center, Colorado Plateau Field Station at Northern Arizona University. Flagstaff. Available at: http://sbsc.wr.usgs.gov/cprs/research/projects/swwf/cprsmain.asp.

___. 2010. National Gap Analysis Program Land Cover Data, Version 1. Gap Analysis Program.

___. 2012. Bird Checklists of the United States: Ouray National Wildlife Refuge. Available at: http://www.npwrc.usgs.gov/resource/birds/chekbird/r6/ouray.htm, accessed January 27, 2012.

Utah Department of Agriculture and Food. 2009. County Declared Noxious Weeds in Utah. Available at: http://ag.utah.gov/divisions/plant/noxious/documents/noxCounty.pdf, accessed October 1, 2012.

Utah Department of Agriculture and Food. 2010. Utah Noxious Weed List. Available at: http://ag.utah.gov/divisions/plant/noxious/documents/noxUtah.pdf, accessed October 1, 2012.

Utah Department of Natural Resources (UDNR). 2008. Utah Conservation Data Center Available at: http://dwrcdc.nr.utah.gov/ucdc/.

Utah Division of Wildlife Resources (UDWR). 1997. Inventory of Sensitive Species and Ecosystems in Utah. Paper No. 402, Salt Lake City.

___. 1998. Inventory of Sensitive Species and Ecosystems in Utah. Prepared for the Utah Reclamation Mitigation and Conservation Commission and the U.S. Department of the Interior. Prepared by Utah Division of Wildlife Resources, Salt Lake City.

___. 2000. White-faced Ibis (*Plagadis chihi*). Salt Lake City.

___. 2005a. Utah Comprehensive Wildlife Conservation Strategy. Salt Lake City.

___. 2005b. Plant Information Compiled by the Utah Natural Heritage Program: A Progress Report. Salt Lake City.

___. 2006. Utah Sensitive Species List. Salt Lake City.

___. 2009a. Greenback Trout Gets Protection. Available at: http://wildlife.utah.gov/dwr/news/42-utah-wildlife-news/92-greenback-trout-gets-protection.html, accessed Fall 2012.

___. 2009b. Utah Greater Sage-grouse Management Plan. Publication Number 09-17, Salt Lake City.

___. 2009c. Rangewide Conservation Agreement and Strategy for Northern Leatherside (*Lepidomeda copei*). Publication Number 09-11, Salt Lake City.

___. 2010a. Utah Sensitive Species List. Salt Lake City.

___. 2010b. Conservation Agreement and Strategy for Northern Leatherside (*Lepidomeda aliciae*) in the State of Utah. Publication Number 10-19, Salt Lake City.

___. 2011a. Utah Sensitive Species List. Salt Lake City.

___. 2011b. Utah's State Listed Species by County. Utah Division of Wildlife Resources, Utah Conservation Data Center, Salt Lake City.

___. 2011c. GIS shapefiles depicting sage-grouse occupied habitat in Utah. GIS data received March 27, 2012 from Utah Division of Wildlife Resources.

___. 2013a. GIS shapefiles depicting occupied sage-grouse leks in Utah. GIS data received on August 10, 2011, Salt Lake City.

___. 2013b. Recommended seasonal restrictions and BMPs for development in wildlife habitats in Utah. Excerpt from unpublished document emailed to EPG on September 30, 2013.

Utah Native Plant Society (UNPS). 1989. Report for 1989 Challenge Cost Share Project, Uinta National Forest. Target species: *Phacelia argillacea* Atwood (Clay phacelia). Prepared by M.A. "Ben" Franklin and J.S. Tuhy.

UNPS. 2011. Utah Rare Plant Guide [online], edited by A.J. Frates. Available at: www.utahrareplants.org, accessed November 2011.

___. 2012. Utah Rare Plant Guide [online], edited by A.J. Frate. Available at: www.utahrareplants.org, accessed Fall 2012.

Utah Natural Heritage Program (UNHP). 2003. Vertebrate information compiled by the Utah Natural Heritage Program: A Progress Report. Salt Lake City.

___. 2012. GIS shapefiles depicting locations of special status species in Utah. GIS data received on January 6, 2012 from S. Lindsey, Salt Lake City.

Utah Partners in Flight. 2012. Utah Partners in Flight Physiographic Areas. Available at: http://wildlife.utah.gov/publications/pdf/utah_partners_in_flight.pdf.

Valdez, R.A. and G.H. Clemmer. 1982. Life History and Prospects for Recovery of the Humpback and Bonytail Chub. In *Proceedings of a Symposium on Fishes of the Upper Colorado River System: Present and Future*, edited by W.M. Miller, H.M. Tyus, and C.A. Carlson, pp. 109-119. American Fisheries Society, Bethesda, Maryland.

Valdez, R.A., P.B. Holden, and T.B. Hardy. 1990. Habitat Suitability Index Curves for Humpback Chub of the Upper Colorado River Basin. *Rivers* 1:31-42.

Vanicek, C.D. and R.H. Kramer. 1969. Life History of the Colorado Squawfish, *Phtychocheilus lucius*, and the Colorado Chub, *Gilia robusta*, in the Green River in Dinosaur National Monument,1964-1966. *Transactions of the American Fisheries Society* 98:193-208.

Vickery, P.D. 1996. Grasshopper Sparrow (*Ammodramus savannarum*). In *The Birds of North America*, edited by A. Poole and F. Gill, pp. 239. The Academy of Natural Sciences and The American Ornithologists' Union, Philadelphia, Pennsylvania and Washington, D.C.

Wakkinen, W.L., K.P. Reese, and J.W. Connelly. 1992. Sage grouse Nest Locations in Relation to Leks. *Journal Wildlife Management* 56:381-383.

Wallestad, R.O. 1971. Summer Movements and Habitat Use by Sage grouse Broods in Central Montana. *Journal Wildlife Management* 35:129-136.

Wallestad, R.O., J.G. Peterson, and R.L. Eng. 1975. Foods of Adult Sage Grouse in Central Montana. *Journal of Wildlife Management* 39:628-630.

Wallestad, R.O. and D.B. Pyrah. 1974. Movement and Nesting of Sage grouse Hens in Central Montana. *Journal Wildlife Management* 39:630-633.

Wallestad, R.O. and P. Schladweiller. 1974. Breeding Season Movements and Habitat Selection of Male Sage grouse. *Journal of Wildlife Management* 38:634-637.

Walters, E.L., E.H. Miller, and P.E. Lowther. 2002. Red-naped Sapsucker (*Sphyrapicus nuchalis*). The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/663b.

Wambolt, C.L., A.J. Harp, B.L. Welch, N. Shaw, J.W. Connelly, K.P. Reese, C.E. Braun, D.A. Klebenow, E.D. McArthur, J.G. Thompson, L.A. Torell, and J.A. Tanaka. 2002. Conservation of Greater Sage-grouse on Public Lands in the Western U.S.: Implications of Recovery and Management Policies. Policy Paper SG-02-02, Policy Analysis Center for Western Public Lands. Caldwell, Idaho.

Watson. 2013. Personal communication between David Watson, BLM Salt Lake Filed Office, and Jan Summerhays, EPG Plant Ecologist, concerning noxious weeds in Salt Lake Field Office. April 22, 2013.

Welsh, S.L., N.D. Atwood, S. Goodrich, and L.C. Higgins. 2003. *A Utah Flora*. 3rd edition, revised. Brigham Young University, Provo, Utah.

Welsh, S.L., N.D. Atwood, and J.L. Reveal. 1975. Endangered, Threatened, Extinct, Endemis and Rare or Restricted Utah Vascular Plants. *Great Basin Naturalist* 35:327-376.

Welsh, S.L., S. Atwood, S. Goodrich, and L.C. Higgins. 2008. *A Utah Flora*. 4th edition, revised. Brigham Young University, Provo, Utah.

Welsh, S.L. and S. Goodrich. 1980. Miscellaneous plant novelties from Alaska, Nevada, and Utah. *Great Basin Naturalist* 40:78-88.

Wyoming Game and Fish Department (WGFD). 2005a. Avian Species of Special Concern in Wyoming. Cheyenne.

___. 2005b. Mammalian Species of Special Concern in Wyoming. Cheyenne.

___. 2005c. A Comprehensive Wildlife Conservation Strategy for Wyoming. Cheyenne.

___. 2010a. Wyoming's State Wildlife Action Plan. Interagency Advisory Team, Cheyenne.

___. 2010b. GIS shapefiles depicting sage-grouse core areas in Wyoming GIS data received August 30, 2011.

___. 2012. GIS shapefiles depicting occupied sage-grouse leks in Wyoming. GIS data received September 2012.

White, C.M., M. Clayton, N.J. Clum, T.J. Cade, and W. Granger Hunt. 2002. Peregrine Falcon (*Falco peregrinus*). The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/660.

Wilson, E.C., W.A. Hubert, and S.H. Anderson. 1993. Nesting and Foraging Ecology of Least Terns on Sand Pits in Central Nebraska. *Southwestern Naturalist* 38:9-14.

Wisdom, M.J., C.W. Meinke, S.T. Knick, and M.A. Schroeder. 2011. Factors Associated with Extirpation of Sage-grouse. In *Greater Sage-Grouse: Ecology of a Landscape Species and its Habitats*, edited by S.T. Knick and J.W. Connelly, pp. 451-472. Cooper Ornithological Union, University of California Press, Berkeley.

With, K.A. 2010. McCown's Longspur (*Rhyncophanes mccownii*). The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/096.

Woodin, M.C. and T.C. Michot. 2002. Redhead (*Aythya americana*). The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/695.

Wyoming Natural Diversitiy Database (WYNDD). 2011. GIS shapefiles depicting locations of special status species locations in Wyoming. GIS data recieved September 20, 2011 from M. Arnet, Laramie.

Wyoming Partners in Flight. 2012. Wyoming Partners in Flight Physiographic Areas. Available at: http://www.partnersinflight.org/bcps/pifplans.htm, accessed Fall 2012.

Wyoming Weed and Pest Council. 2012. Weed and Pest Declared List (By County). Amended February 2012. Available at: http://www.wyoweed.org/Documents/DocumentPage/2012%20Declared%20List.pdf, accessed October 1, 2012.

Yosef, R. 1994. The Effects of Fencelines on the Reproductive Success of Loggerhead Shrikes. *Conservation Biology* 8:281-285.

Yosef, R. 1996. Loggerhead Shrike (*Lanius ludovicianus*). The Birds of North America Online, edited by A. Poole. Cornell Lab of Ornithology. Ithaca, New York. Available at: http://bna.birds.cornell.edu/bna/species/231.

Young, J.R., J.W. Hupp, J.W. Bradbury, and C.E. Braun. 1994. Phenotypic Divergence of Secondary Sexual Traits Among Sage-grouse, *Centrocercus urophasianus* Populations. *Animal Behaviour* 47:1353-1362.

APPENDIX F – COMPLIANCE WITH APPLICABLE SAGE-GROUSE POLICIES, PLANS, AND PROCEDURES AND APPLICANT-PROPOSED MITIGATION

F.1 Introduction

The Bureau of Land Management (BLM) and several cooperating agencies participating in the preparation of the Environmental Impact Statement (EIS) for the Energy Gateway South Transmission Project (Project) have recently updated or are in the process of revising policies and plans addressing management and conservation of greater sage-grouse (*Centrocercus urophasianus*) in the Project area. These revisions are largely in response to declining greater sage-grouse populations in the western United States, agency responsibilities for sage-grouse conservation, and the U.S. Fish and Wildlife Service's (FWS) *12 Month Findings for Petitions to List the Greater Sage-grouse as Threatened or Endangered*, published in March 2010, which found that listing the species under the Endangered Species Act was warranted but precluded by higher priority listing actions. Several of these policy and sage-grouse management plan revisions have been initiated or completed since the Applicant (PacifiCorp, doing business as Rocky Mountain Power) submitted an *Application for Transportation and Utility Systems and Facilities on Federal Lands* (Standard Form 299) on November 28, 2007, initiating the BLM and cooperating agencies' review of the Project.

The BLM and cooperating agencies have collaborated to prepare the EIS in accordance with current relevant law, regulation, policies, and plans; including those guiding agency decisions that may have an impact on sage-grouse and sage-grouse habitat. This appendix addresses actions and planning undertaken by the BLM, cooperating agencies, and the Applicant to prepare the EIS and potentially develop the Project in compliance with applicable law, regulation, policies, and plans related to sage-grouse.

The BLM and cooperating agencies collaborated to prepare a *Framework for Sage-grouse Impacts Analysis for the Energy Gateway South Transmission Project* (April 2013; Exhibit F1) as an early step to addressing potential impacts on sage-grouse during preparation of the EIS. The framework outlines the analysis and potential mitigation required for agencies whose decisions pertaining to the Project are evaluated in the EIS to adequately analyze the potential effects of the Project on sage-grouse and sage-grouse habitat and potentially select an action alternative that would be consistent with agency missions and goals pertaining to sage-grouse conservation. The framework also was developed to facilitate relevant cooperating agency decisions and evaluation of compliance with applicable plans and policies that are not subject to National Environmental Policy Act review and not addressed in the EIS.

F.2 Applicable Sage-grouse Policies and Plans

F.2.1 Federal

F.2.1.1 Bureau of Land Management Washington Office Instruction Memorandum 2012-043 Greater Sage-Grouse Interim Management Policies and Procedures

On December 22, 2011, BLM issued Washington Office (WO) Instruction Memorandum (IM) 2012-043, which provides interim conservation policies and procedures for greater sage-grouse that are to be applied

by BLM field offices to ongoing and proposed authorizations and activities. The purpose of the WO-IM 2012-043 is to promote sustainable greater sage-grouse populations and conserve greater sage-grouse habitat while BLM develops and decides how to best incorporate long-term conservation measures for greater sage-grouse into applicable land-use plans. The IM policies and procedures apply to BLM actions in preliminary priority habitat (PPH) and preliminary general habitat (PGH) for greater sage-grouse, which will be identified by the state wildlife agencies. (Note: The conservation policies and procedures described in the IM do not apply in areas where a state and/or local regulatory mechanism has been developed for the conservation of the greater sage-grouse in coordination and concurrence with the FWS, and the state sage-grouse plan has subsequently been adopted by the BLM through the issuance of a state-level BLM Instruction Memorandum). The WO-IM 2012-043 prescribes specific procedures for pending and future right-of-way applications in preliminary priority and preliminary general habitat. The Notice of Intent to prepare an EIS for the Project was published in the *Federal Register* on April 1, 2011, and therefore these procedures are applicable to the Project.

WO IM 2012-043 procedures for pending and future right-of-way applications in preliminary priority habitat include:

- Conduct pre-application meetings for all new right-of-way proposals consistent with the right-of-way regulations (43 Code of Federal Regulations [CFR] 2804.10) and consistent with current renewable energy right-of-way policy guidance (WO-IM-2011-061, issued February 7, 2011).
- For pending applications, assess the impact of the proposed right-of-way on greater sage-grouse and its habitat, and implement the following:
    - Ensure that reasonable alternatives for siting the right-of-way outside of the PPH or within a BLM-designated utility corridor are considered and analyzed in compliance with the National Environmental Policy Act
    - Identify technically feasible best management practices, conditions, etc. (e.g., siting, burying powerlines) that may be implemented in order to eliminate or minimize impacts
- For right-of-ways where the total project disturbance from the right-of-way and any connected action is less than 1 linear mile, or 2 acres of disturbance, develop mitigation measures related to construction, maintenance, operation, and reclamation activities that, as determined in cooperation with the respective state wildlife agency, would cumulatively maintain or enhance greater sage-grouse habitat.
- For right-of-way applications where the total project disturbance from the right-of-way and any connected action is greater than 1 linear mile or 2 acres of disturbance, it is BLM policy that where a field office determines that it is appropriate to authorize a right-of-way, the following process must be followed:
    - The BLM will document the reasons for its determination and require the right-of-way holder to implement measures to minimize impacts on sage-grouse habitat.
    - In addition to considering opportunities for onsite mitigation, the BLM will, to the extent possible, cooperate with project proponents to develop and consider implementing appropriate offsite mitigation that the BLM, coordinating with the respective state wildlife agency, determines would avoid or minimize habitat and population-level effects (refer to WO-IM-2008-204, Off-site Mitigation). When developing such mitigation, the BLM should consider compensating for the short-term and long-term direct and indirect loss of greater sage-grouse and its habitat.
    - Unless the BLM determines, in coordination with the respective state wildlife agency, that the proposed right-of-way and mitigation measures would cumulatively maintain or enhance greater sage-grouse habitat, the proposed right-of-way decision must be forwarded to the appropriate BLM State Director, State Wildlife Agency Director, and FWS representative for

their review. If this group is unable to agree on the appropriate mitigation for the proposed right-of-way, then the proposed decision must be forwarded to the Greater Sage-Grouse National Policy Team with the addition of the State Wildlife Agency Director, when appropriate, for its review. If the National Policy Team and the State Wildlife Agency Director are unable to agree on the appropriate mitigation for the proposed right-of-way, the National Policy Team will coordinate with and brief the BLM Director for a final decision in absence of consensus.

The three states crossed by the Project (Wyoming, Colorado, and Utah) all have statewide sage-grouse management plans and are participating with BLM and U.S. Forest Service (USFS) in the ongoing amendments of resource management plans (RMPs) and land and resource management plans (LRMPs), respectively, and interim management of sage-grouse differently as follows:

- Wyoming has established a state regulatory mechanism for the conservation of the sage-grouse and the BLM has adopted this state strategy through the issuance of BLM IM WY 2012-019; therefore, PPH and PGH will not be designated in Wyoming. The Wyoming Core Areas have been adopted by the BLM.

- Colorado has developed PPH and PGH that focus conservation efforts on the most important habitat for the species and provides a biological basis for land use recommendations under BLM WO IM 2012-043 and is participating with the BLM in the ongoing amendments of RMPs in Colorado.

- Utah has developed a state regulatory mechanism for the conservation of sage-grouse that could be adopted by the FWS and BLM in place of the conservation measures identified in the IM and has not designated PPH and PGH. However, BLM has not adopted the state regulatory mechanism at this time. For the purposes of identifying PPH and PGH, BLM considers the Utah Division of Wildlife Resources (UDWR) occupied sage-grouse habitat layer to be synonymous with PPH in the Utah; no PGH has been identified.

F.2.1.2 U.S. Forest Service Interim Recommendations for Greater Sage-grouse and Greater Sage-grouse Habitat

On October 12, 2012 the USFS issued Interim Recommendations for Greater Sage-Grouse and Greater Sage-Grouse Habitat. Similar to BLM WO IM 2012-043, the USFS Interim Recommendations provide conservation policies and procedures for greater sage-grouse that are to be applied on National Forest system land until USFS LRMPs are incorporated to include sage-grouse conservations measures. Additionally, USFS seeks to promote consistency with BLM management of sage-grouse on BLM-administered lands under BLM WO IM 2012-043.

The USFS Interim Recommendations for Greater Sage-Grouse and Greater Sage-Grouse Habitat recommendations for nonrecreational special use proposals including power lines direct USFS to:

- Within 3 kilometers of sage-grouse habitat, avoid authorizing placement of overhead power lines or other tall structures that provide perch sites for raptors.
- Determine, in coordination with the respective state wildlife agency, whether a proposal that may affect sage-grouse or sage-grouse habitats would likely have more than minor adverse effects on sage-grouse or sage-grouse habitat.
- If the proposed use likely would have more than minor adverse effects on sage-grouse habitat:
  - Consider feasible alternatives for siting the use outside of sage-grouse habitat; and

- Identify technically feasible best management practices in terms of siting placement of overhead power lines or other tall structures (e.g., burying power lines) that may be implemented, to avoid or minimize impacts on sage-grouse or sage-grouse habitats.

- In consultation with the state wildlife agency, develop mitigation measures for construction, maintenance, operation, and reclamation of the proposed use that minimize impacts on sage-grouse habitat.

F.2.1.3 BLM Resource Management Plans and USFS Forest Plans

Many BLM RMPs and USFS LRMPs contain land-use restrictions to promote sage-grouse conservation (e.g., limitations on development activities near sage-grouse leks). Restrictions identified in applicable plans are detailed in EIS Appendix E, Table E-11 and have been considered in the analysis presented in Chapter 3. BLM and USFS are currently preparing amendments and EISs for applicable RMPs and LRMPs in Wyoming, Colorado, and Utah to include additional sage-grouse conservation measures. The BLM and USFS amendments of applicable land-use plans are anticipated to be complete prior to the Record of Decision for the Project. If an action alternative is selected, the Project would be developed in compliance with the conservation measures in applicable BLM RMPs and USFS LRMPs.

F.2.2 State

F.2.2.1 Wyoming

The Governor of Wyoming issued Executive Order 2011-5 in June 2011. Executive Order 2011-5 replaced previous executive orders pertaining to sage-grouse in Wyoming and established a state regulatory mechanism to protect sage-grouse and sage-grouse habitat. The Executive Order established Core Population Areas and focuses conservation efforts in these areas including limits on the density of surface disturbance and restrictions on surface occupancy and seasonal use (EIS Appendix E, Table E-11). Additionally, the Executive Order established new transmission line corridors through the Core Population Areas and implemented restrictions on development of new transmission lines within core areas outside of the established corridors.

In addition to Executive Order 2011-5, the Wyoming Game and Fish Commission adopted the Wyoming Greater Sage-grouse Conservation Plan in 2003. The plan was developed to maintain and improve sage-grouse habitats in Wyoming, provide for coordinated management across jurisdictional or ownership boundaries, and develop the statewide support necessary to assure the survival of Wyoming's sage-grouse populations. The plan is intended to be used as guidance regarding sage-grouse management by state and federal agencies in Wyoming and the Wyoming Game and Fish Commission has sought agreements with federal agencies to implement the plan.

F.2.2.2 Colorado

The Colorado Greater Sage-grouse Steering Committee published the Colorado Greater Sage-grouse Conservation Plan in 2008. The purpose of the plan is to facilitate the conservation of sage-grouse and their habitats in Colorado by supporting goals that, if achieved, would facilitate the recovery of the species and result in its removal from the state’s species of concern list. Guidelines for sage-grouse protection from populations and habitat disturbance were developed as a part of the plan (EIS Appendix E, Table E-11). Colorado Parks and Wildlife works collaboratively with federal, state, and local agencies as well as local working groups to implement the recommendations included in the plan.

The Colorado Department of Natural Resources is working collaboratively with BLM during the ongoing amendment of BLM RMPs to include sage-grouse conservation measures and is providing information to

FWS for consideration in its development of a listing decision for the species. This work includes the identification of sage-grouse PPH and PGH in the state as well as preparation of "The Colorado Package," a compilation of accomplishments and ongoing actions to promote sage-grouse conservation based on the strategies identified in the 2008 Colorado Greater Sage-grouse Conservation Plan.

F.2.2.3 Utah

The Governor of Utah approved the Conservation Plan for Greater Sage-grouse in Utah in April 2013. The plan is designed to eliminate the threats facing sage-grouse while balancing the economic and social needs of the residents of Utah by establishing incentive-based conservation programs for private, local government, and School and Institutional Trust Lands Administration lands and regulatory programs on other state- and federally managed lands. To achieve this goal, the plan establishes sage-grouse management areas and implements management protocols in these areas. Management provisions in sage-grouse management areas include seasonal and spatial restrictions on development activities, limits on extent of new cumulative permanent disturbance, and special provisions for electric transmission lines.

Additionally, the UDWR published the Utah Greater Sage-grouse Management Plan in 2009. The plan identifies threats and issues affecting sage-grouse management in Utah as well as goals, objectives, and strategies intended to guide UDWR, local working groups, and land managers efforts to protect, maintain, and improve sage-grouse populations and habitats and balance their management with other resource uses.

F.2.3 Local

F.2.3.1 Local Area Working Groups

The Project could cross sage-grouse habitats in the boundaries of eight sage-grouse local working groups; three in Utah (Uinta Basin, Strawberry Valley, and Castle Country), three in Colorado (Northwest Colorado, Piceance/Parachute/Roan Creek, and Pinon Mesa), and 2 in Wyoming (Bates Hole/Shirley Basin and South-central Wyoming). Each local working group has prepared a conservation plan to assess the status of local populations, to provide guidance and recommendations to meet objectives for maintaining sage-grouse populations and improving habitat, and to promote incorporation of local knowledge and local participation in larger efforts to promote conservation of sage-grouse.

F.3 Coordination and Actions Taken to Comply With Applicable Plans and Policies

Sage-grouse and sage-grouse habitats are widespread in landscapes crossed by the alternative routes in Wyoming, Colorado, and Utah. BLM and the cooperating agencies acknowledged that alternative routes that avoid sage-grouse and sage-grouse habitat would not be feasible early during the preparation of the EIS. The agencies collaborated with the Applicant to identify feasible strategies to avoid, minimize, and compensate for the potential effects of the Project on sage-grouse pursuant to the plans and policies described in Section F.2.

F.3.1 Project Siting

The BLM worked with the cooperating agencies and the Applicant to avoid and minimize potential effects on sage-grouse by identifying and eliminating or modifying alternative routes that would have substantially greater effects on sage-grouse or sage-grouse habitat compared to other alternative routes considered.

F.3.3.1 Routes Eliminated from Further Consideration

Transmission line alternative routes and segments included in the Applicant's Application for Transportation and Utility Systems and Facilities on Federal Lands were systematically screened and analyzed using the methods described in EIS Sections 2.5.1.1 and 2.5.1.3. Alternative routes that would have substantially higher impacts on sage-grouse and sage-grouse habitat compared to other alternative routes studied were eliminated from further consideration in the EIS. Alternative routes and segments that were eliminated from further consideration at least in part due to their impacts on sage-grouse and sage-grouse habitats include (refer to *Energy Gateway South Transmission Project Siting Study Report*, BLM 2012; EIS Section 2.5.1.1; and EIS Maps 2-3a and 2-3b):

Wyoming

- Links W17 and W18 were eliminated from consideration because they cross the Hannah sage-grouse core area outside of the utility corridor identified in the Wyoming Governor's Executive Order 2011-5 and are not parallel to an existing transmission line. Therefore, these links do not comply with the Executive Order regarding greater sage-grouse core area protection.
- Links W19 and W20 were eliminated from consideration because they cross the Hannah and South Rawlins sage-grouse core areas outside of the utility corridor identified in the Wyoming Governor's Executive Order 2011-5 and do not parallel to an existing transmission line. Therefore, these links do not comply with the Executive Order regarding greater sage-grouse core area protection.
- Links W453, W454, W490, W491, W492, W493, and W520 were eliminated from consideration because any route using these links would be required to cross the Salt Wells sage-grouse core area outside of the utility corridor identified in the Wyoming Governor's Executive Order 2011-5 and would not be parallel to an existing transmission line. Therefore, alternative routes using these links do not comply with the Executive Order regarding greater sage-grouse core area protection. Additionally, alternative routes using these links may have substantial impacts on sage-grouse in Utah (refer to description of Links U20, U30, and U90).

Colorado

- Links C50, C45, C51, and C80 were eliminated from consideration because they cross important habitats that support some of the highest densities of breeding sage-grouse in the Northwest Colorado sage-grouse population, which is the largest sage-grouse population in Colorado.

Utah

- Links U20, U30, and U90 were eliminated from consideration because they cross important habitats occupied by the Diamond Mountain sage-grouse population, which is one of the largest and most robust sage-grouse populations of sage-grouse in Utah. Additionally, alternative routes using these links may have substantial impacts on sage-grouse in Wyoming (refer to description of Links W453, W454, W490, W491, W492, W493, and W520).
- Link U322 was eliminated from consideration because it crosses important habitats occupied by the Halfway Hollow sage-grouse population that have not been affected by previous transmission line development. Additionally, alternative routes using this link may have substantial impacts on other important sage-grouse habitats in Wyoming and Utah (refer to description of Links W453, W454, W490, W491, W492, W493, W520, U20, U30, and U90).
- Links U422 and U423 were eliminated from consideration because they are not located adjacent to an existing high-voltage transmission line and therefore would have greater impacts on sage-

grouse compared to Links U425, U426, and U427, which were retained for analysis, where they cross important habitats occupied by the Strawberry/Fruitland sage-grouse population.

F.3.3.2 Revision to Alignments and Incorporation of Local Route Variations

The BLM, cooperating agencies, and the Applicant worked collaboratively to refine the alternative routes analyzed in the EIS, as practicable, to avoid or minimize effects on sage-grouse and important sage-grouse habitats. These refinements included local adjustments to the alternative routes to locate them outside of designated sage-grouse habitat or in habitats of lower value to sage-grouse and development of local route variations that would avoid important sage-grouse habitats. Segments that were refined and local route variations that were developed at least in part to reduce potential effects on sage-grouse and sage-grouse habitats include:

Wyoming

- The alignment of Link W21 was refined to reduce impacts on sage-grouse by locating the segment closer to other planned infrastructure and closer to the center of the utility corridor identified in Wyoming Governor's Executive Order 2011-5 in the Hanna sage-grouse core area.

Colorado

- The alignment of Links C61, C71, C72, and C91 were refined to reduce impacts on sage-grouse, to the extent practicable, by locating the segments farther away from known sage-grouse leks and outside of sage-grouse priority habitat used by the Northwest Colorado sage-grouse population.

Utah

- The alignment of Links U401 and U404 were refined to avoid important habitats occupied by the Anthro Mountain sage-grouse population.
- Links U409, U411, U520, U514, U516, U560, U515, U540, and U513 were developed to provide local route variations in Utah that would avoid sage-grouse leks and other important habitats occupied by the Emma Park sage-grouse population, which is one of most robust sage-grouse populations in Utah (refer to EIS Section 3.2.8.5).

F.3.2 Development of Additional Onsite Mitigation

The BLM, cooperating agencies, and the Applicant are working collaboratively to develop onsite mitigation measures that could be used to reduce impacts on sage-grouse and sage-grouse habitat in addition to the mitigation measures in applicable BLM, USFS, and state agency plans. Development of additional onsite mitigation measures to reduce potential effects on sage-grouse is ongoing and the final measures will be outlined in the Applicant's voluntary sage-grouse conservation and mitigation plan for the selected alternative route. Mitigation measures that have been agreed-on include:

- Modification of the proposed tower design to use H-frame tubular steel structures (Selective Mitigation Measure 6 [EIS Table 2-13]) and the installation of perch deterrents on these structures (Selective Mitigation Measure 14) within 4 miles of sage-grouse leks in designated sage-grouse core areas and priority habitats to reduce potential sage-grouse predation by raptors (refer to EIS Section 3.2.8.4).

Other mitigation measures that are being considered include:

- Reduced speed limits during construction and maintenance activities to reduce risk of sage-grouse collision with moving vehicles and reduce disturbance to sage-grouse resulting from vehicle noise;
- Additional restrictions on use of herbicides in areas where sage-grouse are known to congregate;
- Special reclamation standards focused on restoring functionality and quality of sage-grouse habitat beyond the minimum standards required by agency policy;
- Expanded seasonal and spatial restrictions in important sage-grouse habitats beyond the minimum restrictions required by applicable agency policies and plans; and
- Reducing the separation between the Project and other linear infrastructure (including other transmission lines) for short distances in important sage-grouse habitats where high levels of impact on sage-grouse are anticipated.

F.3.3 Development of Offsite Mitigation

Despite removing and modifying alternative routes and segments that would have comparatively higher impacts on sage-grouse and implementing additional onsite mitigation, BLM and the cooperating agencies anticipate that implementation of any of the alternative routes analyzed in the EIS would result in high residual impacts on sage-grouse and sage-grouse habitat (refer to EIS Section 3.2.8.5). The residual impacts would not be consistent with the objectives for sage-grouse and sage-grouse habitat management identified in applicable agency plans and policies (Section F.2). In accordance with BLM WO IM 2013-142 and other cooperating agency policies pertaining to offsite mitigation, BLM, the cooperating agencies, and the Applicant are working collaboratively to develop appropriate offsite mitigation that could be implemented to facilitate reasonable development of the Project consistent with applicable agency plans and policies pertaining to sage-grouse. To facilitate this collaboration, the Applicant has convened a group of sage-grouse biologists from the BLM and cooperating agencies (the Habitat Equivalency Analysis [HEA] Technical Working Group) to provide input and guidance for developing the Applicant's Sage-grouse Mitigation Plan, including the HEA (refer to EIS Section 6.2.2.1). The methods used in development of the Applicant's Sage-grouse Mitigation Plan, including the HEA and the types of offsite mitigation being considered are described in Exhibit B (Energy Gateway South Transmission Project Greater Sage-grouse Habitat Equivalency Analysis Plan).

F.4 Applicant Provided Commitments for Mitigation

The following statement was prepared by the Applicant to outline the company's intention to prepare a voluntary sage-grouse conservation and mitigation plan for the selected alternative route:

> The Draft EIS analysis describes potential Project-related impacts on sage-grouse and their habitat. These impacts have been minimized or avoided to the extent feasible by the BLM and cooperating agencies using avoidance and minimization measures (e.g., seasonal restrictions) from applicable BLM, USFS, and other applicable land-use and conservation plans. After application of these avoidance and mitigation measures, the BLM analysis indicates that impacts on sage-grouse and their habitat are likely to occur as a result of implementation of the Project. To meet requirements of BLM IM 2012-043, October, 2012 USFS Manual updates, and other applicable agency policies, Rocky Mountain Power will take voluntary actions to avoid, minimize, and compensate for the Project's effects on sage-grouse and their habitat.
>
> The agencies have developed a framework for Sage-grouse Impacts Analysis for the Energy Gateway South Transmission Project. The framework is used by the Applicant

and the agencies to identify and analyze Project-related impacts and develop adequate mitigation. The framework identifies the use of a Habitat Equivalency Analysis (HEA), conducted by the project Applicant, as a replicable method for determining mitigation that is scaled to Project-related permanent and interim losses of sage-grouse habitat services.

In coordination with the agencies, Rocky Mountain Power will develop a voluntary sage-grouse conservation and mitigation plan for the preferred alternative route. The final plan will document Rocky Mountain Power's offer of scaled mitigation and other voluntary Applicant-committed mitigation measures for sage-grouse. The mitigation plan will offer measures to avoid, minimize, or compensate for all Project effects characterized by the framework and identified in the EIS that could not be mitigated or avoided using measures in BLM or other agency plans, including losses of habitat services quantified using the HEA.

F.4.1 Energy Gateway South Transmission Project Greater Sage-grouse Habitat Equivalency Analysis Plan

The *Energy Gateway South Transmission Project Greater Sage-grouse Habitat Equivalency Analysis Plan*, developed by the Applicant in coordination with the HEA Technical Working Group (refer to EIS Section 6.2.2.1) is included as Exhibit F2.

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Exhibit F1 – Framework for Sage-grouse Impacts Analysis

Framework for Sage-grouse Impacts Analysis for the Energy Gateway South Transmission Project
December 3, 2013

(1) Evaluation of Direct and Indirect Impacts - This portion of the overall Greater Sage-Grouse (hereafter sage-grouse) Impacts Assessment Framework addresses Project-related habitat impacts that bear directly on listing factors considered by the U.S. Fish and Wildlife Service (FWS) when evaluating the need to provide full listing protection under the Endangered Species Act (ESA).

A starting point for this analysis is a thorough review of the threats assessment/five factor analysis that FWS conducted as part of the March 23, 2010 (75 FR 13910), listing of the sage-grouse as a Candidate under ESA. An evaluation of all potential threats to sage-grouse and sage-grouse habitat from the transmission line should be conducted incorporating the latest available scientific information—most of which is referenced in the *Federal Register* notice itself.

Of particular importance is the synthesis evaluation of all potential threats of the Project that operate cumulatively to impact sage-grouse populations and habitat in a way that is not adequately evaluated by examining threats independently. The direct, indirect and cumulative impacts analysis for the Project should consider the *Federal Register* notice cumulative threats assessment summary as an example of how to fully analyze impacts associated with the proposed project. Reference to additional scientific information published since the issuance of the *Federal Register* notice is available on the FWS website and should be incorporated into the analysis: Best available scientific information should be used in the direct, indirect and cumulative impacts analysis.

A project environmental affects analysis of sage-grouse populations that attend leks within 18 kilometers of the Project is a critical component of an indirect impacts analysis for the species. Sage-grouse that attend leks up to 18 kilometers from the Project may be indirectly affected by the loss of habitat functionality during other seasons of the year (Connelly et.al. 2000). The construction of a transmission project or other linear facility may pose additional hindrance of seasonal migration patterns or avoidance of important seasonal habitats once used extensively by local sage-grouse populations. Qualitative and quantitative measures of habitat change must be considered in describing the potential impacts of the Project. In the context of managing a species that requires such a large landscape of habitats to meet their life-cycle needs, and the nature of the proposed disturbance, it is reasonable to make some assumptive predictions about the relative impacts within 18 kilometers.

(2) Addressing Direct Loss of Birds - This piece of the overall Greater Sage-Grouse Impacts Assessment Framework is an important contribution to the range wide jeopardy analysis conducted as part of the informal conferencing process for this Candidate species. Additionally, addressing impacts on populations provides key information needed for completing any potential future formal Section 7 consultation that would be required if the sage-grouse is ultimately listed under ESA during project development, thereby significantly streamlining this process.

FWS is actively working on this issue as it relates to range wide sage-grouse conservation. There are two ways that the Applicant is expected to help resolve this concern:

(a) Work closely with FWS and state agency biologists to develop an approach to address loss of birds from Project-related impacts and their replacement. This will include development of a monitoring plan utilizing best and most current scientific methods for estimating loss of birds during both construction and operational periods after the Project is constructed. Monitoring would be conducted using a Bakke design (preconstruction, postconstruction, and control site monitoring) to compare changes in local populations and habitat use that could occur in the analysis area.

(b) Contribute financially to research projects that have been designed specifically to address this issue.

(3) Mitigation - An impacts analysis that has been conducted in coordination with agency biologists—leading to an adequate understanding of impacts on sage-grouse populations and habitat—is necessary to identify mitigation needs and to develop mitigation plans that focus on the amount and locations of impacts and commensurate mitigation measures and actions. Discussion and evaluation of mitigation should be relevant to local identified impacts and with the understanding that mitigation ratios will remain the same across state lines. That is, a bird in Wyoming is equivalent to one in Colorado or Utah; an acre of nesting habitat in Colorado is worth as much in Wyoming and Utah; etc. Mitigation actions should also focus on localized replacement of ecological values for GSG impacted by the Project with replacement, recovery, or compensation of habitat values planned to be located as closely as possible to where the impacts occurred. However, biological factors may provide a valid basis for adjusting the minimal mitigation ratio beyond one-to-one replacement of values. Three such factors include: (a) the best available scientific information regarding the relative value of sage-grouse populations contributing to long-term species viability across the species' range points to the relative importance of central and southwestern Idaho, central and northwestern Nevada, eastern Oregon, and the state of Wyoming; (b) regarding individual birds, hens have a much higher biological value, in terms of contribution to populations, than males; and (c) localized habitats of high ecological value including (but not limited to) those serving key functions in demographic, genetic, or seasonal connectivity, important wintering areas, or leks.

There will be two primary components of mitigation, a Project-wide mitigation plan and the Habitat Equivalency Analysis (HEA) described in this section. The mitigation plan will include the HEA as articulated below, as well as any other impacts as identified in the EIS (i.e., indirect impacts) and associated mitigation not included in the HEA.

(a) An overarching Project-wide sage-grouse mitigation plan will be developed that includes a description of all Project-related impacts and mitigation measures that will be used to offset/compensate for them.

(b) The HEA provides a standardized basis to determine a one-to-one ratio for habitat services lost/ habitat services mitigated. For this Project, functionality of habitat to support sage grouse is the habitat service of interest. Habitat services lost can be quantified and where possible replacement habitat services of equal kind and value would be provided as mitigation. However, replacement of in-kind habitat services may not be possible in all locations, so habitat services ratio of services lost to services replaced may be greater than 1:1 in some areas

HEA is a method of quantifying the permanent or interim loss of habitat services from Project-related impacts. HEA provides a scientific-based, peer-reviewed method of scaling mitigation requirements, and has been used by federal regulatory agencies including the FWS and National Oceanic and Atmospheric Administration. The HEA is not meant to be an impacts analysis in and of itself; rather, it is a way to objectively determine quantity of Project-related habitat impacts and provides the quantity and type of mitigation necessary to offset loss of habitat services as a form of output.

The HEA process for Gateway South is an Applicant-lead effort that requires close collaboration with state agencies in states sustaining most of the impacts on populations and habitat (Wyoming, Colorado, and Utah) as well as FWS and BLM biologists and local working groups to ensure adequacy of analysis and a corresponding final product. Building models associated with the HEA process must be done in close coordination with agency biologists and local working groups in order to address concerns, questions, assumptions, and issues as they arise.

Agency biologists recognize the need for the incorporation of data and information in the HEA models that the Applicant may not currently have. Agency biologists will work with the Applicant to obtain such information to the extent they can (e.g., habitat maps; adequate vegetation data) again, reiterating the need for an interactive approach between the Applicant and agency biologists in order to ensure adequate completion of the HEA.

The initial starting point for evaluating direct and indirect impacts on sage-grouse habitat will be 18 kilometers either side of the proposed transmission line, addressing impacts on roughly 98 percent of nesting hens according the best available scientific information. Any deviation from this starting point must be supported by scientific literature and collaboratively determined to be appropriate if habitats do not extend to those distances: agency biologists can direct the Applicant to recently published literature on this topic which the Applicant is encouraged to use.

Calculating Density of Disturbance within Key Habitat (Applied in Wyoming only)

Once the analysis is complete and an alternative has been selected, an additional site-specific evaluation of density of disturbance within Key Habitats/Core Areas may be conducted. The purpose of this evaluation is to evaluate opportunities to (1) minimize density of disturbance within Key Habitats/Core Areas that are outside the designated disturbance corridor identified in the Wyoming Governor's Executive Order 2011-5 and (2) restore and/or enhance important sage-grouse habitat as a part of Project-related mitigation. These site-specific habitat evaluations also will enable BLM to: (a) demonstrate compliance with the *Greater Sage-Grouse Habitat Management Policy on Wyoming BLM Administered Public Lands including Federal Mineral Estate* (IM WY-2010-012); and (b) demonstrate consistency with the *Greater Sage-Grouse Core Area Protection*, Wyoming Governor's Executive Order 2011-5. In Colorado and Utah, if density disturbance calculations are completed, they will be closely coordinated with the appropriate state and federal agencies to ensure that each state's Key Habitat areas are appropriately identified and considered in the Density disturbance calculation (DDC).

The overall goal of a Sage-Grouse Key Habitat/Core Area Strategy is to limit the density and duration of disturbances and restrict activities within Key Habitats/Core Areas sufficient to ensure the long-term conservation and management of sage-grouse within each state. To this end, the DDC is a tool designed to measure habitat loss within the Key Habitat/Core Area. In particular, in Wyoming, it is used to determine—in terms of management actions— how the Project-related disturbance can be limited to no more than 5 percent loss of habitat and result in no more than an average of one disturbance per 640 acres.

Step 1: Determination of leks that will be used in the site-specific evaluation:
Place a four-mile boundary around the outer Project boundary (as defined by the proposed area of disturbance related to the Project, i.e., right-of-way width, or similar). All occupied and undetermined sage-grouse leks located within four miles of the outer boundary of the Project, and within Key Habitat/Core Areas, the will be considered in the DDC.

Step 2: Determine the DDC area size and configuration:
A four-mile boundary placed around the perimeter of each lek identified in Step 1 and the area within the boundary of the leks, plus the four-mile Project boundary, creates the DDC area for the Project.

Step 3: Density of disturbance habitat evaluation:
Disturbance will be evaluated for the DDC area as a whole, as well as for individual leks within the DDC area. Any portion of the DDC that falls outside Key Habitat/Core Area will be removed from this portion of the evaluation for Wyoming to maintain consistency with the provisions in Wyoming Executive Order 2011-5.

<u>Disturbance Calculation</u>: Total acres of "disturbance" within the DDC area will be determined through an evaluation of:

a. Existing and proposed disturbance—sage-grouse habitat that is disturbed by existing anthropogenic features or activities (e.g., transmission lines, distribution lines, wind

development, oil/gas wells/facilities, active mine areas, geothermal, communication towers, pipelines, paved and improved roads, and others) and wildfire, including the full right-of-way width of the Proposed Action;

b. Approved permits (i.e., any state or federal permits providing approval for on the ground actions) for projects not yet implemented or constructed.

Habitat Disturbance Evaluation: In Wyoming, for projects that will result in disturbance of more than 5 percent of the DDC area, it may be advantageous for the Applicant to map the full extent of sage-grouse habitat within the DDC area in order to reduce this percentage. If this is done, it will be conducted to identify:

a. "Suitable Habitat" and "Marginal Habitat" using BLM's Habitat Assessment Framework and unsuitable habitats within the DDC area
b. Sage-grouse evidence of use of suitable habitats (seasonal use, densities based on best available information)
c. Priority restoration areas (which could reduce the existing disturbances to below the 5 percent threshold), for example:
    i) Areas where plug and abandon activities on retired oil and gas wells will eliminate disturbance
    ii) Areas where past reclamation has not produced suitable habitat
d. Areas of invasive species
e. Lands where other conservation assurances are in place (e.g., candidate conservation agreement with assurances, easements, habitat contract, etc.)

Step 4: Determination of existing and allowable suitable habitat disturbance:
Acres of disturbance within suitable habitat divided by the total suitable habitat within the DDC area, multiplied by 100, represents the percent of disturbed suitable habitat within the DDC area. In Wyoming, subtracting the percentage of existing disturbed suitable habitat from 5 percent equals new allowable suitable habitat disturbance until plant regeneration or reclamation reduces acres of disturbed habitat within the DDC area.

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Exhibit F2 –
Greater Sage-grouse
Habitat Equivalency Analysis Plan

Rocky Mountain Power |
Pacific Power
1407 West North Temple
Salt Lake City, Utah 84116

Energy Gateway South Transmission Project Greater Sage-grouse Habitat Equivalency Analysis Plan

Prepared by

Rocky Mountain Power – PacifiCorp

May 2013

Energy Gateway South Transmission Project
Greater Sage-grouse Habitat Equivalency Analysis Plan

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May 2, 2013

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INTRODUCTION

The Gateway South Transmission Line Project (Gateway South or Project) is part of PacifiCorp's transmission expansion program, called Energy Gateway, which is intended to connect new and existing energy generation resources to customers throughout PacifiCorp's service territory. Energy Gateway is composed of several large-scale projects that will support increasing electric energy use and improve system reliability.

The Project is designed to provide 1,500 megawatts (MW) of new capacity needed to meet the current and forecasted needs of PacifiCorp's customers. These forecasts are based on PacifiCorp's Integrated Resource Plan (IRP) as required to fulfill the regulatory requirements and guidelines established by the public utility commissions of the states served by PacifiCorp. The IRP addresses the obligations of each company, pursuant to the Open Access Transmission Tariff, to plan for and to expand its transmission system in a non-discriminatory manner based on the needs of its native load and network customers.

Gateway South is independent of, and would be proposed regardless of, any particular new generation project. The transmission grid can be thought of in terms of hubs, spokes, and a backbone connecting the hubs. Each substation is a hub that receives or sends electricity along the spokes. For this system to work, a backbone of high-capacity transmission lines (including Gateway South) is needed to connect the hubs and transport the electricity from the source to the customer.

Gateway South will:

- Provide long-term transmission capacity to move resources to growing load centers;
- Connect Gateway West and Gateway Central, which will provide operational flexibility for the bulk electric network, increase reliability of the network, and support path ratings for each segment;
- Improve capacity and reliability of other interconnected transmission lines associated with Energy Gateway;
- Reduce transmission limitations on the existing system; and
- Provide incremental transmission capacity planned at approximately 1,500 MW.

As proposed, the Project would be comprised of an extra high-voltage alternating current (AC) transmission line that would run between existing, planned, and proposed substations. The proposed single-circuit 500-kilovolt (kV) transmission line would be approximately 400 miles in length; the line would begin at the planned Aeolus Substation near Medicine Bow, Wyoming, connect to two separate proposed series compensation substations, and terminate at the existing Clover Substation near Mona, Utah. Two proposed series compensation substations are planned at approximately the one-third and two-third points along the line between the Aeolus and Clover Substations. Modifications at the existing Mona Substation are required to re-terminate existing lines to accommodate the nearby 500-kV termination at Clover Substation.

Gateway South will cross federal, state, and private lands along its route from Wyoming to Utah. The federal lands are primarily administered by the Bureau of Land Management (BLM). As such, PacifiCorp filed an application with BLM for a right-of-way (ROW) grant across public lands. The BLM, in compliance with the National Environmental Policy Act of 1969 (NEPA), is preparing an environmental impact statement (EIS) for Gateway South to inform its decision making on PacifiCorp's ROW grant application.

In December 2011, BLM released an instruction memorandum to help guide conservation actions aimed at conserving greater sage-grouse (*Centrocercus uropahsianus*) (sage-grouse) and its sagebrush habitat. Instruction Memorandum No. 2012-043 (IM 2012-43) helps to balance conservation actions benefiting sage-grouse while maintaining a robust economy in the West by outlining processes for BLM field officials to follow when analyzing impacts to sage-grouse and developing appropriate mitigation. It also establishes the BLM's principles to protect unfragmented habitat; minimize new habitat loss and fragmentation; and manage habitats to maintain, enhance, or restore conditions for sage-grouse. In addition to considering opportunities for onsite mitigation, IM 2012-043 encourages BLM to cooperate with project proponents to develop appropriate off-site mitigation. Through on-site and off-site mitigation, the project proponent should avoid or minimize population-level project effects, as determined by the BLM and respective state wildlife agencies. The IM states when developing such mitigation, the BLM should consider compensating for the short-term and long-term direct and indirect loss of sage-grouse and its habitat.

The BLM, working in concert with the U.S. Fish and Wildlife Service (Service), developed a Framework for Sage-grouse Impacts Analysis (Framework; January 2011), which was applied to the Energy Gateway West Project. The BLM and Rocky Mountain Power decided that the Framework will be revised for application to Energy Gateway South (meeting April 4, 2013). The Framework addresses project-related impacts to sage-grouse habitat that bear directly on listing factors considered by the Service when evaluating the need to provide full listing protection under the Endangered Species Act (ESA). According to the Framework, mitigation is addressed after the NEPA-mandated impacts analysis has been conducted, resulting in an adequate understanding of impacts to sage-grouse populations and habitat, which is described in the EIS. The Framework specifies the use of Habitat Equivalency Analysis (HEA), conducted by the project proponent, as a replicable method for determining mitigation that is scaled to project-related permanent and interim habitat losses.

PacifiCorp will provide a final conservation and mitigation plan documenting the scaled compensatory mitigation to the BLM as a voluntary applicant-committed mitigation measure for sage-grouse. The mitigation plan will offer compensation for all project effects characterized by the Framework that could not be mitigated using other voluntary efforts (e.g., seasonal restrictions, speed limits, etc.). To comply with IM 2012-43 and to maintain consistency with the analysis for the Energy Gateway West Project, PacifiCorp will complete an HEA to determine the amount of compensatory mitigation necessary to offset some of the anticipated disturbance to sage-grouse habitat resulting from the construction, operation, and maintenance of Gateway South. The HEA will quantify mitigation due for a subset of the Project effects characterized by the Framework; the HEA can only be used to quantify mitigation for project effects that are known and quantifiable. Refer to the mitigation plan for

specifics on mitigation projects and to review PacifiCorp's approach to mitigating project effects characterized by the Framework analysis that could not be modeled in the HEA.

The HEA will be completed for areas of known sage-grouse habitat in Wyoming, Colorado, and Utah that are intersected by the agency preferred alternative selected by the BLM through the NEPA process. This process requires close coordination with the BLM and other stakeholders to ensure the compensatory mitigation identified in the HEA offsets the impacts modeled from the Gateway South project to the extent required by BLM, U.S. Forest Service, and other applicable agency policy. PacifiCorp initiated meetings regarding the HEA with the BLM and other stakeholders prior to the identification of an agency preferred alternative due to the level of effort required to perform the HEA modeling and schedule constraints. The product of these early meetings is this HEA Plan; all HEA analyses will be conducted after the agency preferred alternative is identified in the Draft EIS per the Framework.

The HEA is not an impacts analysis for the Project. The impacts analysis for the Project is separate and is documented in the EIS. Rather, the HEA will be used as a decision-support tool by PacifiCorp to develop a mitigation plan for the agency preferred alternative. The HEA will quantify the mitigation due for the Project effects modeled and the value of conservation project types for offsetting that loss; the mitigation plan will disclose PacifiCorp's proposed mixture of project types and project specifications. It is anticipated that the HEA will model loss of habitat services associated with vegetation loss (direct effect), noise (indirect effect), and human presence (indirect effect). Additional Project effects (such as introduction and spread of invasive species; decreased lek attendance; habitat loss caused by behavioral avoidance of transmission corridors; increased public access and associated impacts [e.g., noise, trash]; and increased predation and nesting by raptors and corvids due to the presence of transmission structures) may not be included in the HEA because of lack of information necessary to establish a quantified relationship between the construction and operation of the transmission line and response by sage-grouse. PacifiCorp may still provide voluntary mitigation to reduce effects that are identified in the EIS analysis, but not quantified in the HEA, in the event that these effects are determined by the agencies to require mitigation.

The following sections describe the HEA process and identify the potential types of mitigation projects that could be used to compensate for the short-term and long-term direct and indirect loss of sage-grouse and its habitat.

OVERVIEW OF HABITAT EQUIVALENCY ANALYSIS

HEA is a science-based, peer-reviewed method of quantifying interim and permanent habitat injuries, measured as a loss of habitat services from pre-disturbance conditions, and scaling compensatory habitat requirements to those injuries (King 1997; Dunford et al. 2004; Allen et al. 2005; Kohler and Dodge 2006; National Oceanic and Atmospheric Administration [NOAA] 2006, 2009). Habitat services include those ecosystem features (physical site-specific characteristics of an ecosystem) and ecosystem functions (biophysical processes that occur within an ecosystem) that support wildlife and human populations (King 1997).

Habitat services are generally quantified using a metric that represents the functionality or quality of habitat (i.e., the ability of that habitat to provide wildlife "services" such as nest sites, forage, cover from predators, etc.). When wildlife habitat is the primary service of interest, areas with the highest habitat service levels are those areas with highest habitat quality. Interim (or short-term) habitat injuries are those services that are absent during certain phases of the project that would have been available if that disturbance had not occurred. Examples of interim habitat injuries include temporary vegetation losses, temporary soil partitioning, and temporary displacement of wildlife populations. Permanent habitat injuries are those habitat injuries remaining after project completion and interim reclamation and recovery are complete. Examples of permanent habitat injuries include permanent vegetation loss, permanent loss of wildlife or fisheries populations, irrecoverable impacts to soils or water as a result of contamination.

HEA uses a service-to-service approach to scaling. HEA does not assume a one-to-one trade-off in resources (in number of acres, for example); rather, HEA balances the number of services lost with those that are gained as a result of conservation activities (NOAA 2006). For example, 1 acre of land with a diverse vegetative structure and abundant tree canopy can support higher numbers of nesting songbirds (the habitat service of interest) than 1 acre of land with few trees and little vegetative diversity. The two land parcels, although equal in size, provide unequal habitat services.

What Does Habitat Equivalency Analysis Do?

HEA is an economics model that:

- Quantifies current habitat services provided in a project area or landscape (commonly referred to as the baseline habitat service level);
- Quantifies the interim and permanent injuries to the baseline habitat service level; and
- Determines appropriately scaled restoration and conservation activities to offset habitat services lost as a result of project impacts.

Benefits of Habitat Equivalency Analysis

The benefits of HEA include the following.

- High credibility – the approach has been evaluated and documented in scientific peer-reviewed literature and has held up in numerous court cases.
- Analysis is quantitative rather than qualitative in nature.
- Equations are straightforward, but have enough input variables to allow flexibility in project design.
- Provides a replicable method for negotiation of mitigation ratios, acceptable compensatory restoration, and/or fines.
- Valuable planning tool; can be used to evaluate the cost of multiple compensatory mitigation projects.

- Applicable to any ecosystem type where an appropriate habitat services metric can be defined.
- Currently the most commonly used method by natural resource trustees to assess damages to ecosystems.
- Used by federal regulatory agencies, such as the U.S. Fish and Wildlife Service, NOAA, BLM, Environmental Protection Agency, Department of Interior, U.S. Army Corps of Engineers.

When Habitat Equivalency Analysis Should be Used (Chapman 2004)

HEA is an appropriate tool for scaling mitigation when:

- Habitat services can be defined or modeled;
- Quantification of project impacts is possible;
- Replacement of services lost is feasible; and
- Conservation methods are sufficiently known.

COMPONENTS OF COMPENSATION

Compensation for habitat services (that is, the impact to sage-grouse habitat modeled by the HEA) includes two components: 1) recovery of the injured area (primary restoration; Figure 1), and 2) compensation for the interim loss of habitat services occurring prior to full recovery (compensatory restoration; Figure 2).

HEA quantifies the habitat services lost during the lifetime of a project compared to baseline (Area X in Figure 1) and scales the compensatory project so that it provides services that are equal to that loss (Area Y in Figure 2). Baseline refers to the quantity of habitat services that would have existed had the disturbance not occurred. The quantity of services lost (Area X) depends on the extent of the injury and the time required for restoration; actions taken to accelerate the rate of primary restoration would decrease the interim loss of habitat services, requiring less compensatory restoration. In some cases, full restoration of the lost services may not be feasible, in which case the area required for compensation (Area Y) would be larger. Compensatory restoration may occur off-site (such as by the purchase of additional habitat), or on-site through habitat improvements that increase habitat services above baseline (such as non-native vegetation removal, shrub thinning, or understory planting).

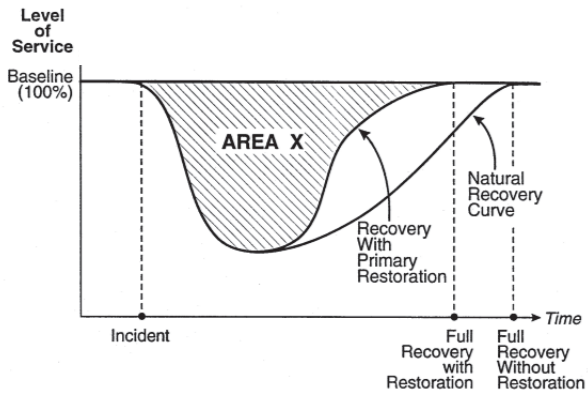

Figure 1. Changes in habitat service level compared to the baseline service level during construction and restoration (copied from King 1997). Area X represents the services lost at an injury site with Primary Restoration expressed as percent of baseline.

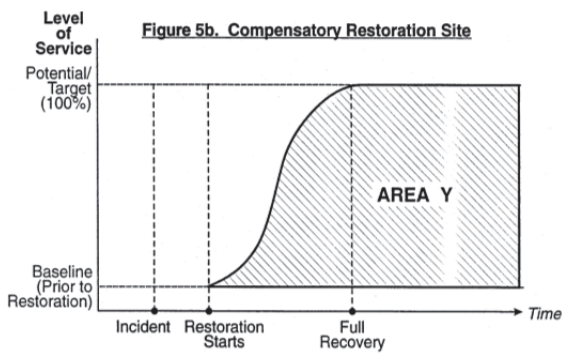

Figure 2. Changes in habitat service level with compensatory restoration (copied from King 1997). Area Y represents the services gained at the compensatory restoration site expressed as percent of potential/target level less baseline (pre-restoration) percent.

MEASURING HABITAT SERVICES (ECOLOGICAL ECONOMICS)

Quantifying the services provided by an ecosystem is a complex task. This complexity can be reduced through the use of an attribute, or metric, that provides a measure of the services of interest. The metric must be able to capture the relative differences in the quality and quantity of services being provided before and after restoration and between primary and compensatory sites (NOAA 2009).

Measurements of habitat services over the lifetime and area of a project are used in the HEA. These measurements have three components: land area, service level (or habitat quality level), and time. The relative service level can be quantified using a metric that measures or scores one or more key habitat elements for a species or wildlife community of interest. Examples of key habitat elements are vegetation stem density, vegetation type, nest density, percentage of canopy cover, and proximity to critical habitat. Habitat services are commonly expressed in service-acres or service-acre-years.

DATA NEEDED FOR HABITAT EQUIVALENCY ANALYSIS

Developing appropriate baseline metrics, quantifying project impacts, and identifying appropriate compensatory mitigation requires substantial and consistent datasets. Data for the following are needed to conduct an HEA.

- Evaluation of baseline services at the primary project site.
- Extent of the disturbance at the primary project site.
- Project timeline.
- Percentage of services predicted to be lost during initial (short-term) disturbance and expected rate of recovery with restoration at the primary project site.
- Timeline for compensatory restoration.
- Services associated with compensatory projects.
- Timeline of compensatory projects.
- Discount rate for each time period (3% is commonly used in HEAs).

HABITAT EQUIVALENCY ANALYSIS PROCESS FOR GATEWAY SOUTH

Completion of the HEA process for the Project Agency Preferred Alternative will require close coordination with the BLM and other appropriate agencies and stakeholders. Such coordination will ensure that the best available scientific data are being used, the habitat service metric is appropriate for the species-specific habitat affected in the Project area, the results of the HEA are understood, and the compensation offsets the interim and permanent loss of habitat services modeled. The following steps will be completed as part of the development of the HEA for the Gateway South.

1. **Establishing baseline habitat services prior to disturbance.**

   PacifiCorp will work closely with the appropriate agencies and stakeholders to finalize a habitat services metric that will quantify sage-grouse habitat services. Appendix A provides a description of the habitat services metric that will serve as the basis for quantifying baseline habitat services, Project-related habitat service losses, and the benefits of habitat restoration and mitigation projects. This habitat services metric has considered the best available scientific information regarding sage-grouse habitat and response to disturbance. This information was used to define variables in the metric when there was a consistent trend in the literature (i.e., the studies measured a consistent response of sage-grouse to its environment), and when existing data were available to inform their use. Appendix B describes how this metric will be applied to establish a baseline measure of habitat services for the Project area.

2. Quantifying the permanent and interim losses to the baseline service level that result from the Project disturbance.

Permanent and interim losses of habitat services caused by the construction and operation of Gateway South will be subtracted from the baseline habitat services. Direct and indirect losses of habitat services over the life of the Project will provide the basis for identifying the amount and type of mitigation necessary to offset the losses that can be quantified in the HEA. Appendix C describes the approaches that will be used to quantify the direct and indirect losses that will occur as a result of Project construction and operations.

3. Identifying appropriate mitigation projects that may be used to compensate for lost services.

PacifiCorp will work with the agencies and stakeholders to identify mitigation projects that may be used to compensate for the permanent and interim losses of habitat services. All mitigation projects would be subject to appropriate land management agency or landowner approval, permits, and planning. Appendix D describes the methods that will be used to quantify habitat service gains resulting from mitigation projects. Mitigation projects likely to be considered and quantified in the HEA include, but are not limited to the following.

- Fence marking, modification, or removal – Fences that pose a high collision risk for sage-grouse (Stevens et al., in press) would be marked, modified, or removed to reduce or remove threats to sage-grouse. Appropriate land management agency or landowner coordination would be important to ensure fence-related conservation activities support current and future land use objectives.
- Sagebrush restoration or enhancement projects – Sagebrush restoration or enhancement projects might include seeding sagebrush and associated understory vegetation into previously disturbed or burned areas or transplanting already established sagebrush stems and seedlings into areas where sagebrush has been removed or thinned. Appropriate land management agency or landowner coordination would be important to ensure sagebrush enhancement activities support ongoing and future land use objectives.
- Conifer removal – In areas where conifers are encroaching into suitable sage-grouse habitat, conifer removal (specifically removal of piñon pine and juniper) could be used to reduce habitat fragmentation and to restore previously unsuitable habitat. Priorities for conifer removal would include lop-and-scatter removal of Phase I[1] conifer encroachment and cut-pile-dispose or mastication of Phase II (mid conifer encroachment). Phase III conifer treatment would also be evaluated but unlikely to

[1]Miller et al. (2005) characterized the three stages of woodland succession:
Phase I - early-succession, trees are present but shrubs and herbs are the dominant vegetation that influence ecological processes (hydrologic, nutrient, and energy cycles) on the site;
Phase II - mid-succession, trees are co-dominant with shrubs and herbs and all three vegetation layers influence ecological processes on the site;
Phase III - late-succession, trees are the dominant vegetation and the primary plant layer influencing ecological processes on the site.

be selected as an appropriate compensatory tool. Appropriate land management agency or landowner coordination would be important to ensure activities support ongoing and future land use objectives.

- Conservation easements – Where possible, conservation easements could be used to provide long-term contractual protection of high-quality sage-grouse habitat, conservation efforts, and improvement projects. PacifiCorp's ability to acquire conservation easements would be dependent upon the willingness of private landowners to participate in a conservation program. Landowner coordination would be important to ensure activities support ongoing and future land use objectives.

In the HEA, the benefits of mitigation projects must be quantifiable using the habitat services metric. The above list consists of those mitigation projects with benefits that could be quantified in the HEA. As the Gateway South HEA is completed for the Agency Preferred Alternative, other mitigation projects are likely to be identified. Additional mitigation projects with benefits that cannot be quantified in the HEA will be considered separately and their compensatory value determined in coordination with the lead agencies and other stakeholders. PacifiCorp's mitigation plan will describe the mixture of mitigation projects proposed to offset the effects of Gateway South, and will consider agency preferences for project types by project segment.

4. Quantifying the amount of mitigation necessary to compensate for the losses to baseline services that remain after project implementation.

Once final mitigation projects have been identified and approved by PacifiCorp, the lead agencies, and involved stakeholders, the average habitat service gain and cost per service returned[2] will be quantified for each project type. The resulting values will be balanced with the services lost to determine the compensatory mitigation appropriate to offset the permanent and interim loss of sage-grouse habitat services resulting from development of Gateway South. Appendix C describes the approach that will be used to identify appropriate levels of compensatory mitigation for direct and indirect losses of habitat services modeled that will occur as a result of project construction and operations. A final conservation and mitigation plan/report documenting the scaled compensatory mitigation would be provided to BLM as a voluntary applicant-committed mitigation measure for sage-grouse.

[2] Habitat service gains are averaged among several hypothetical mitigation projects that are modeled. Mitigation project costs are obtained for previously-conducted projects, standardized per acre or mile of application, and averaged among projects.

LITERATURE CITED

Allen, P.D. II, D.J. Chapman, and D. Lane. 2005. Scaling environmental restoration to offset injury using habitat equivalency analysis. In *Economics and Ecological Risk Assessment: Applications to Watershed Management*, edited by R.F. Bruins and M.T. Heberling, pp. 165–184. Boca Raton, Florida: CRC Press.

Chapman, D.J. 2004. Habitat Equivalency Analysis: Overview and Case Example. Presentation to: EPA Science Advisory Board Committee on Valuing the Protection of Ecological Systems and Services.

Dunford, R.W., T.C. Ginn, and W.H. Desvousges. 2004. The use of habitat equivalency analysis in natural resource damage assessments. *Ecological Economics* 48(2004):49–70.

King, D.M. 1997. Comparing Ecosystem Services and Values, with Illustrations for Performing Habitat Equivalency Analysis. Prepared by King and Associates, Inc., Washington, D.C., for U.S. Department of Commerce, Silvery Spring, Maryland.

Kohler, K.E., and R.E. Dodge. 2006. Visual HEA: Habitat equivalency analysis software to calculate compensatory restoration following natural resource injury. *Proceedings of 10th International Coral Reef Symposium*, pp. 1611–1616.

Miller, R.F., J.D. Bates, T.J. Svejcar, F.B. Pierson, and L.E. Eddleman. 2005. Biology, ecology, and management of western juniper. Technical Bulletin 152. Corvallis, Oregon: Oregon State University,

National Oceanic and Atmospheric Administration (NOAA). 2006. Habitat equivalency analysis: an overview. Available online at www.darrp.noaa.gov/library/pdf/heaoverv.pdf. Accessed July 6, 2009.

———. 2009. Restoration economics, habitat equivalency analysis. Available online at http://www.csc.noaa.gov/coastal/economics/habitatequ.htm. Accessed July 6, 2009.

Stevens, B.S., D.E. Naugle, B. Dennis, J.W. Connelly, T. Griffiths, and K.P. Reese. In press. Mapping sage-grouse fence-collision risk: Spatially-explicit models to target conservation implementation. *Wildlife Society Bulletin*.

APPENDIX A

Proposed Habitat Service Metric for the Gateway South Transmission Line

DEVELOPMENT OF HABITAT SERVICE METRIC FOR HABITAT EQUIVALENCY ANALYSIS

PacifiCorp has convened a group comprised of agency and stakeholder representatives to work with consultants on the Habitat Equivalency Analysis (HEA) (the HEA Technical Working Group [HTWG]). From Colorado, the HTWG includes a representative from the U.S. Bureau of Land Management (BLM), the U.S. Fish and Wildlife Service, Colorado Parks and Wildlife, and Moffat County. Utah representatives are from the BLM, U.S. Fish and Wildlife Service, Utah Division of Wildlife Resources, and Uintah County. Wyoming representatives are from the BLM, the U.S. Fish and Wildlife Service, Wyoming Game and Fish, the Saratoga-Encampment-Rawlins Conservation District, and the Little Snake River Conservation District. Consultants participating in the HTWG include SWCA Environmental Consultants, EPG, and EnviroIssues.

The HTWG developed a habitat service metric for the greater sage-grouse (*Centrocercus urophasianus*) (sage-grouse) using variables identified in the peer-reviewed literature as representative of sage-grouse habitat. Habitat service levels are intended to reflect both the quality of the habitat and the ability of the birds to use the habitat. For each of the metric variables, a habitat service score ranging from 0 to 3 (no services [contributing no value to habitat] to high services [optimal habitat]) was assigned, similar to the sage-grouse habitat assessment framework developed by Stiver et al. (2010) and the sage-grouse habitat suitability index developed by LaGory et al. (2012). Scoring habitat services is a critical step in the HEA process, because it provides a way to measure the relative quality of specific habitat functions in a specific area.

The scores for this HEA are primarily based on information contained in the literature regarding sage-grouse habitat use and selection. When literature did not allow for direct assignment of value ranges for HEA scores, professional judgments, which were based on peer-reviewed literature, were used. Professional judgments are associated with specific literature references when possible and/or confirmed with academic and agency biologists.

When a basic life requisite of sage-grouse is absent (vegetation is absent, the area is forested, or high levels of disturbance are present), the cell being scored is assigned a total service value of 0. When a measurements for particular variable within the metric (e.g., % sagebrush cover) matches literature-based descriptions of sub-optimal conditions, that variable is given a service score of 0 (contributing no value to habitat), 1 (poor habitat), or 2 (moderate habitat). For example, sagebrush cover <1% would score a 0, cover of 1%–5% would score a 1, and cover of 5%–15% or >35% would score a 2 for that variable. When measurements for a particular variable match literature-based recommended conditions, that variable is given a service score of 3 (optimal habitat). For example, sagebrush cover of 15%–35% would score a 3 for that variable.

Scoring of the variables is categorical and each variable is given the same weight in the model. This approach is based on the best available data and is consistent with the general approach of LaGory et al. (2012). LaGory et al. (2012) describe their approach as follows:

> In general, there was insufficient information in existing studies to determine relationships among variables and habitat suitability or relative contributions between variables/components. Therefore, for simplicity, we developed piecewise linear functions of suitability based on the assumption that all variables are of equal weight and applied these functions to geospatial layers to generate indices ranging from 0 (poor) to 100 (optimal). This approach is similar to that used for many of the U.S. Fish and Wildlife Service (USFWS) Habitat Suitability Index models in their Habitat Evaluation Procedure, (available at http://www.fws.gov/policy/ESMindex.html).

While the individual variables are not weighted, the number of variables relating to a habitat attribute (e.g., six for vegetation vs. one for slope) and the size of the buffers (e.g., 6.4 kilometers [km] for leks vs. 2 km for fences with high collision risk) give some attribute categories more influence than others. In the metric, there are three variables that score sagebrush characteristics (sagebrush abundance index, sagebrush % cover, and sagebrush canopy height), so areas that are not dominated by sagebrush will score low for these three variables, resulting in a lower overall score.

Sage-grouse habitat suitability publications vary in their baseline environmental conditions affecting a particular study site. Even studies within the same state may describe different suitable habitat conditions depending on elevation, precipitation zone, and other geographic or climatic factors affecting each study site.

No specific habitat studies have been conducted on the Project's transmission line corridor alternatives, therefore the habitat metrics described below mostly rely on information presented in BLM et al. (2000), Cagney et al. (2009), Connelly et al. (2000), Connelly et al. (2011), and other summary publications. Specific citations are given to support the habitat model framework when applicable.

A single habitat service metric is applied to the whole Project corridor in order to standardize results. This approach assumes that optimal habitat or poor habitat for sage-grouse looks the same (that is, measures the same for the variables in the metric) regardless of its location, despite regional differences in habitat features and availability.

As a result, the best available habitat at the edge of the species' range may not score as high as the best available habitat in the center of the species' range, unless they have the same measurements for the variables in the metric. The following sections describe the development of the habitat service model variables.

METRIC OF SAGE-GROUSE HABITAT SERVICES

The metric is only applied to areas that contain sage-grouse habitat. To more accurately model sage-grouse utilization areas, land cover types typically avoided by sage-grouse are masked from the analysis area before the metric is applied. Disturbances of these lands require no mitigation in the HEA. These land cover types include all forest types, urban areas, open water, roadways, well pads, mine footprints, areas <100 meters (m) from roadways with >6,000 annual average daily traffic (AADT), and <25 m of paved roads and heavily traveled

gravel roads (multiple sources per U.S. Fish and Wildlife listing decision in Federal Register; Johnson et al. 2011).

The metric for sage-grouse habitat services used in this HEA is a simple additive model (Table A1). Each cell in the analysis area is scored separately by summing the scores of Variables 01 through 09. Each variable is described in detail below.

DESCRIPTIONS OF METRIC VARIABLES

Anthropogenic Variables

Habitat within and surrounding the Project transmission line corridor is currently influenced by fences used for livestock management (e.g., to control livestock movements and vegetation use within grazing allotments and pastures, to delineate or protect private property and agricultural croplands, and to restrict livestock from improved and unimproved roadways); and by roads, mines, wells, and existing transmission substations that fragment the vegetative landscape and alter wildlife use patterns. Two anthropogenic-influenced variables were used to address these effects on sage-grouse habitat suitability.

<u>VAR01 and VAR02 Distance to Roads and Highways</u>

Research into the effects of roads on sage-grouse is varied. For instance in Colorado, Rogers (1964) mapped 120 leks with regard to distance from roads and found that 42% of leks were over 1.6 km (1 mile) from the nearest improved road, but that 26% of leks were within about 90 m (about 100 yards) of a county or state highway, and two leks were on a road. Connelly et al. (2004) also note the use of roads for lek sites. In contrast, Craighead Beringia South (2008) reported results from a 2007 to 2009 study of sage-grouse seasonal habitat use in Jackson Hole, Wyoming. Results indicate that sage-grouse avoid areas within approximately 100 m of paved roads. Similarly, Pruett et al. (2009) found that lesser prairie-chickens avoided one of the two highways in the study by 100 m; however, some prairie-chickens crossed roads and had home ranges that overlapped the highways, thus roads did not completely exclude them from neighboring habitat. Johnson et al. (2011) examined the correlation between trends in lek attendance and the environmental and anthropogenic features within 5- and 18-km buffers around leks. They found that lek attendance declined over time with length of interstate highway within 5 km, although the authors note that this trend was based on relatively few data points and no pre-highway data were available for comparison. Interstate highways >5 km away and smaller state and federal highways had little or no effect on trends in lek attendance. Thresholds less than 5 km were not examined.

In the habitat services metric, those habitats located within 100 m of a high-traffic paved road (interstate highway or high-traffic federal or state highway with >6,000 AADT, for example), or within 25 m of a low-traffic paved road (low-traffic federal or state highway, or other paved roads, for example) were considered to provide no services to sage-grouse due to traffic and associated noise/human disturbance and were given a score of 0 (no services). Unpaved roads with high traffic loads (for example, oil and gas service roads, mine service roads, etc.) provide similar disturbance levels as paved roads with similar traffic loads (e.g., low-traffic state highway).

Table A1. Anthropogenic and Habitat Variables Used as a Metric of Sage-grouse Habitat Services

Variable Number	Variables	3	2	1	0	Primary Citations
VAR01	Distance to interstate highway or high-traffic (>6,000 AADT) federal or state highway (meters)	>1,000	650–1,000	100–650	NA	Craighead Beringia South (2008); Johnson et al. (2011); Pruett et al. (2009)
VAR02	Distance (meters) to low-traffic (<6,000 AADT) federal or state highways, other paved roads, heavily travelled gravel roads, well pads, mine footprints, and transmission substations	>200	50–200	25–50	NA	Connelly et al. (2004); Craighead Beringia South (2008); Johnson et al. (2011); Pruett et al. (2009)
VAR03	Distance to fence segments that pose a high collision risk for sage-grouse (kilometers)*	>2.0	0.4–2.0	<0.4	N/A	Christiansen (2009); Stevens et al. (2012); Stevens et al. (in press)
VAR04	Percent slope	<10	10–30	30–40	>40	Beck (1977); Lincoln County Sage Grouse Technical Review Team (2004)
VAR05	Distance to occupied lek† (kilometers)	0–6.4	6.4–8.5	>8.5	N/A	Cagney et al. (2009); Connelly et al. (2000); Connelly et al. (2011); Holloran and Anderson (2005)
VAR06	Sagebrush abundance index (% of vegetation that is sagebrush within a 1 km^2 moving window)	50–95	30–50 or >95	10–30	0–10	Carpenter et al. (2010); Walker et al. (2007); Aldridge and Boyce (2007); Aldridge et al. 2008; Wisdom et al. (2011)
VAR07	Percent sagebrush canopy cover	15–35	5–15 or >35	1–5	<1	Cagney et al. (2009); Connelly et al. (2000); Stiver et al. (2010)

Table A1. Anthropogenic and Habitat Variables Used as a Metric of Sage-grouse Habitat Services

Variable Number	Variables	3	2	1	0	Primary Citations
VAR08	Sagebrush canopy height (centimeters)	30–80	20 to <30 or >80	5–20	<5	Crawford et al. (2004); Connelly et al. (2000); Stiver et al. (2010)
VAR09	Distance of habitat to sage or shrub dominant (meters)	<90	90–275	275–1,000	>1,000	BLM et al. (2000); Connelly et al. (2000); Lincoln County Sage Grouse Technical Review Team (2004)

* Allotment boundaries were used as a surrogate for fence lines. The model by Stevens et al. (in press) was used to identify fence segments that posed a high risk for sage-grouse collision.
[†]Leks were classified as active if their 10-year attendance average was greater than 0.

To characterize this disturbance in the model, mine footprints and well pad footprints were classified and scored as if they were low-traffic roads, so that there are no habitat services within 25 m of these disturbances. Transmission substations (the existing Aeolus and Clover substations at either end of the Project) and series compensation stations were also classified and scored as if they are low-traffic roads in the model to account for the noise and human presence associated with these facilities.

Those habitats located farther than 200 m and 1,000 m, respectively, of a low-traffic road or high-traffic road were considered the most serviceable to sage-grouse (that is, exhibited no decrease in lek attendance) and given a score of 3. A logarithmic curve was fit between the highest and lowest categories so that score increased with distance from the road to estimate the distance breaks associated with scores 1 and 2. A logarithmic rate of change simulates sound attenuation rates better than a linear rate of change (Crocker 2007). Conflicting research results regarding sage-grouse use near and on unpaved resource/collector roads (e.g., two-track roads) did not allow for quantification of the disturbance caused by these roads in the model.

While the application of distances to all scores (0–3) is not perfectly supported in the peer-reviewed literature, our approach places a penalty upon habitats that are bisected by all types of large roadways. Penalties are higher for roads that typically have higher traffic levels and risk to sage-grouse (e.g., mortality from collision, noise disturbance) than less-utilized secondary roads that generally have less traffic and implied risk.

<u>VAR03 Distance to Fences that Pose a High Risk for Collision</u>

Fence collisions have been reported as a cause of significant injury and mortality to grouse species (sage-grouse [Braun 2006; Call and Maser 1985; Connelly et al. 2004; Christiansen 2009; Danvir 2002; Stevens et al. 2012]; lesser prairie-chicken [Wolfe et al. 2007]; ptarmigan [Bevanger and Broseth 2000]; and red grouse, black grouse, and capercaillie [Baines and Summers 1997; Catt et al. 1994; Petty 1995]). In addition to direct mortality, fences provide corridors for mammalian predators increasing the opportunity for predation of hens and broods (Braun 1998). Unlike the other variables in the metric, which are primarily meant to characterize use and avoidance of habitat by sage-grouse, the distance to high risk fences was added to account for the potential direct loss of sage-grouse (not sage-grouse avoidance of fences).

In Wyoming, Christiansen (2009) reported preliminary results of a multiple-year study (2005–ongoing) near Farson on sage-grouse fence strikes and mortalities and the utility of fence markers on reducing collisions. After installation of fence markers on portions of high-risk fences, grouse mortality decreased by 70%. Although the study did not compare the number of strikes with regard to distance to lek, the author recommends that fences should not be located within 0.25 mile (0.4 km) of leks.

In Idaho, Stevens (2011) and Stevens et al. (2012) evaluated the environmental features associated with sage-grouse fence collision risk, and tested the efficacy of reflective vinyl fence markers to reduce collision rates at eight study sites. Modeling predicted marking reduced collision rates by 74% at the mean lek size and fence distance from the lek. Collision probability varied by region, topography, fence type, fence density, and lek proximity. Areas

with high slope or terrain ruggedness generally showed lower collision risk than flat areas. Collisions were more common on fence segments bound by steel t-posts with spans between posts exceeding 4 m. Collision probability increased with fence length per km^2 and proximity to nearest active lek. Stevens et al. (2012) recommended 2-km mitigation buffers around leks in high-risk areas, which is consistent with the recommendation by Braun (2006).

For this variable, fences segments having a high risk for collision were identified using the model by Stevens et al. (in press), which is largely informed by fence proximity to leks and terrain roughness. All habitats within 0.25 mile (0.4 km) of fences with high collision risk were scored as a 1 (few services) for this variable due to the increased risk that sage-grouse in those areas might collide with that fence (Christiansen 2009). As the distance to fence increases, there is decreased likelihood of a sage-grouse striking a fence and potentially less risk of depredation by mammalian and avian predators. Consistent with recommendations by Stevens et al. (2012) and Braun (2006), habitats >2 km from high-risk fence segments were given the highest score of 3. A linear relationship was then used to determine the remaining metric scores (i.e., score of 2 between 0.4 and 2.0 km, and score of 1 <0.4 km of a fence). Risk for collision was determined without regard for fence type or configuration, because data available were not sufficient to differentiate among them in the model.

VAR04 Slope

Slope was used to refine sage-grouse habitat potential. Sage-grouse generally use flat or gently sloping terrain (Connelly et al. 2011; Eng and Schladweiler 1972; Nisbet et al. 1983; Rogers 1964). Beck (1977) plotted the distribution of 199 sage-grouse flocks in Colorado and found that 66% of flocks were on slopes less than 5% and only 13% of flocks were on slopes greater than 10%. Areas with slopes greater than 40% are unsuitable for nesting habitat (Lincoln County Sage Grouse Technical Review Team 2004), but still have some value to sage-grouse and should be retained in the model (professional judgment of the Gateway South HTWG). Therefore, areas with less than 5% slope were assigned a habitat service score of 3, and those exceeding 10% subjectively received incrementally lower habitat service scores. Slopes >40% did not add value to the habitat and received a score of 0 for this variable, but these areas may provide habitat services depending on the scores for the other variables.

A terrain roughness index (TRI) was evaluated for use in place of the slope variable, as some studies have shown that it is a better indicator of sage-grouse use (Carpenter et al. 2010; Doherty et al. 2008; Doherty et al. 2010; Dzialak et al. 2011). However, there was substantial variation in the methods used to calculate TRI (e.g., measure of roughness used and analysis window size) and region evaluated (e.g., Alberta, Canada, vs. Powder River Basin, Wyoming) by these studies. Given this variation, it was not possible to identify literature-supported cutoffs between scores for use in the model.

VAR05 Distance to Lek (10-year Average Count >0 Males)

Current sage-grouse habitat management guidance uses occupied leks as focal points for nesting habitat management (Connelly et al. 2000; Connelly et al. 2011); therefore, distance to lek was used as a variable in the habitat services metric. These guidelines recommend protecting sagebrush communities within 3.2 km of a lek in uniformly distributed habitats and 5.0 km in non-uniformly distributed habitats. Holloran and Anderson (2005) studied nesting sage-grouse at 30 leks in central and western Wyoming and determined that 45% and 64% of

female sage-grouse nested within 3.2 km and 5.0 km, respectively, of the lek where the hen was radio-collared. Moreover, statistical analyses suggested that the area of interest for nesting sage-grouse should be truncated at 8.5 km from a lek. Similar frequencies are reported in Cagney et al. (2009)—66% within 5.0 km and 75% within 6.4 km of a lek where the female bred.

Female sage-grouse do nest at distances greater than 8.5 km (farthest distance reported in Holloran and Anderson [2005] was 27.4 km), so all distances >8.5 km from occupied leks were given a service score of 1 to reflect some potential use by nesting sage-grouse. Areas within 6.4 km of a lek provide the highest service level, because they provide female grouse with forage, roost sites, and cover from predators or inclement weather during the lekking season, in addition to containing lekking habitat and nesting habitat (Cagney et al. 2009). Therefore, areas within 6.4 km of an occupied lek were assigned a service score of 3 for this variable. Between these distances (6.4–8.5 km), areas were assigned a score of 2 for this variable.

<u>VAR06 Sagebrush Abundance Index</u>

Walker et al. (2007) found that the proportion of habitat that was sagebrush within a 6.4-km moving window was a strong predictor of lek persistence in the Powder River Basin of Wyoming. The moving window is an analysis area that is larger than and centered on the cell being scored; in this case, the window is a 6.4-km buffer that moves as the cell being scored is changed. Areas with less than 30% of sagebrush within 6.4 km of the lek center had a lower probability of lek persistence. Aldridge and Boyce (2007) also used a moving window (1 km^2) to measure sagebrush cover and abundance. Their resource selection function found that sage-grouse selected nesting habitat that contained large patches (1 km^2) of sagebrush with moderate canopy cover and moderate sagebrush abundance (i.e., heterogeneous distribution of sagebrush). Carpenter et al. (2010) found similar results in Alberta, Canada. Their top resource selection functions included a quadratic function for sagebrush abundance, which indicates that areas of moderate sagebrush abundance were selected more frequently than areas of homogenous sagebrush.

Aldridge et al. (2008) [per Wisdom et al. (2011)] found that at least 25% of the landscape in a 30.77-km analysis area needed to be dominated by sagebrush for sage-grouse persistence, with 65% being preferred. Wisdom et al. (2011) found that landscapes with less than 27% sagebrush were not different from landscapes from which sage-grouse have been extirpated. Similar to Aldridge et al. (2008), Wisdom et al. (2011) found that 50% sagebrush across a landscape was a good indicator of sage-grouse persistence.

The Gateway South HTWG indicated that sage-grouse prefer higher sagebrush abundance in the southern part of their range (i.e., the Project Area) than is indicated by these studies. For example, the Colorado Parks and Wildlife Avian Research Center has generally found a positive linear relationship between sagebrush abundance and measures of habitat selection (Brian Holmes, Colorado Parks and Wildlife, personal communication with Jon Kehmeier, SWCA, on February 13, 2013). Colorado Parks and Wildlife has not observed an upper inflection point in the proportion of the landscape covered in sagebrush where use or selection begins to drop, and suggest that the difference may be due to the structure and composition of

the sagebrush community (that is, silver sagebrush mixed grassland rangelands of Alberta [Aldridge and Boyce 2007; Carpenter et al. 2010] vs. big sagebrush steppe [Project Area]).

Sagebrush covering 50% to 95% of the landscape scored a 3 for this variable (Aldridge et al. 2008; Wisdom et al. 2011; professional judgment of the HTWG). Sagebrush covering 30% to 50% or >95% scored a 2 for this variable (Aldridge et al. 2008). Sagebrush covering 10% to 30% scored a 1 (Walker et al. 2007; Wisdom et al. 2011) and sagebrush covering less than 10% scored a 0 for this variable.

VAR07 Sagebrush Canopy Cover

Recommended sagebrush canopy cover for sage-grouse habitat varies seasonally. Seasonal habitats were not modeled, but seasonal differences in the selection for sagebrush cover was considered when developing habitat services metrics. The seasonal habitat needs of sage-grouse are described below, followed by scoring of percent sagebrush cover in the habitat services metric.

Seasonal Habitat Use

Nesting

Connelly et al. (2000) cite 13 references to sagebrush coverage that range from 15% to 38% mean canopy cover surrounding the nest. Citations contained within Crawford et al. (2004) reported 12% to 20% cover and 41% cover in nesting habitat. In their species assessment, Connelly et al. (2000) conclude that 15% to 25% canopy cover is the recommended range for productive sage-grouse nesting habitat. This is also the range identified in the sage-grouse habitat assessment framework (Stiver et al. 2010) as providing the highest service level for sage-grouse based on a review of the available literature. Wallestad and Pyrah (1974) reported that successful nests were in stands where sagebrush cover approximated 27%. This cover range is used as a goal in some sage-grouse management guidelines (Bohne et al. 2007; BLM et al. 2000). Cagney et al. (2009) guidelines for grazing in grouse habitat, which use information synthesized from over 300 sources, state that hens tend to select an average 23% live sagebrush canopy cover when selecting nesting sites.

Sage-grouse in Utah use habitats with higher sagebrush canopy cover than is observed in the northern and eastern portions of the species range, possibly due to the relative scarcity of understory grasses in Utah (Renee Chi, BLM, personal communication with Ann Widmer, SWCA, on March 22, 2013). Nest sites in Wildcat Knoll (part of the Emery-Sanpete population of Utah) were located in areas with an average of 33% shrub canopy cover for successful nests and 22% for unsuccessful nests (Perkins 2010). Nests (n = 50) in Parker Mountain were located at sites with an average canopy cover of 35.5% for big sagebrush and 32% for big sagebrush mixed with black sagebrush (Chi 2004; Renee Chi, BLM, personal communication with Ann Widmer, SWCA, on March 22, 2013). In the Sheeprock sage-grouse population, nest site shrub canopy cover measured an average of 62% in 2005 and 83.5% in 2006 (Robinson 2007).

Brood Rearing

Connelly et al. (2000) found that productive brood-rearing habitat should include 10% to 25% cover of sagebrush. This is the range used as a goal in sage-grouse management guidelines (Bohne et al. 2007; BLM et al. 2000). While sagebrush is a vital component of sage-grouse

habitat, very thick shrub cover may inhibit understory vegetation growth and reduce the birds' ability to detect predators (Wiebe and Martin 1998).

Again, sage-grouse in Utah may use areas with higher canopy cover than is typical throughout the northern and eastern parts of their range. Grouse in the Sheeprock population were documented using areas with an average shrub canopy cover of 73% during brood rearing in 2005 and 2006 (Robinson 2007).

Winter

Connelly et al. (2000) cite 10 references to sagebrush coverage in winter-use areas that range from 15% to 43% mean canopy cover (Crawford et al. [2004] also cite two of these references in their assessment); however, they considered a canopy of 10% to 30% cover (above the snow) as a characteristic of sagebrush needed for productive sage-grouse winter habitat. This is the cover range used as a goal in sage-grouse management guidelines (Bohne et al. 2007; BLM et al. 2000). Sage-grouse in Utah may prefer higher cover in winter. In Emma Park, areas of high sagebrush cover were used disproportionally to their availability on the landscape, with an average of 38.3% sagebrush canopy cover in winter-use areas (Crompton and Mitchell 2005).

Scoring in Habitat Services Metric

In general, the recommended sagebrush cover for nesting habitats was intermediate to, and overlapped that of, brood-rearing and winter habitats. Thus, favorable conditions for nesting were given the highest scores for percent sagebrush cover in the sage-grouse habitat services metric.

This variable used the scores assigned by Stiver et al. (2010) for sagebrush cover categories in sage-grouse nesting habitat, with a slight adjustment to account for use of higher canopy cover in Utah. This adjustment is also consistent with the Colorado Greater Sage-Grouse Conservation Plan (Colorado Division of Wildlife et al. 2008). Sagebrush percent canopy cover of 15% to 35% was assumed to provide the highest level of services (score of 3) to nesting sage-grouse. This includes canopy covers that are 10% higher than the average ranges provided in Connelly et al. (2000) and Cagney et al. (2009). Areas with slightly less or more cover than this (55–15 or >35) were given a habitat services score of 2. Habitats with <5% cover received a score of 1.

<u>VAR08 Sagebrush Canopy Height</u>

Sagebrush canopy height is an important aspect of all sage-grouse seasonal habitats. As described above, seasonal habitat models will not be developed for the Project. However, seasonal habitat requirements were considered when developing habitat metric values. The seasonal habitat needs of sage-grouse are described below, followed by scoring of percent sagebrush cover in the habitat services metric.

Seasonal Habitat Use

Nesting

Gregg et al. (1994, cited in Crawford et al. 2004) found that the area surrounding successful nests in Oregon consisted of medium-height (40 to 80 centimeters [cm]) sagebrush. Connelly et al. (2000) cite 11 references to sagebrush height that range from 29 to 79 cm mean height.

In their assessment, Connelly et al. (2000) conclude that sagebrush with a height of 30 to 80 cm is needed for productive sage-grouse nesting habitat in arid sites and 40 to 80 cm in mesic sites. These ranges are supported by Stiver et al. (2010), who recommend a range of 30 to 80 cm, and BLM et al. (2000), which state that optimum sage-grouse nesting habitat consists of sagebrush stands containing plants 40 to 80 cm tall.

Winter

Important structural components in winter habitat include medium to tall (25–80 cm) sagebrush stands (Crawford et al. 2004). Connelly et al. (2000) cite 10 references to sagebrush height in winter habitat that range from 20 to 46 cm above the snow. Two studies measured the entire plant height and provided a range from 41 to 56 cm. In their assessment, Connelly et al. (2000) conclude that characteristics of productive winter habitat include sagebrush that is 25 to 35 cm in height above the snow. This is the height range used as a goal in sage-grouse management guidelines (Bohne et al. 2007; BLM et al. 2000).

Scoring in Habitat Services Metric

Sagebrush canopy heights that provided high-quality nesting habitat generally also provided high-quality winter habitat for sage-grouse. Thus, favorable conditions for nesting were given the highest scores for sagebrush canopy height in the sage-grouse habitat services metric.

The sagebrush cover scores assigned for nesting habitat in the sage-grouse habitat assessment framework by Stiver et al. (2010) to different sagebrush cover categories were assigned to this variable. Areas of sagebrush with a height of 30 to 80 cm were assigned a habitat services score of 3. As sagebrush canopy height decreases, the value of a sagebrush plant to provide cover for nesting females and their nests is diminished. Additionally, low-lying sagebrush is less available to sage-grouse during the winter due to snow cover. Areas with canopy heights greater than 80 cm provided intermediate levels of services because they may provide relatively poor cover for nesting sage-grouse and have foliage that is difficult for sage-grouse to access during mild and moderate winters. Sites with lower and higher sagebrush canopy heights were scored lower (sagebrush 12 to <30 cm or >80 cm in height received a score of 2). Areas with minimal sagebrush canopy heights were considered to have the lowest habitat service value (sagebrush <20 cm received a score of 1).

<u>VAR09 Distance to Vegetation Dominated by Sagebrush or Shrub</u>

Sage-grouse use shrubby habitats including sagebrush during the brood-rearing season (Connelly et al. 2000) and for grouse movement and dispersal (Stiver et al. 2010). Close proximity to shrubby vegetation increases the service value of all vegetation types modeled because shrubby vegetation provides cover from predators, facilitates grouse movement, and supports population connectivity.

The Lincoln County Sage Grouse Technical Review Team (2004) identified proximity to sagebrush cover as an important component in habitat suitability of non-sagebrush, brood-rearing habitats (e.g., mesic lowland habitats, hay meadows). The Team considered brood-rearing areas within <100 yards, 100 to 300 yards, and >300 yards of sagebrush cover as suitable, marginal, and unsuitable habitat, respectively. Similarly, Stiver et al. (2010) considered mesic habitats <90 m, 90 to 275 m, and >275 m of sagebrush to be suitable, marginal, and unsuitable late brood-rearing/summer habitat, respectively. These

categorizations support the concept of increasing service level with proximity to shrubs, particularly sagebrush.

The distance to vegetation dominated by sagebrush or shrub variable (VAR09) measured the distance of the cell being scored (regardless of its vegetation type) to the next nearest cell that was dominated by sagebrush or a shrub species, including willows. For this variable, cells <90 m, 20 to 275 m, and >275 m to a cell dominated by a shrub species were assigned scores of 3, 2, and 1, respectively. The scoring was applied to all vegetation types, because this variable is relevant to bird movement and dispersal from all habitat types.

LITERATURE CITED

Aldridge, C.L., and M.S. Boyce. 2007. Linking occurrence and fitness to persistence: Habitat based approach for endangered Greater Sage Grouse. *Ecological Applications* 17(2)508–526.

Aldridge C.L., S.E. Nielsen, H.L. Beyer, M.S. Boyce, J.W. Connelly, S.T. Knick, and M.A. Schroeder. 2008. Range-wide patterns of greater sage-grouse persistence. *Diversity and Distributions* 17:983–994.

Baines, D., and R.W. Summers. 1997. Assessment of bird collisions with deer fences in Scottish forests. *Journal of Applied Ecology* 34:941–948.

Beck, T.D.I. 1977. Sage grouse flock characteristics and habitat selection during winter. *Journal of Wildlife Management* 41:18–26.

Bevanger, K., and H. Broseth. 2000. Reindeer *Rangifer tarandus* fences as a mortality factor for ptarmigan *Lagopus* spp. *Wildlife Biology* 6:121–127.

Bohne, J., T. Rinkes, and S. Kilpatrick. 2007. *Sage-Grouse Habitat Management Guidelines for Wyoming*. Wyoming Game and Fish Publication. July 24.

Braun, C.E. 1998. Sage-grouse declines in western North America: what are the problems. Proceedings of the Western Association of State Fish and Wildlife Agencies 78:139–156.

———. 2006. A Blueprint for Sage-Grouse Conservation and Recovery. Tucson: Grouse Inc.

Bureau of Land Management (BLM), U.S. Fish and Wildlife Service, U.S. Forest Service, Oregon Department of Fish and Wildlife, and Oregon Division of State Lands. 2000. *Greater Sage-grouse and Sagebrush-steppe Ecosystem: Management Guidelines*.

Cagney, J., E. Bainter, B. Budd, T. Christiansen, V. Herren, M. Holloran, B. Rashford, M. Smith, and J. Williams. 2009. Grazing influence, management and objective development in Wyoming greater sage-grouse habitat with emphasis on nesting and early brood rearing. Unpublished report. Available online at http://gf.state.wy.us/wildlife/wildlife_management/sagegrouse/index.asp. Accessed December 2009.

Call, M.W., and C. Maser. 1985. *Wildlife Habitats in Managed Rangelands – The Great Basin of Southeastern Oregon: Sage Grouse.* General Technical Report PNW-187. USDA Forest Service, Pacific Northwest Forest and Range Experiment Station.

Carpenter, J., C. Aldridge, and M.S. Boyce. 2010. Sage-grouse habitat selection during winter in Alberta. *Journal of Wildlife Management* 74(8):1806–1814.

Catt, D.C., D. Dugan, R.E. Green, R. Moncrieff, R. Moss, N. Picozzi, R.W. Summers, and G.A. Tyler. 1994. Collisions against fences by woodland grouse in Scotland. *Forestry* 67:105–118.

Chi, R.Y. 2004. Greater sage-grouse reproductive ecology and tebuthiuron manipulation of dense big sagebrush on Parker Mountain. M.S. thesis, Utah State University, Logan.

Christiansen, T. 2009. Fence Marking to Reduce Greater Sage-grouse (*Centrocercus urophasianus*) Collisions and Mortality near Farson, Wyoming – Summary of Interim Results. Wyoming Game and Fish Department. Available online at http://pbadupws.nrc.gov/docs/ML1108/ML110830116.pdf. Accessed January 2012.

Colorado Division of Wildlife, USDA Forest Service, USDA Natural Resource Conservation Service, U.S. Bureau of Land Management, and U.S. Fish and Wildlife Service. 2008. Colorado Greater Sage-Grouse Conservation Plan. January 2008. Available online at http://wildlife.state.co.us/WildlifeSpecies/SpeciesOfConcern/Birds/Pages/GreaterSageGrouseConsPlan2.aspx. Accessed March 2013.

Connelly, J.W., S.T. Knick, M.A. Schroeder, and S.J. Stiver. 2004. Conservation assessment of greater sage-grouse and sagebrush habitats. Unpublished report. Cheyenne, Wyoming: Western Association of Fish and Wildlife Agencies.

Connelly, J.W., E T. Rinkes, and C.E. Braun. 2011. Characteristics of greater sage-grouse habitats: a landscape species at micro- and macroscales. In *Greater Sage-grouse Ecology and Conservation of a Landscape Species and its Habitats*, edited by S.T. Knick and J.W. Connelly, pp. 69–83. Berkeley: University of California Press.

Connelly, J.W., M.A. Schroeder, A.R. Sands, and C.E. Braun. 2000. Guidelines to manage sage grouse populations and their habitats. *Wildlife Society Bulletin* 28:967–985.

Craighead Beringia South. 2008. Monitoring Sage Grouse with GPS Transmitters, Implications for Home Range and Small Scale Analysis: A Preliminary Look. Jonah Interagency Mitigation and Reclamation Office. 2008 Wildlife Workshop.

Crawford, J.A., R.A. Olson, N.E. West, J.C. Mosely, M.A. Schroeder, T.D. Whitson, R.F. Miller, M.A. Gregg, and C.S. Boyd. 2004. Synthesis paper: ecology and management of sage-grouse and sage-grouse habitat. *Journal of Range Management* 57:2–19.

Crocker, M.J. 2007. *Handbook of Noise and Vibration Control*. Hoboken, New Jersey: John Wiley and Sons, Inc.

Crompton, B., and D. Mitchell. 2005. The sage-grouse of Emma Park—survival, production, and habitat use in relation to coalbed methane development. Utah Division of Wildlife Resources. December 2005.

Danvir, R.E. 2002. Sage grouse ecology and management in northern Utah sagebrush-steppe. Woodruff, Utah: Deseret Land and Livestock Ranch and the Foundation for Quality Resource Management.

Doherty, K.E., D.E. Naugle, B.L. Walker. 2010. Greater sage-grouse nesting habitat: the importance of managing at multiple scales. *Journal of Wildlife Management* 74(7):1544–1553.

Doherty, K.E., D.E. Naugle, B.L. Walker, and J.M. Graham. 2008. Greater sage-grouse winter habitat selection and energy development. *Journal of Wildlife Management* 72(1):187–195

Dzialak, M.R., C.V. Olsen, S.M. Harju, S.S. Webb, J.P. Mudd, J.B. Winstead, and L.D. Hayden-Wing. 2011. Indentifying and prioritizing greater sage-grouse nesting and brood-rearing habitat for conservation in human-modified landscapes. PLoS ONE 6(10): e26273. doi:10.1371/journal.pone.0026273.

Eng, R.L., and P. Schladweiler. 1972. Sage grouse winter movements and habitat use in central Montana. *Journal of Wildlife Management* 36:141–146.

Gregg, M.A., J.A. Crawford, M.S. Drut, and A.K. DeLong. 1994. Vegetative cover and predation of sage-grouse nests in Oregon. *Journal of Wildlife Management* 58:162–166.

Holloran, M.T., and S.H. Anderson. 2005. Spatial distribution of greater sage-grouse nests in relatively contiguous sagebrush habitats. *The Condor* 107:742–752.

Johnson, D.H., M.J. Holloran, J.W. Connely, S.E. Hanser, C.L. Amundson, and S.T. Knick. 2011. Influences of environmental and anthropogenic features on greater sage-grouse populations, 1997–2007. In *Greater Sage-grouse Ecology and Conservation of a Landscape Species and its Habitats*, edited by S.T. Knick and J.W. Connelly, pp. 407–450. Berkeley: University of California Press.

LaGory, K.E., Y. Hamada, P.F. Tarpey, E.B. Levine, C.C. Weber, L.J. Walston, and D.J. LePoire. 2012. *A Spatially Explicit Individual-Based Modeling Approach to Evaluate the Cumulative Effects of Wind Energy Development on the Greater Sage-grouse*. Prepared by Argonne National Laboratory, Argonne, IL, for the U.S. Department of Energy, Washington, D.C. September 2012. 56 pp.

Lincoln County Sage Grouse Technical Review Team. 2004. *Lincoln County Sage Grouse Conservation Plan*. Nevada. Available online at http://www.ndow.org/wild/conservation/sg/plan/SGPlan063004_R.pdf. Accessed January 2012.

Nisbet, R.A., S.H. Berwick, and K.L. Reed. 1983. A spatial model of sage grouse habitat quality. *Developments in Environmental Modeling* 5:267–276.

Perkins, C.J. 2010. Ecology of isolated greater sage-grouse populations inhabiting the Wildcat Knolls and Horn Mountain, Southcentral Utah. M.S. thesis, Utah State University, Logan.

Petty, S.J. 1995. Assessment of fence collisions by grouse species in Scotland. Forestry Commission Research Information Note 264.

Pruett, C.L., M.A. Patten, and D.H. Wolfe. 2009. Avoidance behavior by prairie grouse: implications for development of wind energy. *Conservation Biology* 23:5:1253–1259.

Robinson, J.D. 2007. Ecology of two geographically distinct greater sage-grouse populations inhabiting Utah's West Desert. M.S. thesis, Utah State University, Logan.

Rogers, G.E. 1964. *Sage Grouse Investigations in Colorado*. Technical Bulletin No. 16. Denver: Colorado Game, Fish and Parks Department.

Stevens, B. 2011. Impacts of fences on greater sage-grouse in Idaho: collision, mitigation, and spatial ecology. M.S. thesis, University of Idaho, Moscow.

Stevens, B.S., J.W. Connelly, and K.P. Reese. 2012. Multi-scale assessment of greater sage-grouse fence collision as a function of site and broad scale factors. *Journal of Wildlife Management* 76(7):1370–1380.

Stevens, B.S., D.E. Naugle, B. Dennis, J.W. Connelly, T. Griffiths, and K.P. Reese. In press. Mapping sage-grouse fence-collision risk: Spatially-explicit models to target conservation implementation. *Wildlife Society Bulletin*.

Stiver, S.J., E.T. Rinkes, and D.E. Naugle. 2010. Sage-grouse habitat assessment framework. Unpublished report. Boise, Idaho: Bureau of Land Management, Idaho State Office.

Wallestad, R.O., and D.B. Pyrah. 1974. Movement and nesting of sage grouse hens in central Montana. *Journal of Wildlife Management* 38:630–633.

Walker, B.L., D.E. Naugle, and K.E. Doherty. 2007. Greater sage-grouse population response to energy development and habitat loss. *Journal of Wildlife Management* 71:2644–2654.

Wiebe, K.L., and K. Martin. 1998. Costs and benefits of nestcover for ptarmigan: changes within and between years. *Animal Behaviour* 56:1137–1144.

Wisdom M.J., C.W. Meinke, S.T. Knick, and M.A. Schroeder. 2011. Factors associated with extirpation of sage-grouse. In *Greater Sage-grouse Ecology and Conservation of a Landscape Species and its Habitats*, edited by S.T. Knick and J.W. Connelly, pp. 451–474. Berkeley: University of California Press.

Wolfe, D.H., M.A. Patten, E. Shochat, C.L. Pruett, and S.K. Sherrod. 2007. Causes and patterns of mortality in lesser prairie-chickens (*Tympanuchus pallidicinctus*) and implications for management. *Wildlife Biology* 13 (Suppl. 1):95–104.

APPENDIX B

Quantification of Baseline Habitat Service Level

QUANTIFICATION OF BASELINE HABITAT SERVICE LEVEL

The pre-construction baseline of the habitat services will be based on existing datasets to the extent possible. It is not anticipated that additional data collection will be necessary to complete the Habitat Equivalency Analysis (HEA). The baseline service level will be determined by applying the habitat service metrics described in Appendix A to the Assessment Area that is identified for the Project. For other similar projects, the Assessment Area included the footprint of the project and a buffer around the footprint, because greater sage-grouse (*Centrocercus urophasianus*) (sage-grouse) habitat service losses were expected to extend beyond the area of direct disturbance.

ESRI ArcGIS ArcInfo 10.X, Spatial Analyst, and ModelBuilder software and tools will be used to conduct analyses. To facilitate calculations across the entire assessment area, it is anticipated that all data will be converted to a raster/grid format. Raster or grid algebra processing is significantly faster for a project of this size.

PREPARATION OF GIS MODEL INPUT LAYERS

Habitats within and surrounding the corridor for the preferred alternative will be summarized in a series of representative raster layers for the 9 metric variables (see Appendix A). These nine variables consist of data representations within the project area for human disturbance, landscape characteristics, proximity to sage-grouse lek locations, and vegetation characteristics that may influence the use of habitat by sage-grouse. A spatial resolution of 30 meters (m) is anticipated to be sufficient to capture a 'landscape level' perspective of habitat across the Assessment Area.

Representative raster data will be created for each variable in the HEA metric (Appendix A). Scores for each cell in each raster will be assigned per the variable scores listed in Table A1 of Appendix A. The following sections describe the datasets anticipated to be necessary to describe each of the variables described in Appendix A.

Lands Excluded From Analysis

As described in Appendix A, land cover types and terrain features that do not provide suitable habitat for sage-grouse will be removed from the HEA model. All vegetation types and landforms that potentially provide habitat for sage-grouse will remain in the model.

VAR01 and VAR02 Distance to Roads and Highways or Other Infrastructure

Road layers used in developing the baseline HEA model are available from the Bureau of Land Management, U.S. Forest Service, state agencies, or from readily available standard road and infrastructure layers. Road layers will be compared between states to ensure consistency in classification prior to using them in the HEA model development. HEA model scores will be applied to 30-m raster cells according to the process described in Table A1, Appendix A. For example, all cells that are more than 1,000 m from interstate highways or high traffic volume state and federal highways will be given a score of 3, those between 650 and 1,000 m will be given a score of 2, those between 100 and 650 m will be given a score of

1, and those cells within 100 m will be removed from consideration in the model per the description provided for Variable 4 in Table A1 and the supporting text.

VAR03 Distance to Fences that Pose a High Risk for Collision

Grazing allotment boundaries will be used as surrogates for fence locations in the HEA baseline model development, because fence data of equal quality is not available across the entire assessment area. Modeling of fences will only occur where data are available, which may exclude private lands and federal lands that do not have allotments defined. The model of Stevens et al. (in press) will be used to identify fences that pose a high collision risk for sage-grouse. Scores for distance to high-risk fence will be applied to the 30-m grid cells in the model in the same manner as described for roads and highways with cells closest to fences receiving the lowest scores and those farthest from fences receiving the highest scores.

VAR04 Slope

Slope will be calculated using 30-m digital elevation models and scored according to the process described in Appendix A.

VAR05 Distance to Lek (10-year Average Count >0 Males)

Lek data will be obtained from the wildlife management agencies in each state. Lek status will be determined for all leks. Leks that have been active in the past 10 years or that have an unknown status will be included in the HEA model. Those that are labeled as unoccupied or inactive will not be included. Cells surrounding leks will be scored according to the methods described in Appendix A with cells closest to leks receiving the highest scores.

VAR06 Sagebrush Abundance Index

A sagebrush abundance index will be determined from available vegetation layers by calculating the proportion of sagebrush in a 1-square-kilometer area surrounding each 30-m cell in the assessment area. Scores will be applied using the methods described in Appendix A. Areas with a high proportion of sagebrush in the landscape and some habitat heterogeneity will be scored higher than areas with little habitat heterogeneity or areas with little or no sagebrush.

Sagebrush Cover, Sagebrush Canopy Height

When possible, percent cover and height will be determined directly from the vegetation attribute data included in the GAP and Landfire vegetation datasets. Where data are not available, attributes for percent cover and height will be determined using other data sources. Sampling data from GAP/Landfire datasets as well as datasets obtained from BLM and the state agencies will be used to attribute vegetation percent cover and height for segments of the landscape with the most similar characteristics. Once vegetation values have been applied to the 30-m grid, HEA scores will be applied using the methods described in Appendix A.

Distance to Vegetation Dominated by Sagebrush or Shrub

The distance from each cell to the nearest sagebrush- or shrub-dominated cell will be calculated. Cells within or closest to sagebrush or shrub landscapes will be scored higher than those that are distant from shrub-dominated cells.

SUMMATION OF BASELINE SERVICES IN THE HEA MODEL

Spatial grids representing the above HEA variables will be combined through additive raster calculations to create a final raster layer. The value of each cell will be the sum of variables 1 through 9. The final numeric value for each cell is the habitat services provided to sage-grouse by that cell.

The resulting habitat service values and the number of acres associated with each of the habitat service values will be multiplied together and summed across the Assessment Area to calculate the total habitat services (expressed in service acres) (Equation 1). The total habitat services provided by the Assessment Area will be calculated and will serve as the pre-construction baseline for the Project.

Equation 1. $$VJ = \sum_{1}^{i} (V_i * J_{V_i})$$

where:

VJ is the habitat services (service-acres) provided by the Assessment Area,

V is the habitat service score (i.e., the sum of the variable scores in the habitat service metric),

i is the number of possible unique values for *V*, and

J_{V_i} is the number of acres for each value of V_i, where $\sum_{1}^{i} J_{V_i}$ would equal the total acreage of the Assessment Area (*J*).

APPENDIX C

Quantification of Habitat Service Losses

QUANTIFICATION OF HABITAT SERVICE LOSSES

Habitat service losses caused by the Project will be modeled using geographic information system (GIS) technology for important Project milestones by decreasing the variable scores below the Baseline level for the Project effects identified for that milestone using habitat services metric in the footprint of the Project (direct disturbances) and in buffers around the footprint (indirect disturbances). The habitat service scores for each milestone will be summed across the Assessment Area to calculate the estimated interim and permanent habitat service losses associated with the Project.

DESCRIPTION OF DISTURBANCES BY PROJECT MILESTONE

The habitat services provided by the Assessment Area will be measured at several different Project milestones that reflect varying levels of disturbance.

The Project milestones modeled for the HEA will be:

1. **Baseline**—the baseline milestone quantifies habitat services available to greater sage-grouse (*Centrocercus urophasianus*) (sage-grouse) before disturbance. The calculation of the habitat services available to sage-grouse at Baseline is described in Appendix B.
2. **Construction—**the transmission line construction milestone quantifies habitat services available to sage-grouse during the construction of the Project.
3. **Restoration**—the restoration milestone quantifies habitat services available to sage-grouse after Project construction is complete and some services return with the reduction in noise and human presence.
4. **Recovery**—the recovery milestone quantifies habitat services available to sage-grouse after a vegetation type has recovered to the greatest extent expected after Project restoration is complete. Habitat services return to baseline conditions in restored areas with the time to recovery being dependent on the vegetation type. It is anticipated that there will be multiple vegetation-based recovery endpoints. Vegetation recovery endpoints will be determined upon identification of the vegetation communities impacted by the Project.

QUANTIFYING LOSS OF HABITAT SERVICES DUE TO SURFACE DISTURBANCE DURING CONSTRUCTION

For the Construction milestone, direct disturbances will be defined as the loss of habitat services associated with vegetation removal and ground-disturbing activities within the construction footprint (Table C1). The habitat service scores for all 30-square-meter raster cells in the Project footprint where vegetation removal or ground disturbance occur will be changed from the Baseline service scores to 0 in the GIS model for this milestone. Recovery from the disturbed state will be applied per the vegetation-specific recovery curves for the Project.

Table C1. Direct Disturbance Levels Modeled by Project Milestone and Disturbance Type

Project Milestones	Percent Baseline Services Present by Direct Disturbance Type		
	Series Compensation Stations	Transmission Towers	Access Roads, Transmission Lines, and Temporary Infrastructure
Baseline	100%	100%	100%
Construction	0%	0%	0%
Restoration	0%	0%	0%
Progressive Vegetation Recovery	0%	0% within permanent tower footprint. Elsewhere baseline services will be retuned per the vegetation-specific recovery curves developed for the Project.*	Baseline services will be retuned per the vegetation-specific recovery curves developed for the Project.

* Baseline habitat services will return in the model in areas where two-track roads will be maintained for occasional access by PacifiCorp personnel. Two-track roads were not identified in metric as changing the habitat services available for sage-grouse, and so these roads have no effect in the model once construction is complete.

QUANTIFYING LOSS OF HABITAT SERVICES DUE TO INDIRECT DISTURBANCES DURING CONSTRUCTION

Indirect disturbances will be simulated by applying buffers to the construction footprint and decreasing the habitat service scores below the Baseline habitat service scores within the buffers. Because of uncertainties in the indirect impacts of transmission structures on sage-grouse, at this time, noise and human presence will be the only indirect disturbances modeled in the HEA.

Use of construction equipment such as backhoes, cranes, front-end loaders, bulldozers, graders, excavators, compressors, generators, and various trucks would be needed for mobilizing crew, transportation and use of materials, line work, site clearing, and preparation during the construction phase of the Project. Construction of and improvements to access roads would require use of earthmoving equipment such as bulldozers and graders. Table C2 provides the typical noise levels for the construction equipment that could potentially be used during the construction phase of the Project (ranging 80 to 90 A-weighted decibels [dBA] at 50 feet [15 meters (m)] from any work site).[1]

[1] Construction noise values taken from Energy Gateway West HEA report.

Table C2. Typical Noise Levels from Construction Equipment

Equipment Type	Noise Level at 50 feet (dBA)
Crane	88
Backhoe	85
Pan loader	87
Bulldozer	89
Fuel truck	88
Water truck	88
Grader	85
Roller	80
Mechanic truck	88
Flat bed truck	88
Dump truck	88
Tractor	80
Concrete truck	86
Concrete pump	82
Front end loader	83
Scraper	87
Air compressor	82
Average construction site	85

Noise during the construction phase of the Project would be similar in magnitude to noise produced by vehicles using secondary roads (county highways, state highways, and heavily travelled gravel roads such as access roads for oil and gas development, mining, etc.). Passenger vehicles, medium trucks, and heavy trucks travelling 55 miles per hour (mph) produce typical noise levels of 72 to 74 dBA, 80 to 82 dBA, and 84 to 86 dBA, respectively, from a distance of 50 feet. Therefore, the noise disturbance associated with construction will be modeled as if the construction area was a secondary road (Table C3).

In the model, buffers will be placed around active construction areas in a manner that is identical to the methods used for secondary roads. The cells that fall within these buffers will be scored in a manner identical to a secondary road (that is, the score for VAR02 decreased).

Table C3. Indirect Disturbance Levels Modeled by Project Year and Disturbance Type

Project Milestones	Indirect Disturbance Buffers Applied by Disturbance Type		
	Series Compensation Stations	Transmission Towers	Access Roads, Transmission Lines, and Temporary Infrastructure
Baseline	None	None	None
Construction	Secondary road	Secondary road	Secondary road
Restoration	Secondary road	None	None
Progressive Vegetation Recovery	Secondary road	None	None
	Secondary road	None	None
	Secondary road	None	None
	Secondary road	None	None

QUANTIFYING HABITAT SERVICES LOSSES DURING RESTORATION AND RECOVERY

Project-related habitat service losses are anticipated to decrease once construction is complete. Although still below baseline levels, the habitat service scores rise during restoration and recovery with vegetation regrowth (direct disturbances) and decreased levels of noise and human presence (indirect disturbances).

Restoration Milestone

For the Restoration milestone, direct disturbances will be defined as the loss of all habitat services in the construction footprint where vegetation clearing and ground disturbance occurs because the vegetation has not regrown sufficiently to provide habitat (see Table C1).

The indirect disturbance buffers that are applied to the series compensation stations during construction will remain during the restoration milestone and for the life of the Project because of the noise and human activity associated with operation of these facilities. No indirect disturbances will be modeled for the rest of the Project because little vehicle traffic or human presence is anticipated in these areas after construction of the line is complete.

Progressive Recovery Milestone

For the Recovery milestone, direct disturbances will be defined as the loss of all habitat services in the footprint of the transmission structure pads and the partial loss of services in areas of vegetation regrowth (see Table C1). Indirect disturbances will be applied in a manner identical to the Construction milestone (see Table C3).

Habitat services in areas where the vegetation is reclaimed (i.e., outside the footprint of permanent facilities) will gradually return to baseline conditions at a rate dependent on the vegetation type. Services will return more rapidly for vegetation having rapid recovery rates

(e.g., agriculture, grassland, wetland, or riparian) than for those with slower recovery times (e.g., shrub-dominated including sagebrush). Vegetation recovery curves will be developed for the vegetation communities that are impacted by Project activities.

To calculate the progressive return of services, the percentage of the baseline service value for a cell will be calculated based on the appropriate vegetation recovery curve. For example, in those vegetation types with rapid restoration potential (agricultural areas, some grasslands, etc.), habitat services could be returned to 100% of Baseline in the first year following construction. Those with longer recovery times may only achieve partial service returns per year until achieving their maximum value. For example, a vegetation community with a 50-year recovery period might achieve 10% value in year 5 after restoration, 20% in year 10, 30% in year 15, etc., until all services are returned in year 50.

HEA TO QUANTIFY INTERIM AND PERMANENT HABITAT INJURIES

The approach described above will produce a measure of habitat services (in service-acres) for each of the Project milestones for each of the modeled Project segments. The HEA is a stepwise model which quantifies the habitat injury separately in each year (Figure C1) and each of the milestones will be assigned to a calendar year per the schedule provided by the Project proponents after the preferred alternative is identified. It is likely that a linear change in habitat services will be used to estimate annual service-acre increases between restoration and recovery and between the vegetation-specific recovery times. The total number of service-acres lost per year will be summed across the analysis period and expressed as service-acre-years. This value is the estimated sum of the interim and permanent losses to sage-grouse habitat that would occur as a result of project construction and operation.

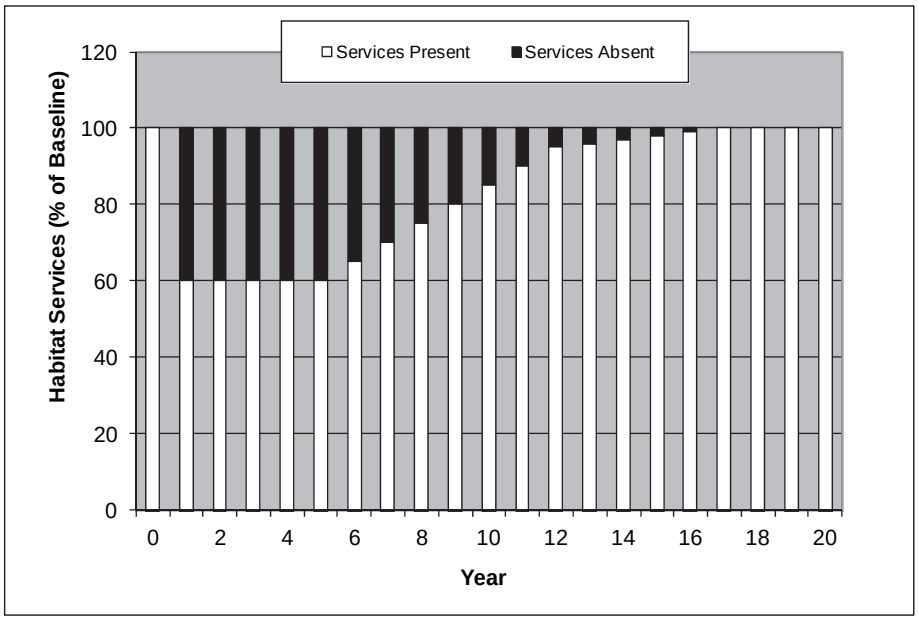

Figure C1. Hypothetical example of how the HEA model considers habitat services absent and habitat services present in each year to calculate the total services lost over the Project period (i.e., sum of the black bars).

The HEA model balances the cumulative injury (*I*, service-acre-years) over the lifetime of the Project with the cumulative benefit of habitat restoration and mitigation (*R*, service-acre-years), so that the services returned by habitat restoration and mitigation are greater than or equal to the cumulative injury ($R \geq I$). The habitat injury (*I*, service-acre-years) will be quantified for the life of the Project using Equation 2. Equation 2 was adapted from Equation 8.1 in Allen et al. (2005)[2]. The discount rate (*r*) is anticipated to be set to 3%, which is standard for this type of analysis. The discount rate converts services being provided in different time periods into current time period equivalents (Allen et al. 2005). The discount rate effectively weighs the habitat service losses so that losses occurring early in the project result in a greater overall injury than losses occurring later in the project. Likewise, habitat restoration and mitigation occurring early in the Project would result in a greater benefit than habitat restoration and mitigation occurring late in the Project.

Equation 2. $$I = \sum_{t=0}^{y} JV^{j} * \rho_{t} * \left[(b^{j} - x_{t}^{j}) / b^{j} \right]$$

where:

I is the present value of the service-acre-years lost over *y* due to interim and permanent injury,

$t = 0$ is the year the project begins,

y is the analysis period (107 years),

JV^j is the value of the habitat services provided by the injured habitat (service-acres) before injury (i.e., at the Baseline milestone),

b^j is the mean service score provided by the Assessment Area (JV^j/J, where J is the injury Assessment Area in acres) at the Baseline milestone (time [*t*] = 0),

ρ_t is the discount factor, where $\rho_t = 1/(1+r)^{t-C}$, where *r* is the discount rate for the time period and *C* is the time the claim is presented (*C* = Project Year 1), and

x_t^j is the mean service score provided by the Assessment Area at the end of year *t* if Project disturbances are applied.

[2] Allen, P.D. II, D.J. Chapman, and D. Lane. 2005. Scaling environmental restoration to offset injury using habitat equivalency analysis. In *Economics and Ecological Risk Assessment: Applications to Watershed Management*, edited by R.F. Bruins and M.T. Heberling, pp. 165–184. Boca Raton, Florida: CRC Press.

APPENDIX D

Quantification of Habitat Service Gains Produced by Habitat Restoration and Mitigation projects

MODELING MITIGATION PROJECT HABITAT SERVICE GAINS

Habitat restoration and mitigation projects are intended to create new, or protect existing, greater sage-grouse (*Centrocercus urophasianus*) (sage-grouse) habitat services (Table D1). These measures serve as a "toolbox" from which mitigation options may be selected by PacifiCorp for inclusion in a mitigation package once the Bureau of Land Management has identified the preferred alternative for Gateway South and final Habitat Equivalency Analysis (HEA) results are available for that alternative. The purpose of implementing the habitat restoration and mitigation projects is to offset the cumulative sage-grouse habitat service losses in the Assessment Area over the Project lifetime (see *I* in Equation 2 from Appendix C). The HEA will be used to evaluate the benefit of a sample of conservation projects in the Assessment Area.

Table D1. Potential Habitat Restoration and Mitigation projects for Inclusion in the HEA

Measure	Brief Project Description	Anticipated Benefits
Fence removal and marking with flight diverters	Fence segments that pose a high collision risk for sage-grouse (Stevens et al., in press*) would be marked, modified, or removed to reduce or remove threats to sage-grouse.	• Reduce mortality due to sage-grouse collisions • Increase visibility of fences • Increase contiguous patches of shrub-steppe habitat • Remove localized grazing pressure and increase habitat
Sagebrush restoration and improvement projects	Seeding, planting seedlings, or transplanting containerized sagebrush plants (one plant per 5 square meters) and seeding a bunchgrass understory.	• Create contiguous patches of shrub-steppe habitat with optimal sagebrush cover and height and a bunchgrass understory • Increase availability of high-quality nesting, brood rearing, and winter habitats
Juniper/conifer removal	Mechanical removal (lop and scatter, cut-pile-cover, or mastication) of juniper/confer adjacent to areas with optimal sagebrush cover and height.	• Reverse juniper/conifer encroachment on shrub-steppe habitat to increase contiguous patches of sage-grouse habitat • Increase light penetration to support a forb and grass understory
Conservation easements	Removes threat of specific land uses to sensitive wildlife populations.	• Prevent sage-grouse habitat destruction or degradation near urban areas and oil and gas development • Reduce future fragmentation of shrub-steppe habitat

* Stevens, B.S., D.E. Naugle, B. Dennis, J.W. Connelly, T. Griffiths, and K.P. Reese. In press. Mapping sage-grouse fence-collision risk: Spatially-explicit models to target conservation implementation. Wildlife Society Bulletin.

GIS MODELING OF CONSERVATION BENEFITS

The analysis of habitat service benefits produced by each habitat restoration or mitigation measure in Table D1 will be completed using an approach similar to that described for quantifying habitat losses. It is necessary that both analyses—quantification of habitat service

losses and habitat service gains—use the same habitat services metric (see Appendix A), the same unit of measure (service-acres and service-acre-years), the same analysis period, and the same discount rate. Figure D1 illustrates a hypothetical example of how mitigation would be added to the baseline service metric over time to derive an estimate of the service-acre-years provided by the mitigation projects that will be modeled for the Project.

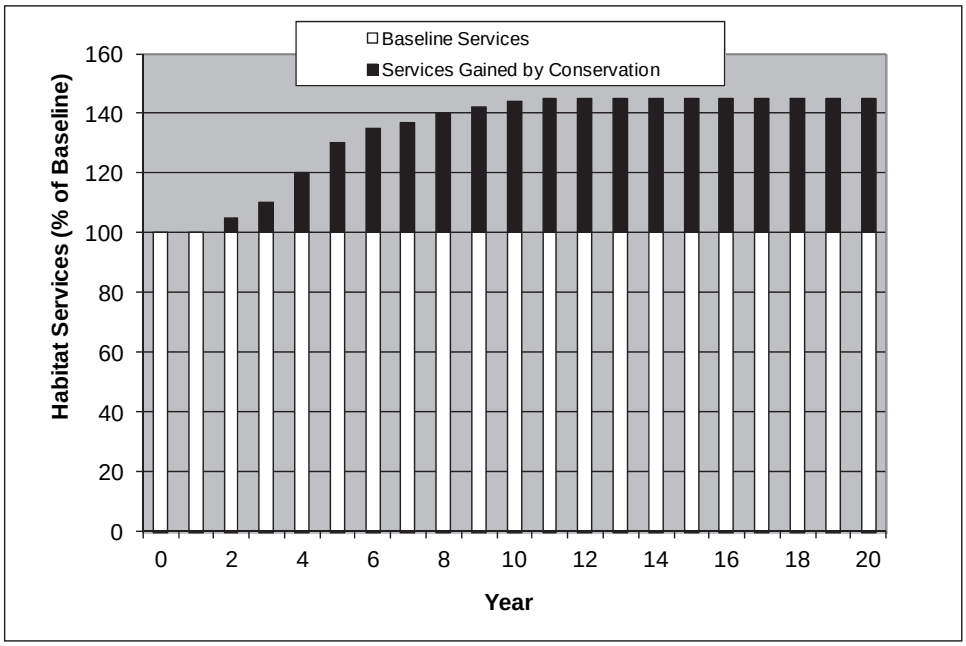

Figure D1. Hypothetical example of how the HEA model considers habitat services gained by habitat restoration and mitigation to calculate the total services gained over the project period (i.e., sum of the black bars).

Modeling Habitat Restoration and Mitigation projects

Ideally, locations of possible habitat restoration and mitigation projects will be identified prior to finalization of the HEA process. In the event that these locations are not known, hypothetical habitat restoration and mitigation project areas will be used to estimate average habitat service gain.

Once actual or hypothetical habitat restoration and mitigation project locations are identified, variable scores in the HEA model will be changed to approximate the change in habitat services expected with implementation of the measure. The new habitat service score will be calculated for each cell in the Assessment Area using the same habitat services metric used to quantify baseline and impacts (see Appendix A). The habitat service benefit of a modeled project will be calculated by determining the difference in the habitat services provided at baseline and after implementation of the habitat restoration or mitigation measure.

For each habitat restoration/mitigation project, the time to full benefit and project initiation timing will be determined and accounted for in the HEA model to estimate of the present value habitat service gain that would be created. The present value habitat service gain (*R*,

service-acre-years) will be quantified for the life of the Project using Equation 3 (adapted from Equation 8.1 in Allen et al. 2005[1]).

Equation 3. $$R = \sum_{t=0}^{y} PV^{p} * \rho_{t} * \left[(x_{t}^{p} - b^{p}) / b^{p} \right]$$

where:

R is the present value of the service-acre-years gained by the habitat restoration or mitigation measure,

$t = 0$ is the year the transmission line Project begins,

y is the analysis period (107 years),

PV^p is the value of the habitat services provided by the improved habitat (service-acres) before habitat restoration or mitigation measure (i.e., at the Baseline milestone),

b^p is the mean service score provided by the Assessment Area (PV^p/P, where P is the injury Assessment Area in acres) at the Baseline milestone (time [t] = 0),

ρ_t is the discount factor, where $\rho_t = 1/(1+r)^{t-C}$, where r is the discount rate for the time period and C is the time the claim is presented (C = Project Year 1), and

x_t^p is the mean service score provided by the Assessment Area at the end of year t if habitat restoration or mitigation measure benefits are applied.

The present value habitat service gain (R) will be standardized among projects by dividing by size of project (units in acres or linear miles depending on the conservation measure modeled) and averaged among hypothetical projects applying the same conservation measure to produce the service-years gained per unit of treatment ($\overline{R}^m$). This value will be used in mitigation calculations.

ESTIMATING COST TO IMPLEMENT MODELED HABITAT RESTORATION AND MITIGATION PROJECTS

The cost of the modeled habitat restoration and mitigation projects will be estimated by averaging the known cost of similar projects previously implemented (in current year U.S. dollars). The cost per unit treated will be divided by the average service-acre-years per unit area treated (calculated in the previous section), to estimate the price per service-acre-year gained for each of the habitat restoration and mitigation projects. This is the currency that will be used to offset the permanent and interim habitat service losses associated with Project construction and operation for the duration of the analysis.

[1] Allen, P.D. II, D.J. Chapman, and D. Lane. 2005. Scaling environmental restoration to offset injury using habitat equivalency analysis. In *Economics and Ecological Risk Assessment: Applications to Watershed Management*, edited by R.F. Bruins and M.T. Heberling, pp. 165–184. Boca Raton, Florida: CRC Press.

APPROACH TO OFFSET HABITAT SERVICE LOSSES WITH HABITAT SERVICE GAINS

An HEA scales the mitigation package (i.e., funding to create habitat services) to offset the loss of habitat services over the lifetime of the project. The injury is offset by planned habitat restoration and mitigation projects in Equation 4, where the project size (P^m) can be solved for each habitat restoration or mitigation measure type (m).

Equation 4 $$I = \sum_{m1}^{i} P^m * \overline{R}^m$$

where:

I is the present value of the service-acre-years lost over y due to interim and permanent injury,

y is the analysis period (107 years)

i is the number of habitat restoration and mitigation projects modeled,

P^m is the size of the habitat restoration or mitigation project of type m (in units of acres or miles), and

$\overline{R}^m$ is mean service-years gained per unit (acres or miles) of treatment.

Once the P^m is defined for each habitat improvement and mitigation measure, the costs per unit can be applied. Mitigation due is the sum of the costs to implement each of the habitat improvement and mitigation projects needed to offset the Project.

APPENDIX G – GRAZING ALLOTMENT SUPPORTING DATA

Introduction

Tables G-1, G-2, and G-3 are lists of the grazing allotments crossed by each alternative route for each state. This information supports the land use resource inventories and impact assessment. The inventories and analysis are included in the Draft Environmental Impact Statement and Land-use Plan Amendments for the Energy Gateway South Transmission Project Section 3.2.10.

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TABLE G-1 GRAZING ALLOTMENTS FOR THE WYOMING TO COLORADO – AEOLUS TO U.S. HIGHWAY 40 (WYCO) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
Alternative WYCO-B (Applicant Preferred Alternative)						
Chace Block	BLM Rawlins Field Office	67,290	4.5	52	22	0.0
Continental	BLM Rawlins Field Office	24,926	5.3	60	26	0.0
Daley Ranch	BLM Rawlins Field Office	24,587	3.9	44	19	0.0
Dana Block North	BLM Rawlins Field Office	70,878	16.6	191	81	0.0
East Muddy	BLM Rawlins Field Office	25,034	3.6	42	18	0.0
Echo Springs	BLM Rawlins Field Office	37,788	5.8	67	29	0.0
Ellis Block	BLM Rawlins Field Office	34,530	0.5	6	2	0.0
Lazy Y S Ranch	BLM Rawlins Field Office	17,834	3.6	42	18	0.0
North Walcott	BLM Rawlins Field Office	73,724	4.6	53	23	0.0
Not named	BLM Rawlins Field Office	442,935	18.4	211	90	0.0
Pass Creek Ridge	BLM Rawlins Field Office	59,168	9.2	105	45	0.0
Powder Rim Rotati	BLM Rawlins Field Office	46,706	8.2	95	40	0.0
Quealey Block	BLM Rawlins Field Office	23,782	1.5	18	8	0.0
Riner	BLM Rawlins Field Office	59,505	11.4	131	56	0.0
Rotten Springs	BLM Rawlins Field Office	21,024	0.7	8	4	0.0
Sand Creek	BLM Rawlins Field Office	29,920	7.3	84	36	0.0
Sixteen Mile	BLM Rawlins Field Office	82,186	10.9	125	53	0.0
South Barrel	BLM Rawlins Field Office	10,268	3.2	37	16	0.0
South Laclede	BLM Rawlins Field Office	53,035	11.4	131	56	0.0
South Wamsutter	BLM Rawlins Field Office	32,817	7.1	82	35	0.0
Cedar Springs Draw	BLM Little Snake Field Office	35,489	7.7	88	38	0.0
East Powder Wash	BLM Little Snake Field Office	27,154	3.8	44	19	0.0
Grounds	BLM Little Snake Field Office	8,012	2.1	24	10	0.0
Horse Draw	BLM Little Snake Field Office	7,414	1.8	21	9	0.0
Nipple Peak	BLM Little Snake Field Office	15,560	5.3	61	26	0.0
Powder Wash	BLM Little Snake Field Office	27,432	1.8	21	9	0.0
Sand Wash	BLM Little Snake Field Office	76,108	2.4	28	12	0.0
Sheepherder Spring	BLM Little Snake Field Office	86,354	4.7	53	23	0.0
Snake River	BLM Little Snake Field Office	62,469	11.3	130	56	0.0
West Wapiti Peak	BLM Little Snake Field Office	10,411	3.6	42	18	0.0
Elk Springs	BLM White River Field Office	26,620	8.0	92	39	0.0
Horse Draw	BLM White River Field Office	17,761	6.6	75	32	0.0

TABLE G-1 GRAZING ALLOTMENTS FOR THE WYOMING TO COLORADO – AEOLUS TO U.S. HIGHWAY 40 (WYCO) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
Massadona	BLM White River Field Office	10,871	0.6	6	3	0.0
White River Trail	BLM White River Field Office	928	0.8	9	4	0.0
Winter Valley Gulch	BLM White River Field Office	1,564	0.1	1	0	0.0
BLM Total[4]		**1,651,911**	**198.5**	**2,283**	**973**	**0.0**
20515	Wyoming State Lands	160	0.3	3	1	0.0
30742	Wyoming State Lands	639	1.0	11	5	0.0
36220	Wyoming State Lands	799	0.6	7	3	0.0
Mar-53; Wl-1101	Wyoming State Lands	638	1.0	12	5	0.0
Mar-97; Wl-1101	Wyoming State Lands	639	1.0	12	5	0.0
No lease number identified	Wyoming State Lands	1,751	0.0	0	0	0.0
Cross Mountain Ranch Limited Partnership/Company	Colorado State Land Board	3,841	1.0	12	5	0.0
John A. Maneotis	Colorado State Land Board	5,125	3.1	35	15	0.0
Nottingham Land & Livestock	Colorado State Land Board	8,885	4.2	48	20	0.0
Three Springs Ranch Corporation	Colorado State Land Board	641	0.9	10	4	0.0
Albert F. Villard	Colorado State Land Board	600	0.7	8	3	0.0
Visintainer Sheep Company	Colorado State Land Board	3,259	1.0	12	5	0.0
State Total		**26,967**	**14.8**	**170**	**72**	**0.0**
Grand Total		**1,661,948**	**201.6**	**2,318**	**988**	**0.0**
Route Variation WYCO-B-1						
Chace Block	BLM Rawlins Field Office	67,290	4.5	52	22	0.0
Continental	BLM Rawlins Field Office	24,926	5.3	60	25	0.0
Daley Ranch	BLM Rawlins Field Office	24,587	3.9	44	18	0.0
Dana Block North	BLM Rawlins Field Office	70,878	16.6	191	80	0.0
East Muddy	BLM Rawlins Field Office	25,034	3.6	42	17	0.0
Echo Springs	BLM Rawlins Field Office	37,788	5.8	67	28	0.0
Ellis Block	BLM Rawlins Field Office	34,530	0.5	6	2	0.0
Lazy Y S Ranch	BLM Rawlins Field Office	17,834	3.6	42	17	0.0
North Walcott	BLM Rawlins Field Office	73,724	4.6	53	22	0.0
Not named	BLM Rawlins Field Office	442,935	18.4	211	88	0.0
Pass Creek Ridge	BLM Rawlins Field Office	59,168	9.2	105	44	0.0
Powder Rim Rotati	BLM Rawlins Field Office	46,706	8.2	95	40	0.0
Quealey Block	BLM Rawlins Field Office	23,782	1.5	18	7	0.0

TABLE G-1
GRAZING ALLOTMENTS FOR THE WYOMING TO COLORADO – AEOLUS TO U.S. HIGHWAY 40 (WYCO) ALTERNATIVE ROUTES

Allotment	Jurisdiction	Total Acres of Allotment	Miles Crossed	Acres of Temporary Disturbance[1]	Acres of Permanent Disturbance[2]	Percent of Allotment Disturbed[3]
Riner	BLM Rawlins Field Office	59,505	11.4	131	55	0.0
Rotten Springs	BLM Rawlins Field Office	21,024	0.7	8	4	0.0
Sand Creek	BLM Rawlins Field Office	29,920	7.3	84	35	0.0
Sixteen Mile	BLM Rawlins Field Office	82,186	10.9	125	52	0.0
South Barrel	BLM Rawlins Field Office	10,268	3.2	37	16	0.0
South Laclede	BLM Rawlins Field Office	53,035	11.4	131	55	0.0
South Wamsutter	BLM Rawlins Field Office	32,817	7.1	82	34	0.0
Cedar Springs Draw	BLM Little Snake Field Office	35,489	7.7	88	37	0.0
East Powder Wash	BLM Little Snake Field Office	27,154	3.8	44	18	0.0
Grounds	BLM Little Snake Field Office	8,012	2.1	24	10	0.0
Horse Draw	BLM Little Snake Field Office	7,414	1.8	21	9	0.0
Nipple Peak	BLM Little Snake Field Office	15,560	5.3	61	25	0.0
Powder Wash	BLM Little Snake Field Office	27,432	1.8	21	9	0.0
Sand Wash	BLM Little Snake Field Office	76,108	2.4	28	12	0.0
Sheepherder Spring	BLM Little Snake Field Office	86,354	4.7	53	22	0.0
Snake River	BLM Little Snake Field Office	62,469	11.8	135	56	0.0
West Wapiti Peak	BLM Little Snake Field Office	10,411	3.6	42	17	0.0
Elk Springs	BLM White River Field Office	26,620	8.0	92	39	0.0
Horse Draw	BLM White River Field Office	17,761	6.6	75	31	0.0
Massadona	BLM White River Field Office	10,871	0.6	6	3	0.0
White River Trail	BLM White River Field Office	928	0.8	9	4	0.0
Winter Valley Gulch	BLM White River Field Office	1,564	0.1	1	0	0.0
BLM Total[4]		**1,651,911**	**198.9**	**2,288**	**955**	**0.0**
20515	Wyoming State Lands	160	0.3	3	1	0.0
30742	Wyoming State Lands	639	1.0	11	5	0.0
36220	Wyoming State Lands	799	0.6	7	3	0.0
Mar-53; Wl-1101	Wyoming State Lands	638	1.0	12	5	0.0
Mar-97; Wl-1101	Wyoming State Lands	639	1.0	12	5	0.0
No lease number identified	Wyoming State Lands	1,751	0.0	0	0	0.0
Cross Mountain Ranch Limited Partnership/Company	Colorado State Land Board	3,841	1.0	12	5	0.0
John A. Maneotis	Colorado State Land Board	5,125	3.1	35	15	0.0
Nottingham Land & Livestock	Colorado State Land Board	8,885	4.2	48	20	0.0

TABLE G-1 GRAZING ALLOTMENTS FOR THE WYOMING TO COLORADO – AEOLUS TO U.S. HIGHWAY 40 (WYCO) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
Three Springs Ranch Corporation	Colorado State Land Board	641	0.9	10	4	0.0
Albert F. Villard	Colorado State Land Board	600	0.7	8	3	0.0
State Total		**23,706**	**13.8**	**158**	**66**	**0.0**
Grand Total		**1,659,325**	**202.0**	**2,323**	**970**	**0.0**
Route Variation WYCO-B-2 (Agency Preferred Alternative)						
Chace Block	BLM Rawlins Field Office	67,290	4.5	52	22	0.0
Continental	BLM Rawlins Field Office	24,926	5.3	60	25	0.0
Daley Ranch	BLM Rawlins Field Office	24,587	3.9	44	18	0.0
Dana Block North	BLM Rawlins Field Office	70,878	16.6	189	80	0.0
East Muddy	BLM Rawlins Field Office	25,034	3.6	41	17	0.0
Echo Springs	BLM Rawlins Field Office	37,788	5.8	66	28	0.0
Ellis Block	BLM Rawlins Field Office	34,530	0.5	5	2	0.0
Lazy Y S Ranch	BLM Rawlins Field Office	17,834	3.6	41	17	0.0
North Walcott	BLM Rawlins Field Office	73,724	4.6	52	22	0.0
Not named	BLM Rawlins Field Office	442,935	18.4	210	88	0.0
Pass Creek Ridge	BLM Rawlins Field Office	59,168	9.2	105	44	0.0
Powder Rim Rotati	BLM Rawlins Field Office	46,706	8.2	94	40	0.0
Quealey Block	BLM Rawlins Field Office	23,782	1.5	18	7	0.0
Riner	BLM Rawlins Field Office	59,505	11.4	130	55	0.0
Rotten Springs	BLM Rawlins Field Office	21,024	0.7	8	4	0.0
Sand Creek	BLM Rawlins Field Office	29,920	7.3	84	35	0.0
Sixteen Mile	BLM Rawlins Field Office	82,186	10.9	124	52	0.0
South Barrel	BLM Rawlins Field Office	10,268	3.2	37	16	0.0
South Laclede	BLM Rawlins Field Office	53,035	11.4	130	55	0.0
South Wamsutter	BLM Rawlins Field Office	32,817	7.1	81	34	0.0
Cedar Springs Draw	BLM Little Snake Field Office	35,489	7.1	81	34	0.0
Disappointment	BLM Little Snake Field Office	32,302	3.6	41	17	0.0
East Powder Wash	BLM Little Snake Field Office	27,154	3.8	44	18	0.0
Grounds	BLM Little Snake Field Office	8,012	2.1	24	10	0.0
Horse Draw	BLM Little Snake Field Office	7,414	1.8	21	9	0.0
Nipple Peak	BLM Little Snake Field Office	15,560	5.3	60	25	0.0
Powder Wash	BLM Little Snake Field Office	27,432	1.8	20	9	0.0
Sand Wash	BLM Little Snake Field Office	76,108	2.4	28	12	0.0

TABLE G-1 GRAZING ALLOTMENTS FOR THE WYOMING TO COLORADO – AEOLUS TO U.S. HIGHWAY 40 (WYCO) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
Sheepherder Spring	BLM Little Snake Field Office	86,354	4.7	53	22	0.0
Snake River	BLM Little Snake Field Office	62,469	11.3	129	54	0.0
Elk Springs	BLM White River Field Office	26,620	8.3	95	40	0.0
Horse Draw	BLM White River Field Office	17,761	6.6	75	31	0.0
Massadona	BLM White River Field Office	10,871	0.6	6	3	0.0
White River Trail	BLM White River Field Office	928	0.8	9	4	0.0
Winter Valley Gulch	BLM White River Field Office	1,564	0.1	1	0	0.0
BLM Total[4]		**1,673,802**	**198.2**	**2,259**	**951**	**0.0**
20515	Wyoming State Lands	160	0.3	3	1	0.0
30742	Wyoming State Lands	639	1.0	11	5	0.0
36220	Wyoming State Lands	799	0.6	7	3	0.0
Mar-53; Wl-1101	Wyoming State Lands	638	1.0	11	5	0.0
Mar-97; Wl-1101	Wyoming State Lands	639	1.0	12	5	0.0
No lease number identified	Wyoming State Lands	1,751	0.0	0	0	0.0
Cross Mountain Ranch Limited Partnership/Company	Colorado State Land Board	3,841	1.0	12	5	0.0
John A. Maneotis	Colorado State Land Board	5,125	3.1	35	15	0.0
Nottingham Land & Livestock	Colorado State Land Board	8,885	4.2	48	20	0.0
Three Springs Ranch Corporation	Colorado State Land Board	641	0.9	10	4	0.0
Albert F. Villard	Colorado State Land Board	600	0.7	8	3	0.0
Visintainer Sheep Company	Colorado State Land Board	3,259	1.0	12	5	0.0
State Total		**26,967**	**14.8**	**168**	**71**	**0.0**
Grand Total		**1,683,199**	**201.2**	**2,294**	**966**	**0.0**
Route Variation WYCO-B-3						
Chace Block	BLM Rawlins Field Office	67,290	4.5	52	22	0.0
Continental	BLM Rawlins Field Office	24,926	5.3	60	26	0.0
Daley Ranch	BLM Rawlins Field Office	24,587	3.9	44	19	0.0
Dana Block North	BLM Rawlins Field Office	70,878	16.6	191	81	0.0
East Muddy	BLM Rawlins Field Office	25,034	3.6	42	18	0.0
Echo Springs	BLM Rawlins Field Office	37,788	5.8	67	29	0.0
Ellis Block	BLM Rawlins Field Office	34,530	0.5	6	2	0.0
Lazy Y S Ranch	BLM Rawlins Field Office	17,834	3.6	42	18	0.0
North Walcott	BLM Rawlins Field Office	73,724	4.6	53	23	0.0

TABLE G-1 GRAZING ALLOTMENTS FOR THE WYOMING TO COLORADO – AEOLUS TO U.S. HIGHWAY 40 (WYCO) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
Not named	BLM Rawlins Field Office	442,935	18.4	211	90	0.0
Pass Creek Ridge	BLM Rawlins Field Office	59,168	9.2	105	45	0.0
Powder Rim Rotati	BLM Rawlins Field Office	46,706	8.2	95	40	0.0
Quealey Block	BLM Rawlins Field Office	23,782	1.5	18	8	0.0
Riner	BLM Rawlins Field Office	59,505	11.4	131	56	0.0
Rotten Springs	BLM Rawlins Field Office	21,024	0.7	8	4	0.0
Sand Creek	BLM Rawlins Field Office	29,920	7.3	84	36	0.0
Sixteen Mile	BLM Rawlins Field Office	82,186	10.9	125	53	0.0
South Barrel	BLM Rawlins Field Office	10,268	3.2	37	16	0.0
South Laclede	BLM Rawlins Field Office	53,035	11.4	131	56	0.0
South Wamsutter	BLM Rawlins Field Office	32,817	7.1	82	35	0.0
Cedar Springs Draw	BLM Little Snake Field Office	35,489	7.8	90	38	0.0
East Powder Wash	BLM Little Snake Field Office	27,154	3.8	44	19	0.0
Grounds	BLM Little Snake Field Office	8,012	2.1	24	10	0.0
Horse Draw	BLM Little Snake Field Office	7,414	1.8	21	9	0.0
Nipple Peak	BLM Little Snake Field Office	15,560	5.3	61	26	0.0
Powder Wash	BLM Little Snake Field Office	27,432	1.8	21	9	0.0
Sand Wash	BLM Little Snake Field Office	76,108	2.4	28	12	0.0
Sheepherder Spring	BLM Little Snake Field Office	86,354	4.7	53	23	0.0
Snake River	BLM Little Snake Field Office	62,469	11.3	130	56	0.0
West Wapiti Peak	BLM Little Snake Field Office	10,411	3.4	39	16	0.0
Elk Springs	BLM White River Field Office	26,620	8.2	94	40	0.0
Horse Draw	BLM White River Field Office	17,761	6.6	75	32	0.0
Massadona	BLM White River Field Office	10,871	0.6	6	3	0.0
White River Trail	BLM White River Field Office	928	0.8	9	4	0.0
Winter Valley Gulch	BLM White River Field Office	1,564	0.1	1	0	0.0
BLM Total[4]		**1,651,911**	**198.5**	**2,283**	**973**	**0.0**
20515	Wyoming State Lands	160	0.3	3	1	0.0
30742	Wyoming State Lands	639	1.0	11	5	0.0
36220	Wyoming State Lands	799	0.6	7	3	0.0
Mar-53; Wl-1101	Wyoming State Lands	638	1.0	12	5	0.0
Mar-97; Wl-1101	Wyoming State Lands	639	1.0	12	5	0.0
No lease number identified	Wyoming State Lands	1,751	0.0	0	0	0.0

TABLE G-1 GRAZING ALLOTMENTS FOR THE WYOMING TO COLORADO – AEOLUS TO U.S. HIGHWAY 40 (WYCO) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
Cross Mountain Ranch Limited Partnership/Company	Colorado State Land Board	3,841	1.0	12	5	0.0
John A. Maneotis	Colorado State Land Board	5,125	3.1	35	15	0.0
Nottingham Land & Livestock	Colorado State Land Board	8,885	4.2	48	20	0.0
Three Springs Ranch Corporation	Colorado State Land Board	641	0.9	10	4	0.0
Albert F. Villard	Colorado State Land Board	600	0.7	8	3	0.0
Visintainer Sheep Company	Colorado State Land Board	3,259	1.0	12	5	0.0
State Total		**26,967**	**14.8**	**170**	**72**	**0.0**
Grand Total		**1,661,948**	**201.6**	**2,318**	**988**	**0.0**
Alternative WYCO-C						
Chace Block	BLM Rawlins Field Office	67,290	4.5	52	21	0.0
Continental	BLM Rawlins Field Office	24,926	0.8	9	4	0.0
Daley Ranch	BLM Rawlins Field Office	24,587	3.9	44	18	0.0
Dana Block North	BLM Rawlins Field Office	70,878	16.6	191	78	0.0
Echo Springs	BLM Rawlins Field Office	37,788	5.8	67	27	0.0
Ellis Block	BLM Rawlins Field Office	34,530	0.5	6	2	0.0
Lazy Y S Ranch	BLM Rawlins Field Office	17,834	3.6	42	17	0.0
North Barrel	BLM Rawlins Field Office	58,924	3.1	35	14	0.0
North Laclede	BLM Rawlins Field Office	41,848	10.5	121	49	0.0
North Walcott	BLM Rawlins Field Office	73,724	4.6	53	22	0.0
Not named	BLM Rawlins Field Office	442,935	18.4	211	86	0.0
Pass Creek Ridge	BLM Rawlins Field Office	59,168	9.2	105	43	0.0
Powder Rim Rotati	BLM Rawlins Field Office	46,706	7.0	81	33	0.0
Quealey Block	BLM Rawlins Field Office	23,782	1.5	18	7	0.0
Riner	BLM Rawlins Field Office	59,505	11.4	131	54	0.0
Rotten Springs	BLM Rawlins Field Office	21,024	2.7	31	13	0.0
Sand Creek	BLM Rawlins Field Office	29,920	4.2	48	20	0.0
Sixteen Mile	BLM Rawlins Field Office	82,186	10.9	125	51	0.0
South Laclede	BLM Rawlins Field Office	53,035	9.4	109	44	0.0
South Wamsutter	BLM Rawlins Field Office	32,817	6.3	73	30	0.0
Willow Creek	BLM Rawlins Field Office	76,258	8.9	103	42	0.0
Cedar Springs Draw	BLM Little Snake Field Office	35,489	7.7	88	36	0.0
East Powder Wash	BLM Little Snake Field Office	27,154	3.8	44	18	0.0

TABLE G-1
GRAZING ALLOTMENTS FOR THE WYOMING TO COLORADO – AEOLUS TO U.S. HIGHWAY 40 (WYCO) ALTERNATIVE ROUTES

Allotment	Jurisdiction	Total Acres of Allotment	Miles Crossed	Acres of Temporary Disturbance[1]	Acres of Permanent Disturbance[2]	Percent of Allotment Disturbed[3]
Grounds	BLM Little Snake Field Office	8,012	2.1	24	10	0.0
Horse Draw	BLM Little Snake Field Office	7,414	1.8	21	8	0.0
Nipple Peak	BLM Little Snake Field Office	15,560	5.3	61	25	0.0
Powder Wash	BLM Little Snake Field Office	27,432	1.8	21	8	0.0
Sand Wash	BLM Little Snake Field Office	76,108	2.4	28	11	0.0
Sheepherder Spring	BLM Little Snake Field Office	86,354	4.7	53	22	0.0
Snake River	BLM Little Snake Field Office	62,469	11.3	130	53	0.0
West Wapiti Peak	BLM Little Snake Field Office	10,411	3.6	42	17	0.0
Elk Springs	BLM White River Field Office	26,620	8.0	92	38	0.0
Horse Draw	BLM White River Field Office	17,761	6.6	75	31	0.0
Massadona	BLM White River Field Office	10,871	0.6	6	3	0.0
White River Trail	BLM White River Field Office	928	0.8	9	4	0.0
Winter Valley Gulch	BLM White River Field Office	1,564	0.1	1	0	0.0
BLM Total[4]		**1,793,637**	**204.5**	**2,351**	**961**	**0.0**
30742	Wyoming State Lands	639	1.0	11	5	0.0
36220	Wyoming State Lands	799	0.6	7	3	0.0
41351	Wyoming State Lands	635	0.5	6	2	0.0
Mar-53; Wl-1101	Wyoming State Lands	638	1.0	12	5	0.0
Mar-97; Wl-1101	Wyoming State Lands	639	1.0	12	5	0.0
No lease number identified	Wyoming State Lands	1,751	0.0	0	0	0.0
Cross Mountain Ranch Limited Partnership/Company	Colorado State Land Board	3,841	1.0	12	5	0.0
John A. Maneotis	Colorado State Land Board	5,125	3.1	35	14	0.0
Nottingham Land & Livestock	Colorado State Land Board	8,885	4.2	48	20	0.0
Three Springs Ranch Corporation	Colorado State Land Board	641	0.9	10	4	0.0
Albert F. Villard	Colorado State Land Board	600	0.7	8	3	0.0
Visintainer Sheep Company	Colorado State Land Board	3,259	1.0	12	5	0.0
State Total		**27,442**	**15.0**	**172**	**70**	**0.0**
Grand Total		**1,803,674**	**207.5**	**2,386**	**975**	**0.0**

TABLE G-1 GRAZING ALLOTMENTS FOR THE WYOMING TO COLORADO – AEOLUS TO U.S. HIGHWAY 40 (WYCO) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
Route Variation WYCO-C-1						
Chace Block	BLM Rawlins Field Office	67,290	4.5	52	21	0.0
Continental	BLM Rawlins Field Office	24,926	0.8	9	4	0.0
Daley Ranch	BLM Rawlins Field Office	24,587	3.9	44	18	0.0
Dana Block North	BLM Rawlins Field Office	70,878	16.6	191	78	0.0
Echo Springs	BLM Rawlins Field Office	37,788	5.8	67	27	0.0
Ellis Block	BLM Rawlins Field Office	34,530	0.5	6	2	0.0
Lazy Y S Ranch	BLM Rawlins Field Office	17,834	3.6	42	17	0.0
North Barrel	BLM Rawlins Field Office	58,924	3.1	35	14	0.0
North Laclede	BLM Rawlins Field Office	41,848	10.5	121	49	0.0
North Walcott	BLM Rawlins Field Office	73,724	4.6	53	22	0.0
Not named	BLM Rawlins Field Office	442,935	18.4	211	86	0.0
Pass Creek Ridge	BLM Rawlins Field Office	59,168	9.2	105	43	0.0
Powder Rim Rotati	BLM Rawlins Field Office	46,706	7.0	81	33	0.0
Quealey Block	BLM Rawlins Field Office	23,782	1.5	18	7	0.0
Riner	BLM Rawlins Field Office	59,505	11.4	131	54	0.0
Rotten Springs	BLM Rawlins Field Office	21,024	2.7	31	13	0.0
Sand Creek	BLM Rawlins Field Office	29,920	4.2	48	20	0.0
Sixteen Mile	BLM Rawlins Field Office	82,186	10.9	125	51	0.0
South Laclede	BLM Rawlins Field Office	53,035	9.4	109	44	0.0
South Wamsutter	BLM Rawlins Field Office	32,817	6.3	73	30	0.0
Willow Creek	BLM Rawlins Field Office	76,258	8.9	103	42	0.0
Cedar Springs Draw	BLM Little Snake Field Office	35,489	7.7	88	36	0.0
East Powder Wash	BLM Little Snake Field Office	27,154	3.8	44	18	0.0
Grounds	BLM Little Snake Field Office	8,012	2.1	24	10	0.0
Horse Draw	BLM Little Snake Field Office	7,414	1.8	21	8	0.0
Nipple Peak	BLM Little Snake Field Office	15,560	5.3	61	25	0.0
Powder Wash	BLM Little Snake Field Office	27,432	1.8	21	8	0.0
Sand Wash	BLM Little Snake Field Office	76,108	2.4	28	11	0.0
Sheepherder Spring	BLM Little Snake Field Office	86,354	4.7	53	22	0.0
Snake River	BLM Little Snake Field Office	62,469	11.8	135	55	0.0
West Wapiti Peak	BLM Little Snake Field Office	10,411	3.6	42	17	0.0
Elk Springs	BLM White River Field Office	26,620	8.0	92	38	0.0

TABLE G-1 GRAZING ALLOTMENTS FOR THE WYOMING TO COLORADO – AEOLUS TO U.S. HIGHWAY 40 (WYCO) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
Horse Draw	BLM White River Field Office	17,761	6.6	75	31	0.0
Massadona	BLM White River Field Office	10,871	0.6	6	3	0.0
White River Trail	BLM White River Field Office	928	0.8	9	4	0.0
Winter Valley Gulch	BLM White River Field Office	1,564	0.1	1	0	0.0
BLM Total[4]		**1,793,637**	**204.9**	**2,356**	**963**	**0.0**
30742	Wyoming State Lands	639	1.0	11	5	0.0
36220	Wyoming State Lands	799	0.4	4	2	0.0
36220	Wyoming State Lands	799	0.3	3	1	0.0
41351	Wyoming State Lands	635	0.5	6	2	0.0
Mar-53; Wl-1101	Wyoming State Lands	638	1.0	12	5	0.0
Mar-97; Wl-1101	Wyoming State Lands	639	1.0	12	5	0.0
No lease number identified	Wyoming State Lands	1,751	0.0	0	0	0.0
Cross Mountain Ranch Limited Partnership/Company	Colorado State Land Board	3,841	1.0	12	5	0.0
John A. Maneotis	Colorado State Land Board	5,125	3.1	35	14	0.0
Nottingham Land & Livestock	Colorado State Land Board	8,885	4.2	48	20	0.0
Three Springs Ranch Corporation	Colorado State Land Board	641	0.9	10	4	0.0
Albert F. Villard	Colorado State Land Board	600	0.7	8	3	0.0
State Total		**24,181**	**14.0**	**161**	**66**	**0.0**
Grand Total		**1,801,051**	**208.0**	**2,392**	**978**	**0.0**
Route Variation WYCO-C-2						
Chace Block	BLM Rawlins Field Office	67,290	4.5	52	21	0.0
Continental	BLM Rawlins Field Office	24,926	0.8	9	4	0.0
Daley Ranch	BLM Rawlins Field Office	24,587	3.9	44	18	0.0
Dana Block North	BLM Rawlins Field Office	70,878	16.6	189	78	0.0
Echo Springs	BLM Rawlins Field Office	37,788	5.8	66	27	0.0
Ellis Block	BLM Rawlins Field Office	34,530	0.5	5	2	0.0
Lazy Y S Ranch	BLM Rawlins Field Office	17,834	3.6	41	17	0.0
North Barrel	BLM Rawlins Field Office	58,924	3.1	35	14	0.0
North Laclede	BLM Rawlins Field Office	41,848	10.5	120	49	0.0
North Walcott	BLM Rawlins Field Office	73,724	4.6	52	22	0.0
Not named	BLM Rawlins Field Office	442,935	18.4	210	86	0.0
Pass Creek Ridge	BLM Rawlins Field Office	59,168	9.2	105	43	0.0

TABLE G-1
GRAZING ALLOTMENTS FOR THE WYOMING TO COLORADO – AEOLUS TO U.S. HIGHWAY 40 (WYCO) ALTERNATIVE ROUTES

Allotment	Jurisdiction	Total Acres of Allotment	Miles Crossed	Acres of Temporary Disturbance[1]	Acres of Permanent Disturbance[2]	Percent of Allotment Disturbed[3]
Powder Rim Rotati	BLM Rawlins Field Office	46,706	7.0	80	33	0.0
Quealey Block	BLM Rawlins Field Office	23,782	1.5	18	7	0.0
Riner	BLM Rawlins Field Office	59,505	11.4	130	54	0.0
Rotten Springs	BLM Rawlins Field Office	21,024	2.7	31	13	0.0
Sand Creek	BLM Rawlins Field Office	29,920	4.2	48	20	0.0
Sixteen Mile	BLM Rawlins Field Office	82,186	10.9	124	51	0.0
South Laclede	BLM Rawlins Field Office	53,035	9.4	108	44	0.0
South Wamsutter	BLM Rawlins Field Office	32,817	6.3	72	30	0.0
Willow Creek	BLM Rawlins Field Office	76,258	8.9	102	42	0.0
Cedar Springs Draw	BLM Little Snake Field Office	35,489	7.1	81	33	0.0
Disappointment	BLM Little Snake Field Office	32,302	3.6	41	17	0.0
East Powder Wash	BLM Little Snake Field Office	27,154	3.8	44	18	0.0
Grounds	BLM Little Snake Field Office	8,012	2.1	24	10	0.0
Horse Draw	BLM Little Snake Field Office	7,414	1.8	21	8	0.0
Nipple Peak	BLM Little Snake Field Office	15,560	5.3	60	25	0.0
Powder Wash	BLM Little Snake Field Office	27,432	1.8	20	8	0.0
Sand Wash	BLM Little Snake Field Office	76,108	2.4	28	11	0.0
Sheepherder Spring	BLM Little Snake Field Office	86,354	4.7	53	22	0.0
Snake River	BLM Little Snake Field Office	62,469	11.3	129	53	0.0
Elk Springs	BLM White River Field Office	26,620	8.3	95	39	0.0
Horse Draw	BLM White River Field Office	17,761	6.6	75	31	0.0
Massadona	BLM White River Field Office	10,871	0.6	6	3	0.0
White River Trail	BLM White River Field Office	928	0.8	9	4	0.0
Winter Valley Gulch	BLM White River Field Office	1,564	0.1	1	0	0.0
BLM Total[4]		**1,815,529**	**204.1**	**2,327**	**959**	**0.0**
30742	Wyoming State Lands	639	1.0	11	5	0.0
36220	Wyoming State Lands	799	0.6	7	3	0.0
41351	Wyoming State Lands	635	0.5	5	2	0.0
Mar-53; Wl-1101	Wyoming State Lands	638	1.0	11	5	0.0
Mar-97; Wl-1101	Wyoming State Lands	639	1.0	12	5	0.0
No lease number identified	Wyoming State Lands	1,751	0.0	0	0	0.0
Cross Mountain Ranch Limited Partnership/Company	Colorado State Land Board	3,841	1.0	12	5	0.0

TABLE G-1 GRAZING ALLOTMENTS FOR THE WYOMING TO COLORADO – AEOLUS TO U.S. HIGHWAY 40 (WYCO) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
John A. Maneotis	Colorado State Land Board	5,125	3.1	35	14	0.0
Nottingham Land & Livestock	Colorado State Land Board	8,885	4.2	48	20	0.0
Three Springs Ranch Corporation	Colorado State Land Board	641	0.9	10	4	0.0
Albert F. Villard	Colorado State Land Board	600	0.7	8	3	0.0
Visintainer Sheep Company	Colorado State Land Board	3,259	1.0	12	5	0.0
State Total		**27,442**	**15.0**	**171**	**70**	**0.0**
Grand Total		**1,824,926**	**207.2**	**2,362**	**974**	**0.0**
Route Variation WYCO-C-3						
Chace Block	BLM Rawlins Field Office	67,290	4.5	52	21	0.0
Continental	BLM Rawlins Field Office	24,926	0.8	9	4	0.0
Daley Ranch	BLM Rawlins Field Office	24,587	3.9	44	18	0.0
Dana Block North	BLM Rawlins Field Office	70,878	16.6	191	78	0.0
Echo Springs	BLM Rawlins Field Office	37,788	5.8	67	27	0.0
Ellis Block	BLM Rawlins Field Office	34,530	0.5	6	2	0.0
Lazy Y S Ranch	BLM Rawlins Field Office	17,834	3.6	42	17	0.0
North Barrel	BLM Rawlins Field Office	58,924	3.1	35	14	0.0
North Laclede	BLM Rawlins Field Office	41,848	10.5	121	49	0.0
North Walcott	BLM Rawlins Field Office	73,724	4.6	53	22	0.0
Not named	BLM Rawlins Field Office	442,935	18.4	211	86	0.0
Pass Creek Ridge	BLM Rawlins Field Office	59,168	9.2	105	43	0.0
Powder Rim Rotati	BLM Rawlins Field Office	46,706	7.0	81	33	0.0
Quealey Block	BLM Rawlins Field Office	23,782	1.5	18	7	0.0
Riner	BLM Rawlins Field Office	59,505	11.4	131	54	0.0
Rotten Springs	BLM Rawlins Field Office	21,024	2.7	31	13	0.0
Sand Creek	BLM Rawlins Field Office	29,920	4.2	48	20	0.0
Sixteen Mile	BLM Rawlins Field Office	82,186	10.9	125	51	0.0
South Laclede	BLM Rawlins Field Office	53,035	9.4	109	44	0.0
South Wamsutter	BLM Rawlins Field Office	32,817	6.3	73	30	0.0
Willow Creek	BLM Rawlins Field Office	76,258	8.9	103	42	0.0
Cedar Springs Draw	BLM Little Snake Field Office	35,489	7.8	90	37	0.0
East Powder Wash	BLM Little Snake Field Office	27,154	3.8	44	18	0.0
Grounds	BLM Little Snake Field Office	8,012	2.1	24	10	0.0
Horse Draw	BLM Little Snake Field Office	7,414	1.8	21	8	0.0

TABLE G-1 GRAZING ALLOTMENTS FOR THE WYOMING TO COLORADO – AEOLUS TO U.S. HIGHWAY 40 (WYCO) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
Nipple Peak	BLM Little Snake Field Office	15,560	5.3	61	25	0.0
Powder Wash	BLM Little Snake Field Office	27,432	1.8	21	8	0.0
Sand Wash	BLM Little Snake Field Office	76,108	2.4	28	11	0.0
Sheepherder Spring	BLM Little Snake Field Office	86,354	4.7	53	22	0.0
Snake River	BLM Little Snake Field Office	62,469	11.3	130	53	0.0
West Wapiti Peak	BLM Little Snake Field Office	10,411	3.4	39	16	0.0
Elk Springs	BLM White River Field Office	26,620	8.2	94	38	0.0
Horse Draw	BLM White River Field Office	17,761	6.6	75	31	0.0
Massadona	BLM White River Field Office	10,871	0.6	6	3	0.0
White River Trail	BLM White River Field Office	928	0.8	9	4	0.0
Winter Valley Gulch	BLM White River Field Office	1,564	0.1	1	0	0.0
BLM Total[4]		**1,793,637**	**204.5**	**2,352**	**961**	**0.0**
30742	Wyoming State Lands	639	1.0	11	5	0.0
36220	Wyoming State Lands	799	0.6	7	3	0.0
41351	Wyoming State Lands	635	0.5	6	2	0.0
Mar-53; Wl-1101	Wyoming State Lands	638	1.0	12	5	0.0
Mar-97; Wl-1101	Wyoming State Lands	639	1.0	12	5	0.0
No lease number identified	Wyoming State Lands	1,751	0.0	0	0	0.0
Cross Mountain Ranch Limited Partnership/Company	Colorado State Land Board	3,841	1.0	12	5	0.0
John A. Maneotis	Colorado State Land Board	5,125	3.1	35	14	0.0
Nottingham Land & Livestock	Colorado State Land Board	8,885	4.2	48	20	0.0
Three Springs Ranch Corporation	Colorado State Land Board	641	0.9	10	4	0.0
Albert F. Villard	Colorado State Land Board	600	0.7	8	3	0.0
Visintainer Sheep Company	Colorado State Land Board	3,259	1.0	12	5	0.0
State Total		**27,442**	**15.0**	**172**	**70**	**0.0**
Grand Total		**1,803,674**	**207.6**	**2,387**	**976**	**0.0**
Alternative WYCO-D						
44 Ranch	BLM Rawlins Field Office	1,625	1.3	14	6	0.0
Baggs Sub Unit	BLM Rawlins Field Office	8,909	0.9	10	4	0.0
Big Robber	BLM Rawlins Field Office	20,463	6.0	68	27	0.0
Chace Block	BLM Rawlins Field Office	67,290	9.7	111	44	0.0
Coal Bank Wash	BLM Rawlins Field Office	7,939	2.1	24	9	0.0

TABLE G-1 GRAZING ALLOTMENTS FOR THE WYOMING TO COLORADO – AEOLUS TO U.S. HIGHWAY 40 (WYCO) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
Cottonwood Hill	BLM Rawlins Field Office	16,039	4.7	54	21	0.0
Daley Ranch	BLM Rawlins Field Office	24,587	3.9	44	17	0.0
Dana Block North	BLM Rawlins Field Office	70,878	3.8	44	17	0.0
Dana Meadows South	BLM Rawlins Field Office	38,690	9.5	108	43	0.0
Doty Mountain	BLM Rawlins Field Office	96,139	9.3	105	42	0.0
East Muddy	BLM Rawlins Field Office	25,034	2.2	25	10	0.0
Ellis Block	BLM Rawlins Field Office	34,530	0.5	5	2	0.0
George Dew	BLM Rawlins Field Office	1,540	1.7	19	7	0.0
Headquarters Ranch	BLM Rawlins Field Office	1,193	1.2	14	5	0.0
Lazy Y S Ranch	BLM Rawlins Field Office	17,834	6.4	73	29	0.0
Little Robber	BLM Rawlins Field Office	919	1.3	15	6	0.0
Mexican Flats	BLM Rawlins Field Office	16,775	3.7	42	17	0.0
North Pine Butte	BLM Rawlins Field Office	2,763	2.0	22	9	0.0
North Walcott	BLM Rawlins Field Office	73,724	4.6	52	21	0.0
Not named	BLM Rawlins Field Office	442,935	18.6	212	84	0.0
Oppenheimer	BLM Rawlins Field Office	14,453	2.7	31	12	0.0
Pass Creek Ridge	BLM Rawlins Field Office	59,168	10.2	116	46	0.0
Poison Buttes	BLM Rawlins Field Office	6,381	3.7	43	17	0.0
Riner	BLM Rawlins Field Office	59,505	0.1	2	1	0.0
Riner	BLM Rawlins Field Office	59,505	11.4	130	51	0.0
Sixteen Mile	BLM Rawlins Field Office	82,186	10.9	124	49	0.0
South Pine Butte	BLM Rawlins Field Office	1,409	1.6	18	7	0.0
V Spreaders	BLM Rawlins Field Office	694	1.2	14	5	0.0
Big Bend	BLM Little Snake Field Office	1,607	1.9	21	8	0.0
Cedar	BLM Little Snake Field Office	7,590	1.9	22	9	0.0
Cedar Springs Draw	BLM Little Snake Field Office	35,489	9.0	102	40	0.0
Chicken Sage	BLM Little Snake Field Office	4,593	2.5	28	11	0.0
Cutoff Gulch	BLM Little Snake Field Office	2,016	0.5	6	2	0.0
Gravel Pit	BLM Little Snake Field Office	1,618	1.6	18	7	0.0
Horse Gulch Sect 15	BLM Little Snake Field Office	37,277	9.6	109	43	0.0
Juniper Mountain	BLM Little Snake Field Office	13,418	2.5	29	11	0.0
Lay Creek	BLM Little Snake Field Office	2,788	1.9	21	8	0.0
Lay Peak Common	BLM Little Snake Field Office	1,680	1.0	11	4	0.0

TABLE G-1 GRAZING ALLOTMENTS FOR THE WYOMING TO COLORADO – AEOLUS TO U.S. HIGHWAY 40 (WYCO) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
Little Juniper	BLM Little Snake Field Office	2,657	1.8	20	8	0.0
Lower Fortification	BLM Little Snake Field Office	1,968	1.2	14	6	0.0
N Deception Creek	BLM Little Snake Field Office	13,028	5.3	61	24	0.0
North Pole Gulch	BLM Little Snake Field Office	2,221	1.4	16	6	0.0
State Block Eu	BLM Little Snake Field Office	12,812	6.7	77	30	0.0
West Four Mile	BLM Little Snake Field Office	4,279	2.0	22	9	0.0
West Wapiti Peak	BLM Little Snake Field Office	10,411	3.6	41	16	0.0
Elk Springs	BLM White River Field Office	26,620	8.0	92	36	0.0
Horse Draw	BLM White River Field Office	17,761	6.6	75	29	0.0
Massadona	BLM White River Field Office	10,871	0.6	6	2	0.0
White River Trail	BLM White River Field Office	928	0.8	9	4	0.0
Winter Valley Gulch	BLM White River Field Office	1,564	0.1	1	0	0.0
BLM Total[4]		**1,406,797**	**205.4**	**2,341**	**924**	**0.0**
17958	Wyoming State Lands	960	0.2	2	1	0.0
25993	Wyoming State Lands	2,637	0.6	6	2	0.0
30742	Wyoming State Lands	639	1.0	11	4	0.0
34394	Wyoming State Lands	200	0.2	2	1	0.0
34759	Wyoming State Lands	320	0.8	10	4	0.0
36220	Wyoming State Lands	799	0.3	3	1	0.0
Mar-53; Wl-1101	Wyoming State Lands	638	1.0	11	5	0.0
Mar-97; Wl-1101	Wyoming State Lands	639	1.0	12	5	0.0
No lease number identified	Wyoming State Lands	1,751	1.0	12	5	0.0
C & C Cattle, LLC	Colorado State Land Board	7,961	4.8	55	22	0.0
Cross Mountain Ranch Limited Partnership/Company	Colorado State Land Board	3,841	1.0	12	5	0.0
Wilton Earle & Sons	Colorado State Land Board	3,561	2.7	31	12	0.0
Clarence Hannong, Jr.	Colorado State Land Board	317	0.8	10	4	0.0
Clifford T. Henderson	Colorado State Land Board	1,801	2.0	23	9	0.0
John Peroulis & Sons	Colorado State Land Board	8,010	4.2	48	19	0.0
John Raftopoulos	Colorado State Land Board	1,990	1.4	16	6	0.0
Three Springs Ranch Corporation	Colorado State Land Board	641	0.9	10	4	0.0

TABLE G-1 GRAZING ALLOTMENTS FOR THE WYOMING TO COLORADO – AEOLUS TO U.S. HIGHWAY 40 (WYCO) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
Albert F. Villard	Colorado State Land Board	600	0.7	8	3	0.0
Visintainer Sheep Company	Colorado State Land Board	3,259	2.4	27	11	0.0
State Total		**39,639**	**25.0**	**285**	**112**	**0.0**
Grand Total		**1,425,227**	**215.7**	**2,459**	**971**	**0.0**
Route Variation WYCO-D-1						
44 Ranch	BLM Rawlins Field Office	1,625	1.3	14	6	0.0
Baggs Sub Unit	BLM Rawlins Field Office	8,909	0.9	10	4	0.0
Big Robber	BLM Rawlins Field Office	20,463	6.0	68	28	0.0
Chace Block	BLM Rawlins Field Office	67,290	9.7	111	45	0.0
Coal Bank Wash	BLM Rawlins Field Office	7,939	2.1	24	10	0.0
Cottonwood Hill	BLM Rawlins Field Office	16,039	4.7	54	22	0.0
Daley Ranch	BLM Rawlins Field Office	24,587	3.9	44	18	0.0
Dana Block North	BLM Rawlins Field Office	70,878	3.8	44	18	0.0
Dana Meadows South	BLM Rawlins Field Office	38,690	9.5	108	44	0.0
Doty Mountain	BLM Rawlins Field Office	96,139	9.3	105	43	0.0
East Muddy	BLM Rawlins Field Office	25,034	2.2	25	10	0.0
Ellis Block	BLM Rawlins Field Office	34,530	0.5	5	2	0.0
George Dew	BLM Rawlins Field Office	1,540	1.7	19	8	0.0
Headquarters Ranch	BLM Rawlins Field Office	1,193	1.2	14	6	0.0
Lazy Y S Ranch	BLM Rawlins Field Office	17,834	6.4	73	30	0.0
Little Robber	BLM Rawlins Field Office	919	1.3	15	6	0.0
Mexican Flats	BLM Rawlins Field Office	16,775	3.7	42	17	0.0
North Pine Butte	BLM Rawlins Field Office	2,763	2.0	22	9	0.0
North Walcott	BLM Rawlins Field Office	73,724	4.6	52	21	0.0
Not named	BLM Rawlins Field Office	442,935	18.6	212	86	0.0
Oppenheimer	BLM Rawlins Field Office	14,453	2.7	31	13	0.0
Pass Creek Ridge	BLM Rawlins Field Office	59,168	10.2	116	47	0.0
Poison Buttes	BLM Rawlins Field Office	6,381	3.7	43	17	0.0
Riner	BLM Rawlins Field Office	59,505	0.1	2	1	0.0
Riner	BLM Rawlins Field Office	59,505	11.4	130	53	0.0
Sixteen Mile	BLM Rawlins Field Office	82,186	10.9	124	50	0.0
South Pine Butte	BLM Rawlins Field Office	1,409	1.6	18	7	0.0
V Spreaders	BLM Rawlins Field Office	694	1.2	14	6	0.0

TABLE G-1 GRAZING ALLOTMENTS FOR THE WYOMING TO COLORADO – AEOLUS TO U.S. HIGHWAY 40 (WYCO) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
Big Bend	BLM Little Snake Field Office	1,607	1.9	21	9	0.0
Cedar	BLM Little Snake Field Office	7,590	1.9	22	9	0.0
Cedar Springs Draw	BLM Little Snake Field Office	35,489	9.1	104	42	0.0
Chicken Sage	BLM Little Snake Field Office	4,593	2.5	28	11	0.0
Cutoff Gulch	BLM Little Snake Field Office	2,016	0.5	6	2	0.0
Gravel Pit	BLM Little Snake Field Office	1,618	1.6	18	7	0.0
Horse Gulch Sect 15	BLM Little Snake Field Office	37,277	9.6	109	44	0.0
Juniper Mountain	BLM Little Snake Field Office	13,418	2.5	29	12	0.0
Lay Creek	BLM Little Snake Field Office	2,788	1.9	21	9	0.0
Lay Peak Common	BLM Little Snake Field Office	1,680	1.0	11	4	0.0
Little Juniper	BLM Little Snake Field Office	2,657	1.8	20	8	0.0
Lower Fortification	BLM Little Snake Field Office	1,968	1.2	14	6	0.0
N Deception Creek	BLM Little Snake Field Office	13,028	5.3	61	24	0.0
North Pole Gulch	BLM Little Snake Field Office	2,221	1.4	16	7	0.0
State Block Eu	BLM Little Snake Field Office	12,812	6.7	77	31	0.0
West Four Mile	BLM Little Snake Field Office	4,279	2.0	22	9	0.0
West Wapiti Peak	BLM Little Snake Field Office	10,411	3.4	38	15	0.0
Elk Springs	BLM White River Field Office	26,620	8.2	93	37	0.0
Horse Draw	BLM White River Field Office	17,761	6.6	75	30	0.0
Massadona	BLM White River Field Office	10,871	0.6	6	3	0.0
White River Trail	BLM White River Field Office	928	0.8	9	4	0.0
Winter Valley Gulch	BLM White River Field Office	1,564	0.1	1	0	0.0
BLM Total[4]		**1,406,797**	**205.4**	**2,342**	**945**	**0.0**
17958	Wyoming State Lands	960	0.2	2	1	0.0
25993	Wyoming State Lands	2,637	0.6	6	3	0.0
30742	Wyoming State Lands	639	1.0	11	4	0.0
34394	Wyoming State Lands	200	0.2	2	1	0.0
34759	Wyoming State Lands	320	0.8	10	4	0.0
36220	Wyoming State Lands	799	0.3	3	1	0.0
Mar-53; Wl-1101	Wyoming State Lands	638	1.0	11	5	0.0
Mar-97; Wl-1101	Wyoming State Lands	639	1.0	12	5	0.0
No lease number identified	Wyoming State Lands	1,751	1.0	12	5	0.0
C & C Cattle, LLC	Colorado State Land Board	7,961	4.8	55	22	0.0

TABLE G-1 GRAZING ALLOTMENTS FOR THE WYOMING TO COLORADO – AEOLUS TO U.S. HIGHWAY 40 (WYCO) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
Cross Mountain Ranch Limited Partnership/Company	Colorado State Land Board	3,841	1.0	12	5	0.0
Wilton Earle & Sons	Colorado State Land Board	3,561	2.7	31	13	0.0
Clarence Hannong, Jr.	Colorado State Land Board	317	0.8	10	4	0.0
Clifford T. Henderson	Colorado State Land Board	1,801	2.0	23	9	0.0
John Peroulis & Sons	Colorado State Land Board	8,010	4.2	48	19	0.0
John Raftopoulos	Colorado State Land Board	1,990	1.4	16	6	0.0
Three Springs Ranch Corporation	Colorado State Land Board	641	0.9	10	4	0.0
Albert F. Villard	Colorado State Land Board	600	0.7	8	3	0.0
Visintainer Sheep Company	Colorado State Land Board	3,259	2.4	27	11	0.0
State Total		**39,639**	**25.0**	**285**	**115**	**0.0**
Grand Total		**1,425,227**	**215.7**	**2,459**	**992**	**0.0**
Alternative WYCO-F						
Big Robber	BLM Rawlins Field Office	20,463	7.3	84	34	0.0
Chace Block	BLM Rawlins Field Office	67,290	4.5	52	21	0.0
Cottonwood Hill	BLM Rawlins Field Office	16,039	6.7	76	31	0.0
Daley Ranch	BLM Rawlins Field Office	24,587	3.9	44	18	0.0
Dana Block North	BLM Rawlins Field Office	70,878	16.6	189	78	0.0
Doty Mountain	BLM Rawlins Field Office	96,139	1.0	11	5	0.0
East Muddy	BLM Rawlins Field Office	25,034	3.2	36	15	0.0
Echo Springs	BLM Rawlins Field Office	37,788	5.8	66	27	0.0
Ellis Block	BLM Rawlins Field Office	34,530	0.5	5	2	0.0
Lazy Y S Ranch	BLM Rawlins Field Office	17,834	3.6	41	17	0.0
Mexican Flats	BLM Rawlins Field Office	16,775	3.8	43	18	0.0
North Walcott	BLM Rawlins Field Office	73,724	4.6	52	22	0.0
Not named	BLM Rawlins Field Office	442,935	18.4	210	86	0.0
Oppenheimer	BLM Rawlins Field Office	14,453	1.6	18	7	0.0
Pass Creek Ridge	BLM Rawlins Field Office	59,168	9.2	105	43	0.0
Powder Rim Rotati	BLM Rawlins Field Office	46,706	14.8	169	70	0.0
Quealey Block	BLM Rawlins Field Office	23,782	1.5	18	7	0.0
Red Creek	BLM Rawlins Field Office	32,701	0.6	6	3	0.0
Riner	BLM Rawlins Field Office	59,505	11.4	130	54	0.0
Sixteen Mile	BLM Rawlins Field Office	82,186	10.9	124	51	0.0

TABLE G-1 GRAZING ALLOTMENTS FOR THE WYOMING TO COLORADO – AEOLUS TO U.S. HIGHWAY 40 (WYCO) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
South Flat Top	BLM Rawlins Field Office	17,978	3.0	34	14	0.0
South Laclede	BLM Rawlins Field Office	53,035	12.3	141	58	0.0
South Wamsutter	BLM Rawlins Field Office	32,817	7.1	81	34	0.0
Cedar Springs Draw	BLM Little Snake Field Office	35,489	7.7	87	36	0.0
East Powder Wash	BLM Little Snake Field Office	27,154	3.8	44	18	0.0
Grounds	BLM Little Snake Field Office	8,012	2.1	24	10	0.0
Horse Draw	BLM Little Snake Field Office	7,414	1.8	21	8	0.0
Nipple Peak	BLM Little Snake Field Office	15,560	5.3	60	25	0.0
Powder Wash	BLM Little Snake Field Office	27,432	1.8	20	8	0.0
Sand Wash	BLM Little Snake Field Office	76,108	2.4	28	11	0.0
Sheepherder Spring	BLM Little Snake Field Office	86,354	4.7	53	22	0.0
Snake River	BLM Little Snake Field Office	62,469	11.3	129	53	0.0
West Wapiti Peak	BLM Little Snake Field Office	10,411	3.6	41	17	0.0
Elk Springs	BLM White River Field Office	26,620	8.0	92	38	0.0
Horse Draw	BLM White River Field Office	17,761	6.6	75	31	0.0
Massadona	BLM White River Field Office	10,871	0.6	6	3	0.0
White River Trail	BLM White River Field Office	928	0.8	9	4	0.0
Winter Valley Gulch	BLM White River Field Office	1,564	0.1	1	0	0.0
BLM Total[4]		**1,780,321**	**212.9**	**2,427**	**1,000**	**0.0**
17958	Wyoming State Lands	960	0.4	4	2	0.0
30742	Wyoming State Lands	639	1.0	11	5	0.0
36220	Wyoming State Lands	799	0.6	7	3	0.0
Mar-53; Wl-1101	Wyoming State Lands	638	1.0	11	5	0.0
Mar-97; Wl-1101	Wyoming State Lands	639	1.0	12	5	0.0
No lease number identified	Wyoming State Lands	1,751	0.0	0	0	0.0
Cross Mountain Ranch Limited Partnership/Company	Colorado State Land Board	3,841	1.0	12	5	0.0
John A. Maneotis	Colorado State Land Board	5,125	3.1	35	14	0.0
Nottingham Land & Livestock	Colorado State Land Board	8,885	4.2	48	20	0.0
Three Springs Ranch Corporation	Colorado State Land Board	641	0.9	10	4	0.0

TABLE G-1 GRAZING ALLOTMENTS FOR THE WYOMING TO COLORADO – AEOLUS TO U.S. HIGHWAY 40 (WYCO) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
Albert F. Villard	Colorado State Land Board	600	0.7	8	3	0.0
Visintainer Sheep Company	Colorado State Land Board	3,259	1.0	12	5	0.0
State Total		**27,768**	**14.9**	**169**	**70**	**0.0**
Grand Total		**1,790,369**	**215.9**	**2,461**	**1,015**	**0.0**
Route Variation WYCO-F-1						
Big Robber	BLM Rawlins Field Office	20,463	7.3	84	34	0.0
Chace Block	BLM Rawlins Field Office	67,290	4.5	52	21	0.0
Cottonwood Hill	BLM Rawlins Field Office	16,039	6.7	76	31	0.0
Daley Ranch	BLM Rawlins Field Office	24,587	3.9	44	18	0.0
Dana Block North	BLM Rawlins Field Office	70,878	16.6	191	76	0.0
Doty Mountain	BLM Rawlins Field Office	96,139	1.0	12	5	0.0
East Muddy	BLM Rawlins Field Office	25,034	3.2	37	15	0.0
Echo Springs	BLM Rawlins Field Office	37,788	5.8	67	27	0.0
Ellis Block	BLM Rawlins Field Office	34,530	0.5	6	2	0.0
Lazy Y S Ranch	BLM Rawlins Field Office	17,834	3.6	42	17	0.0
Mexican Flats	BLM Rawlins Field Office	16,775	3.8	44	17	0.0
North Walcott	BLM Rawlins Field Office	73,724	4.6	53	21	0.0
Not named	BLM Rawlins Field Office	442,935	18.4	211	85	0.0
Oppenheimer	BLM Rawlins Field Office	14,453	1.6	18	7	0.0
Pass Creek Ridge	BLM Rawlins Field Office	59,168	9.2	105	42	0.0
Powder Rim Rotati	BLM Rawlins Field Office	46,706	14.8	170	68	0.0
Quealey Block	BLM Rawlins Field Office	23,782	1.5	18	7	0.0
Red Creek	BLM Rawlins Field Office	32,701	0.6	6	3	0.0
Riner	BLM Rawlins Field Office	59,505	11.4	131	53	0.0
Sixteen Mile	BLM Rawlins Field Office	82,186	10.9	125	50	0.0
South Flat Top	BLM Rawlins Field Office	17,978	3.0	35	14	0.0
South Laclede	BLM Rawlins Field Office	53,035	12.3	142	57	0.0
South Wamsutter	BLM Rawlins Field Office	32,817	7.1	82	33	0.0
Cedar Springs Draw	BLM Little Snake Field Office	35,489	7.7	88	35	0.0
East Powder Wash	BLM Little Snake Field Office	27,154	3.8	44	18	0.0
Grounds	BLM Little Snake Field Office	8,012	2.1	24	10	0.0
Horse Draw	BLM Little Snake Field Office	7,414	1.8	21	8	0.0
Nipple Peak	BLM Little Snake Field Office	15,560	5.3	61	24	0.0

TABLE G-1 GRAZING ALLOTMENTS FOR THE WYOMING TO COLORADO – AEOLUS TO U.S. HIGHWAY 40 (WYCO) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
Powder Wash	BLM Little Snake Field Office	27,432	1.8	21	8	0.0
Sand Wash	BLM Little Snake Field Office	76,108	2.4	28	11	0.0
Sheepherder Spring	BLM Little Snake Field Office	86,354	4.7	53	21	0.0
Snake River	BLM Little Snake Field Office	62,469	11.8	135	54	0.0
West Wapiti Peak	BLM Little Snake Field Office	10,411	3.6	42	17	0.0
Elk Springs	BLM White River Field Office	26,620	8.0	92	37	0.0
Horse Draw	BLM White River Field Office	17,761	6.6	75	30	0.0
Massadona	BLM White River Field Office	10,871	0.6	6	3	0.0
White River Trail	BLM White River Field Office	928	0.8	9	4	0.0
Winter Valley Gulch	BLM White River Field Office	1,564	0.1	1	0	0.0
BLM Total[4]		**1,780,321**	**213.3**	**2,453**	**981**	**0.0**
17958	Wyoming State Lands	960	0.4	4	2	0.0
30742	Wyoming State Lands	639	1.0	11	4	0.0
36220	Wyoming State Lands	799	0.6	7	3	0.0
Mar-53; Wl-1101	Wyoming State Lands	638	1.0	12	5	0.0
Mar-97; Wl-1101	Wyoming State Lands	639	1.0	12	5	0.0
No lease number identified	Wyoming State Lands	1,751	0.0	0	0	0.0
Cross Mountain Ranch Limited Partnership/Company	Colorado State Land Board	3,841	1.0	12	5	0.0
John A. Maneotis	Colorado State Land Board	5,125	3.1	35	14	0.0
Nottingham Land & Livestock	Colorado State Land Board	8,885	4.2	48	19	0.0
Three Springs Ranch Corporation	Colorado State Land Board	641	0.9	10	4	0.0
Albert F. Villard	Colorado State Land Board	600	0.7	8	3	0.0
State Total		**24,507**	**13.9**	**159**	**64**	**0.0**
Grand Total		**1,787,747**	**216.4**	**2,489**	**995**	**0.0**
Route Variation WYCO-F-2						
Big Robber	BLM Rawlins Field Office	20,463	7.3	84	34	0.0
Chace Block	BLM Rawlins Field Office	67,290	4.5	52	21	0.0
Cottonwood Hill	BLM Rawlins Field Office	16,039	6.7	76	31	0.0
Daley Ranch	BLM Rawlins Field Office	24,587	3.9	44	18	0.0
Dana Block North	BLM Rawlins Field Office	70,878	16.6	189	76	0.0
Doty Mountain	BLM Rawlins Field Office	96,139	1.0	11	5	0.0
East Muddy	BLM Rawlins Field Office	25,034	3.2	36	15	0.0

TABLE G-1
GRAZING ALLOTMENTS FOR THE WYOMING TO COLORADO – AEOLUS TO U.S. HIGHWAY 40 (WYCO) ALTERNATIVE ROUTES

Allotment	Jurisdiction	Total Acres of Allotment	Miles Crossed	Acres of Temporary Disturbance[1]	Acres of Permanent Disturbance[2]	Percent of Allotment Disturbed[3]
Echo Springs	BLM Rawlins Field Office	37,788	5.8	66	27	0.0
Ellis Block	BLM Rawlins Field Office	34,530	0.5	5	2	0.0
Lazy Y S Ranch	BLM Rawlins Field Office	17,834	3.6	41	17	0.0
Mexican Flats	BLM Rawlins Field Office	16,775	3.8	43	17	0.0
North Walcott	BLM Rawlins Field Office	73,724	4.6	52	21	0.0
Not named	BLM Rawlins Field Office	442,935	18.4	210	85	0.0
Oppenheimer	BLM Rawlins Field Office	14,453	1.6	18	7	0.0
Pass Creek Ridge	BLM Rawlins Field Office	59,168	9.2	105	42	0.0
Powder Rim Rotati	BLM Rawlins Field Office	46,706	14.8	169	68	0.0
Quealey Block	BLM Rawlins Field Office	23,782	1.5	18	7	0.0
Red Creek	BLM Rawlins Field Office	32,701	0.6	6	3	0.0
Riner	BLM Rawlins Field Office	59,505	11.4	130	53	0.0
Sixteen Mile	BLM Rawlins Field Office	82,186	10.9	124	50	0.0
South Flat Top	BLM Rawlins Field Office	17,978	3.0	34	14	0.0
South Laclede	BLM Rawlins Field Office	53,035	12.3	141	57	0.0
South Wamsutter	BLM Rawlins Field Office	32,817	7.1	81	33	0.0
Cedar Springs Draw	BLM Little Snake Field Office	35,489	7.1	81	33	0.0
Disappointment	BLM Little Snake Field Office	32,302	3.6	41	17	0.0
East Powder Wash	BLM Little Snake Field Office	27,154	3.8	44	18	0.0
Grounds	BLM Little Snake Field Office	8,012	2.1	24	10	0.0
Horse Draw	BLM Little Snake Field Office	7,414	1.8	21	8	0.0
Nipple Peak	BLM Little Snake Field Office	15,560	5.3	60	24	0.0
Powder Wash	BLM Little Snake Field Office	27,432	1.8	20	8	0.0
Sand Wash	BLM Little Snake Field Office	76,108	2.4	28	11	0.0
Sheepherder Spring	BLM Little Snake Field Office	86,354	4.7	53	21	0.0
Snake River	BLM Little Snake Field Office	62,469	11.3	129	52	0.0
Elk Springs	BLM White River Field Office	26,620	8.3	95	38	0.0
Horse Draw	BLM White River Field Office	17,761	6.6	75	30	0.0
Massadona	BLM White River Field Office	10,871	0.6	6	3	0.0
White River Trail	BLM White River Field Office	928	0.8	9	4	0.0
Winter Valley Gulch	BLM White River Field Office	1,564	0.1	1	0	0.0
BLM Total[4]		**1,802,212**	**212.6**	**2,423**	**978**	**0.0**

TABLE G-1 GRAZING ALLOTMENTS FOR THE WYOMING TO COLORADO – AEOLUS TO U.S. HIGHWAY 40 (WYCO) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
17958	Wyoming State Lands	960	0.4	4	2	0.0
30742	Wyoming State Lands	639	1.0	11	4	0.0
36220	Wyoming State Lands	799	0.6	7	3	0.0
Mar-53; Wl-1101	Wyoming State Lands	638	1.0	11	5	0.0
Mar-97; Wl-1101	Wyoming State Lands	639	1.0	12	5	0.0
No lease number identified	Wyoming State Lands	1,751	0.0	0	0	0.0
Cross Mountain Ranch Limited Partnership/Company	Colorado State Land Board	3,841	1.0	12	5	0.0
John A. Maneotis	Colorado State Land Board	5,125	3.1	35	14	0.0
Nottingham Land & Livestock	Colorado State Land Board	8,885	4.2	48	19	0.0
Three Springs Ranch Corporation	Colorado State Land Board	641	0.9	10	4	0.0
Albert F. Villard	Colorado State Land Board	600	0.7	8	3	0.0
Visintainer Sheep Company	Colorado State Land Board	3,259	1.0	12	5	0.0
State Total		**27,768**	**14.9**	**169**	**68**	**0.0**
Grand Total		**1,811,621**	**215.6**	**2,458**	**992**	**0.0**
Route Variation WYCO-F-3						
Big Robber	BLM Rawlins Field Office	20,463	7.3	84	34	0.0
Chace Block	BLM Rawlins Field Office	67,290	4.5	52	21	0.0
Cottonwood Hill	BLM Rawlins Field Office	16,039	6.7	76	31	0.0
Daley Ranch	BLM Rawlins Field Office	24,587	3.9	44	18	0.0
Dana Block North	BLM Rawlins Field Office	70,878	16.6	191	78	0.0
Doty Mountain	BLM Rawlins Field Office	96,139	1.0	12	5	0.0
East Muddy	BLM Rawlins Field Office	25,034	3.2	37	15	0.0
Echo Springs	BLM Rawlins Field Office	37,788	5.8	67	27	0.0
Ellis Block	BLM Rawlins Field Office	34,530	0.5	6	2	0.0
Lazy Y S Ranch	BLM Rawlins Field Office	17,834	3.6	42	17	0.0
Mexican Flats	BLM Rawlins Field Office	16,775	3.8	44	18	0.0
North Walcott	BLM Rawlins Field Office	73,724	4.6	53	22	0.0
Not named	BLM Rawlins Field Office	442,935	18.4	211	86	0.0
Oppenheimer	BLM Rawlins Field Office	14,453	1.6	18	7	0.0
Pass Creek Ridge	BLM Rawlins Field Office	59,168	9.2	105	43	0.0
Powder Rim Rotati	BLM Rawlins Field Office	46,706	14.8	170	70	0.0
Quealey Block	BLM Rawlins Field Office	23,782	1.5	18	7	0.0

TABLE G-1 GRAZING ALLOTMENTS FOR THE WYOMING TO COLORADO – AEOLUS TO U.S. HIGHWAY 40 (WYCO) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
Red Creek	BLM Rawlins Field Office	32,701	0.6	6	3	0.0
Riner	BLM Rawlins Field Office	59,505	11.4	131	54	0.0
Sixteen Mile	BLM Rawlins Field Office	82,186	10.9	125	51	0.0
South Flat Top	BLM Rawlins Field Office	17,978	3.0	35	14	0.0
South Laclede	BLM Rawlins Field Office	53,035	12.3	142	58	0.0
South Wamsutter	BLM Rawlins Field Office	32,817	7.1	82	34	0.0
Cedar Springs Draw	BLM Little Snake Field Office	35,489	7.8	90	37	0.0
East Powder Wash	BLM Little Snake Field Office	27,154	3.8	44	18	0.0
Grounds	BLM Little Snake Field Office	8,012	2.1	24	10	0.0
Horse Draw	BLM Little Snake Field Office	7,414	1.8	21	8	0.0
Nipple Peak	BLM Little Snake Field Office	15,560	5.3	61	25	0.0
Powder Wash	BLM Little Snake Field Office	27,432	1.8	21	8	0.0
Sand Wash	BLM Little Snake Field Office	76,108	2.4	28	11	0.0
Sheepherder Spring	BLM Little Snake Field Office	86,354	4.7	53	22	0.0
Snake River	BLM Little Snake Field Office	62,469	11.3	130	53	0.0
West Wapiti Peak	BLM Little Snake Field Office	10,411	3.4	39	16	0.0
Elk Springs	BLM White River Field Office	26,620	8.2	94	38	0.0
Horse Draw	BLM White River Field Office	17,761	6.6	75	31	0.0
Massadona	BLM White River Field Office	10,871	0.6	6	3	0.0
White River Trail	BLM White River Field Office	928	0.8	9	4	0.0
Winter Valley Gulch	BLM White River Field Office	1,564	0.1	1	0	0.0
BLM Total[4]		**1,780,321**	**212.9**	**2,448**	**1,001**	**0.0**
17958	Wyoming State Lands	960	0.4	4	2	0.0
30742	Wyoming State Lands	639	1.0	11	5	0.0
36220	Wyoming State Lands	799	0.6	7	3	0.0
Mar-53; Wl-1101	Wyoming State Lands	638	1.0	12	5	0.0
Mar-97; Wl-1101	Wyoming State Lands	639	1.0	12	5	0.0
No lease number identified	Wyoming State Lands	1,751	0.0	0	0	0.0
Cross Mountain Ranch Limited Partnership/Company	Colorado State Land Board	3,841	1.0	12	5	0.0
John A. Maneotis	Colorado State Land Board	5,125	3.1	35	14	0.0
Nottingham Land & Livestock	Colorado State Land Board	8,885	4.2	48	20	0.0
Three Springs Ranch Corporation	Colorado State Land Board	641	0.9	10	4	0.0

TABLE G-1
GRAZING ALLOTMENTS FOR THE WYOMING TO COLORADO – AEOLUS TO U.S. HIGHWAY 40 (WYCO) ALTERNATIVE ROUTES

Allotment	Jurisdiction	Total Acres of Allotment	Miles Crossed	Acres of Temporary Disturbance[1]	Acres of Permanent Disturbance[2]	Percent of Allotment Disturbed[3]
Albert F.Villard	Colorado State Land Board	600	0.7	8	3	0.0
Visintainer Sheep Company	Colorado State Land Board	3,259	1.0	12	5	0.0
State Total		**27,768**	**14.9**	**171**	**70**	**0.0**
Grand Total		**1,790,369**	**216.0**	**2,484**	**1,015**	**0.0**

NOTES:
The agency total allotment acreage and the miles crossed do not equal a sum of each agency's total allotment acreage or miles crossed, due to overlap of allotment boundaries. Also, the grand-total acreage and the miles crossed do not equal a sum of each agency's total allotment acreage or miles crossed due to overlap of allotment boundaries.
[1]Temporary Disturbance: Estimated area of disturbance associated with structure work areas, wire pulling-and-tensioning sites, wire-splicing sites, multi-purpose construction yards, helicopter fly yards, guard structures, and temporary access roads (refer to Environmental Impact Statement [EIS] Table 2-1).
[2]Permanent Disturbance: Estimated area of disturbance associated with the area occupied by structures-(pads), communication regeneration stations, substations and series compensation stations, and permanent access roads (refer to EIS Table 2-2).
[3]All percentages of allotments disturbed are less than 0.1 percent. Due to rounding, the percentages are shown as 0.0 percent.
[4]For the BLM White River Field Office, the unit called "Unallotted" has not been included in the numbers above.
BLM = Bureau of Land Management
USFS = U.S. Forest Service

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TABLE G-2 GRAZING ALLOTMENTS FOR THE COLORADO TO UTAH – U.S. HIGHWAY 40 TO BAXTER PASS TO CLOVER (COUT BAX) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
Alternative COUT BAX-B						
Cathedral Bluffs	BLM White River Field Office	107,887	0.7	8	4	0.0
Douglas Creek	BLM White River Field Office	5,405	3.2	37	19	0.0
Evacuation Creek	BLM White River Field Office	114,907	20.6	235	120	0.0
Hall Draw	BLM White River Field Office	6,940	2.2	25	13	0.0
Hatch Flat	BLM White River Field Office	1,493	0.8	9	4	0.0
Johnson/Trujillo	BLM White River Field Office	19,376	2.1	24	12	0.0
Lower Fletcher Draw	BLM White River Field Office	9,868	2.3	26	13	0.0
Massadona	BLM White River Field Office	10,871	1.7	19	10	0.0
Red Wash	BLM White River Field Office	8,219	2.3	26	13	0.0
Spooky Mountain	BLM White River Field Office	29,666	0.7	8	4	0.0
Spring Creek	BLM White River Field Office	40,229	5.2	59	30	0.0
Twin Buttes	BLM White River Field Office	158,651	15.1	172	87	0.0
West Salt Common	BLM Grand Junction Field Office	104,147	20.3	231	118	0.0
Athena	BLM Moab Field Office	46,488	6.0	69	35	0.0
Bar-X	BLM Moab Field Office	21,244	1.5	17	8	0.0
Cisco	BLM Moab Field Office	154,005	21.1	241	122	0.0
Cisco Mesa	BLM Moab Field Office	57,704	9.4	108	55	0.0
Crescent Canyon	BLM Moab Field Office	28,077	5.5	63	32	0.0
Floy Creek	BLM Moab Field Office	24,776	4.6	52	27	0.0
Horse Canyon	BLM Moab Field Office	43,290	6.0	68	35	0.0
Pipeline	BLM Moab Field Office	15,870	4.4	50	25	0.0
San Arroyo	BLM Moab Field Office	139,053	16.4	187	95	0.0
Buckhorn	BLM Price Field Office	47,156	7.1	81	41	0.0
Buckmaster	BLM Price Field Office	55,934	10.8	123	63	0.0
Chimney Rock Flat	BLM Price Field Office	46,641	16.3	185	94	0.0
Little Holes	BLM Price Field Office	10,477	4.5	51	26	0.0
Little Valley	BLM Price Field Office	18,091	5.9	67	34	0.0
Oil Dome	BLM Price Field Office	1,349	1.0	12	6	0.0
R.J.	BLM Price Field Office	2,621	0.6	7	3	0.0
Red Seeps	BLM Price Field Office	25,494	5.6	64	33	0.0
West Huntington	BLM Price Field Office	17,384	7.0	80	41	0.0

TABLE G-2
GRAZING ALLOTMENTS FOR THE COLORADO TO UTAH – U.S. HIGHWAY 40 TO BAXTER PASS TO CLOVER (COUT BAX) ALTERNATIVE ROUTES

Allotment	Jurisdiction	Total Acres of Allotment	Miles Crossed	Acres of Temporary Disturbance[1]	Acres of Permanent Disturbance[2]	Percent of Allotment Disturbed[3]
Wilberg	BLM Price Field Office	5,509	1.0	12	6	0.0
Apple Spring	BLM Richfield Field Office	3,806	2.7	30	15	0.0
Hop Creek	BLM Richfield Field Office	2,566	2.0	22	11	0.0
Indian Hollow	BLM Richfield Field Office	1,774	1.4	16	8	0.0
BLM Total[4]		**1,386,840**	**217.7**	**2,482**	**1,263**	**0.0**
Booth Canyon	Manti-La Sal National Forest	2,671	0.9	11	5	0.0
East Mountain	Manti-La Sal National Forest	11,028	2.4	28	14	0.0
Gentry	Manti-La Sal National Forest	5,162	2.3	26	13	0.0
Joes Valley	Manti-La Sal National Forest	8,185	1.7	19	10	0.0
Out	Manti-La Sal National Forest	7,830	0.6	6	3	0.0
Potter Canyon	Manti-La Sal National Forest	2,577	2.7	31	16	0.0
Private Land Permit	Manti-La Sal National Forest	9,053	2.3	26	13	0.0
Skyline S & G	Manti-La Sal National Forest	8,011	2.0	23	12	0.0
South Skyline S & G	Manti-La Sal National Forest	11,683	0.4	4	2	0.0
Trail Mountain	Manti-La Sal National Forest	23,763	4.6	53	27	0.0
USFS Total		**89,963**	**20.0**	**228**	**116**	**0.0**
Anderson Brothers	Utah School and Institutional Trust Lands	568	1.1	12	6	0.0
Betty Smith	Utah School and Institutional Trust Lands	26,093	8.8	100	51	0.0
Cory Cloward	Utah School and Institutional Trust Lands	989	0.7	8	4	0.0
Craig Bair	Utah School and Institutional Trust Lands	11,222	0.4	4	2	0.0
Division Of Wildlife Resources	Utah School and Institutional Trust Lands	12,748	0.3	4	2	0.0
Donley Ranches, LLC	Utah School and Institutional Trust Lands	1,928	0.7	8	4	0.0
Guymon, Courtney	Utah School and Institutional Trust Lands	11,147	6.2	71	36	0.0
Hatch Livestock	Utah School and Institutional Trust Lands	26,095	6.2	71	36	0.0
Holyoak Land & Livestock	Utah School and Institutional Trust Lands	160	0.3	3	2	0.0
Donald W. Holyoak,	Utah School and Institutional Trust Lands	11,002	0.7	8	4	0.0
Paul Holyoak	Utah School and Institutional Trust Lands	9,118	0.3	4	2	0.0
Jimmy L. or Patsy Allred	Utah School and Institutional Trust Lands	1,102	0.8	9	4	0.0
Johansen Herefords, LLC	Utah School and Institutional Trust Lands	318	0.2	2	1	0.0
John Vetere, Jr.	Utah School and Institutional Trust Lands	1,915	0.5	5	3	0.0
Kirk and Kris Shiner	Utah School and Institutional Trust Lands	2,242	1.1	13	7	0.0
Lee McElprang	Utah School and Institutional Trust Lands	24,264	6.2	71	36	0.0

TABLE G-2 GRAZING ALLOTMENTS FOR THE COLORADO TO UTAH – U.S. HIGHWAY 40 TO BAXTER PASS TO CLOVER (COUT BAX) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
Leon McElprang	Utah School and Institutional Trust Lands	9,592	6.2	71	36	0.0
Leon McElprang	Utah School and Institutional Trust Lands	23,977	6.2	71	36	0.0
Thomas McElprang	Utah School and Institutional Trust Lands	9,946	6.2	71	36	0.0
Wayde S. Nielsen	Utah School and Institutional Trust Lands	639	1.2	13	7	0.0
Randy Campbell and	Utah School and Institutional Trust Lands	1,928	0.5	6	3	0.0
Sacco Brothers Land & Livestock Company	Utah School and Institutional Trust Lands	11,189	4.0	45	23	0.0
Nick And Toni Sampinos	Utah School and Institutional Trust Lands	2,303	1.6	18	9	0.0
The Earl and Sheila Gordon Trust	Utah School and Institutional Trust Lands	22,810	6.2	71	36	0.0
Jessie May Winder	Utah School and Institutional Trust Lands	680	0.3	3	2	0.0
State Total		**93,504**	**28.3**	**322**	**164**	**0.0**
Grand Total		**1,502,421**	**239.5**	**2,730**	**1,389**	**0.0**
Alternative COUT BAX-C						
Cathedral Bluffs	BLM White River Field Office	107,887	0.7	8	4	0.0
Douglas Creek	BLM White River Field Office	5,405	3.2	37	18	0.0
Evacuation Creek	BLM White River Field Office	114,907	20.6	235	113	0.0
Hall Draw	BLM White River Field Office	6,940	2.2	25	12	0.0
Hatch Flat	BLM White River Field Office	1,493	0.8	9	4	0.0
Johnson/Trujillo	BLM White River Field Office	19,376	2.1	24	11	0.0
Lower Fletcher Draw	BLM White River Field Office	9,868	2.3	26	13	0.0
Massadona	BLM White River Field Office	10,871	1.7	19	9	0.0
Red Wash	BLM White River Field Office	8,219	2.3	26	13	0.0
Spooky Mountain	BLM White River Field Office	29,666	0.7	8	4	0.0
Spring Creek	BLM White River Field Office	40,229	5.2	59	28	0.0
Twin Buttes	BLM White River Field Office	158,651	15.1	172	83	0.0
West Salt Common	BLM Grand Junction Field Office	104,147	20.3	231	112	0.0
Athena	BLM Moab Field Office	46,488	6.0	69	33	0.0
Bar-X	BLM Moab Field Office	21,244	1.5	17	8	0.0
Cisco	BLM Moab Field Office	154,005	21.1	241	116	0.0
Cisco Mesa	BLM Moab Field Office	57,704	9.4	108	52	0.0
Crescent Canyon	BLM Moab Field Office	28,077	5.5	63	30	0.0
Floy Creek	BLM Moab Field Office	24,776	4.6	52	25	0.0

TABLE G-2
GRAZING ALLOTMENTS FOR THE COLORADO TO UTAH – U.S. HIGHWAY 40 TO BAXTER PASS TO CLOVER (COUT BAX) ALTERNATIVE ROUTES

Allotment	Jurisdiction	Total Acres of Allotment	Miles Crossed	Acres of Temporary Disturbance[1]	Acres of Permanent Disturbance[2]	Percent of Allotment Disturbed[3]
Horse Canyon	BLM Moab Field Office	43,290	6.0	68	33	0.0
Pipeline	BLM Moab Field Office	15,870	4.4	50	24	0.0
San Arroyo	BLM Moab Field Office	139,053	16.4	187	90	0.0
Buckhorn	BLM Price Field Office	47,156	6.8	77	37	0.0
Buckmaster	BLM Price Field Office	55,934	4.3	49	23	0.0
Calf Canyon	BLM Price Field Office	7,561	0.1	1	0	0.0
Chimney Rock Flat	BLM Price Field Office	46,641	10.4	119	57	0.0
Closed to Grazing	BLM Price Field Office	14,566	9.1	104	50	0.0
Desert	BLM Price Field Office	60,902	5.3	61	29	0.0
Little Holes	BLM Price Field Office	10,477	4.3	49	24	0.0
Little Valley	BLM Price Field Office	18,091	5.9	67	32	0.0
Oil Dome	BLM Price Field Office	1,349	1.0	12	6	0.0
R.J.	BLM Price Field Office	2,621	0.6	7	3	0.0
Red Seeps	BLM Price Field Office	25,494	5.6	64	31	0.0
Summerville	BLM Price Field Office	33,272	6.6	75	36	0.0
Trail Springs	BLM Price Field Office	27,384	2.2	25	12	0.0
West Huntington	BLM Price Field Office	17,384	7.0	80	39	0.0
Wilberg	BLM Price Field Office	5,509	1.0	12	6	0.0
Apple Spring	BLM Richfield Field Office	3,806	2.7	30	15	0.0
Hop Creek	BLM Richfield Field Office	2,566	2.0	22	11	0.0
Indian Hollow	BLM Richfield Field Office	1,774	1.4	16	8	0.0
BLM Total[4]		**1,530,524**	**228.2**	**2,601**	**1,255**	**0.0**
Booth Canyon	Manti-La Sal National Forest	2,671	0.9	11	5	0.0
East Mountain	Manti-La Sal National Forest	11,028	2.4	28	13	0.0
Gentry	Manti-La Sal National Forest	5,162	2.3	26	13	0.0
Joes Valley	Manti-La Sal National Forest	8,185	1.7	19	9	0.0
Out	Manti-La Sal National Forest	7,830	0.6	6	3	0.0
Potter Canyon	Manti-La Sal National Forest	2,577	2.7	31	15	0.0
Private Land Permit	Manti-La Sal National Forest	9,053	2.3	26	13	0.0
Skyline S & G	Manti-La Sal National Forest	8,011	2.0	23	11	0.0

TABLE G-2
GRAZING ALLOTMENTS FOR THE COLORADO TO UTAH – U.S. HIGHWAY 40 TO BAXTER PASS TO CLOVER (COUT BAX) ALTERNATIVE ROUTES

Allotment	Jurisdiction	Total Acres of Allotment	Miles Crossed	Acres of Temporary Disturbance[1]	Acres of Permanent Disturbance[2]	Percent of Allotment Disturbed[3]
South Skyline S & G	Manti-La Sal National Forest	11,683	0.4	4	2	0.0
Trail Mountain	Manti-La Sal National Forest	23,763	4.6	53	25	0.0
USFS Total		**89,963**	**20.0**	**228**	**110**	**0.0**
Anderson Brothers	Utah School and Institutional Trust Lands	568	1.1	12	6	0.0
Betty Smith	Utah School and Institutional Trust Lands	26,093	8.9	101	49	0.0
Cory Cloward	Utah School and Institutional Trust Lands	989	0.7	8	4	0.0
Craig Bair	Utah School and Institutional Trust Lands	11,222	0.4	4	2	0.0
Division Of Wildlife Resources	Utah School and Institutional Trust Lands	12,748	0.3	4	2	0.0
Donley Ranches, LLC	Utah School and Institutional Trust Lands	1,928	0.7	8	4	0.0
Courtney Guymon	Utah School and Institutional Trust Lands	11,147	6.2	71	34	0.0
Hatch Livestock	Utah School and Institutional Trust Lands	26,095	6.2	71	34	0.0
Holyoak Land & Livestock	Utah School and Institutional Trust Lands	160	0.3	3	2	0.0
Donald W. Holyoak	Utah School and Institutional Trust Lands	11,002	0.7	8	4	0.0
Paul Holyoak	Utah School and Institutional Trust Lands	9,118	0.3	4	2	0.0
Jimmy L. or Patsy Allred	Utah School and Institutional Trust Lands	1,102	0.8	9	4	0.0
Johansen Herefords, LLC	Utah School and Institutional Trust Lands	318	0.2	2	1	0.0
John Vetere, Jr.	Utah School and Institutional Trust Lands	1,915	0.5	5	3	0.0
Kirk and Kris Shiner	Utah School and Institutional Trust Lands	2,242	1.1	13	6	0.0
Lee McElprang	Utah School and Institutional Trust Lands	24,264	6.2	71	34	0.0
Leon Mc Elprang	Utah School and Institutional Trust Lands	9,592	6.2	71	34	0.0
Leon McElprang	Utah School and Institutional Trust Lands	23,977	6.2	71	34	0.0
Thomas McElprang	Utah School and Institutional Trust Lands	9,946	6.2	71	34	0.0
Wayde S. Nielsen	Utah School and Institutional Trust Lands	639	1.2	13	6	0.0
Randy Campbell and	Utah School and Institutional Trust Lands	1,928	0.5	6	3	0.0
Sacco Brothers Land & Livestock Company	Utah School and Institutional Trust Lands	11,189	4.4	50	24	0.0
Rex L. Sacco	Utah School and Institutional Trust Lands	3,121	2.1	24	12	0.0
Nick and Toni Sampinos	Utah School and Institutional Trust Lands	2,303	1.6	18	9	0.0
The Earl and Sheila Gordon Trust	Utah School and Institutional Trust Lands	22,810	6.2	71	34	0.0
Jessie May Winder	Utah School and Institutional Trust Lands	680	0.3	3	2	0.0
State Total		**96,625**	**30.9**	**352**	**170**	**0.0**
Grand Total		**1,645,002**	**250.0**	**2,850**	**1,375**	**0.0**

TABLE G-2 GRAZING ALLOTMENTS FOR THE COLORADO TO UTAH – U.S. HIGHWAY 40 TO BAXTER PASS TO CLOVER (COUT BAX) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
Alternative COUT BAX-E						
Cathedral Bluffs	BLM White River Field Office	107,887	0.7	9	4	0.0
Douglas Creek	BLM White River Field Office	5,405	3.2	37	16	0.0
Evacuation Creek	BLM White River Field Office	114,907	20.6	237	101	0.0
Hall Draw	BLM White River Field Office	6,940	2.2	25	11	0.0
Hatch Flat	BLM White River Field Office	1,493	0.8	9	4	0.0
Johnson/Trujillo	BLM White River Field Office	19,376	2.1	24	10	0.0
Lower Fletcher Draw	BLM White River Field Office	9,868	2.3	27	11	0.0
Massadona	BLM White River Field Office	10,871	1.7	19	8	0.0
Red Wash	BLM White River Field Office	8,219	2.3	27	11	0.0
Spooky Mountain	BLM White River Field Office	29,666	0.7	8	3	0.0
Spring Creek	BLM White River Field Office	40,229	5.2	59	25	0.0
Twin Buttes	BLM White River Field Office	158,651	15.1	173	74	0.0
West Salt Common	BLM Grand Junction Field Office	104,147	20.3	233	99	0.0
Athena	BLM Moab Field Office	46,488	6.0	69	30	0.0
Bar-X	BLM Moab Field Office	21,244	1.5	17	7	0.0
Cisco	BLM Moab Field Office	154,005	21.1	243	103	0.0
Cisco Mesa	BLM Moab Field Office	57,704	9.4	108	46	0.0
Crescent Canyon	BLM Moab Field Office	28,077	5.5	63	27	0.0
Floy Creek	BLM Moab Field Office	24,776	4.6	53	22	0.0
Horse Canyon	BLM Moab Field Office	43,290	6.0	69	29	0.0
Pipeline	BLM Moab Field Office	15,870	4.4	50	21	0.0
San Arroyo	BLM Moab Field Office	139,053	16.4	189	80	0.0
Buckmaster	BLM Price Field Office	55,934	4.3	49	21	0.0
Closed to Grazing	BLM Price Field Office	14,566	9.1	105	45	0.0
Coon Spring	BLM Price Field Office	11,319	9.2	106	45	0.0
Desert	BLM Price Field Office	60,902	9.7	111	47	0.0
Gordon Creek Withdrawal	BLM Price Field Office	21,837	3.4	39	17	0.0
Hiawatha	BLM Price Field Office	5,235	2.8	32	14	0.0
Icelander	BLM Price Field Office	49,564	5.7	65	28	0.0
Little Valley	BLM Price Field Office	18,091	5.9	67	29	0.0
Long Bench	BLM Price Field Office	7,572	3.1	36	15	0.0

TABLE G-2
GRAZING ALLOTMENTS FOR THE COLORADO TO UTAH – U.S. HIGHWAY 40 TO BAXTER PASS TO CLOVER (COUT BAX) ALTERNATIVE ROUTES

Allotment	Jurisdiction	Total Acres of Allotment	Miles Crossed	Acres of Temporary Disturbance[1]	Acres of Permanent Disturbance[2]	Percent of Allotment Disturbed[3]
Mathis Wash	BLM Price Field Office	5,230	2.0	23	10	0.0
Mounds	BLM Price Field Office	23,077	8.4	97	41	0.0
Mud Springs	BLM Price Field Office	31,495	3.8	44	19	0.0
North Spring	BLM Price Field Office	7,864	0.8	9	4	0.0
Oviatt	BLM Price Field Office	453	1.3	15	6	0.0
South Olsen Lake	BLM Price Field Office	1,897	2.8	32	14	0.0
Staker	BLM Price Field Office	679	0.8	9	4	0.0
Summerville	BLM Price Field Office	33,272	0.5	6	3	0.0
Trail Canyon	BLM Price Field Office	5,860	3.8	43	18	0.0
Washboard	BLM Price Field Office	11,222	4.4	50	21	0.0
Wattis	BLM Price Field Office	5,744	2.6	30	13	0.0
Hop Creek	BLM Richfield Field Office	2,566	1.3	14	6	0.0
Uinta	BLM Richfield Field Office	1,028	1.2	13	6	0.0
BLM Total[4]		**1,523,442**	**238.7**	**2,745**	**1,170**	**0.0**
Beaver Dams/Boulger	Manti-La Sal National Forest	4,801	0.7	8	3	0.0
Burnout	Manti-La Sal National Forest	4,254	3.0	35	15	0.0
Gooseberry–Cottonwood	Manti-La Sal National Forest	4,668	2.8	32	14	0.0
Private Land	Manti-La Sal National Forest	6,491	2.1	25	10	0.0
Private Land Permit	Manti-La Sal National Forest	9,053	1.4	17	7	0.0
Swens Canyon	Manti-La Sal National Forest	2,072	1.2	14	6	0.0
USFS Total		**31,339**	**11.3**	**130**	**55**	**0.0**
Betty Smith	Utah School and Institutional Trust Lands	26,093	1.4	16	7	0.0
Bill Fasselin	Utah School and Institutional Trust Lands	2,101	2.0	23	10	0.0
Craig Bair	Utah School and Institutional Trust Lands	11,222	0.4	4	2	0.0
Division Of Wildlife Resources	Utah School and Institutional Trust Lands	12,748	0.3	4	2	0.0
Donley Ranches, LLC	Utah School and Institutional Trust Lands	1,928	0.7	8	3	0.0
Bill and Jennie Fasselin	Utah School and Institutional Trust Lands	3,583	2.5	28	12	0.0
Holyoak Land & Livestock	Utah School and Institutional Trust Lands	160	0.3	3	1	0.0
Donald W. Holyoak	Utah School and Institutional Trust Lands	11,002	0.7	8	3	0.0
Paul Holyoak	Utah School and Institutional Trust Lands	9,118	0.3	4	2	0.0
James T. Jensen	Utah School and Institutional Trust Lands	5,555	1.3	14	6	0.0
Jimmy L. or Patsy Allred	Utah School and Institutional Trust Lands	1,102	0.8	9	4	0.0

TABLE G-2
GRAZING ALLOTMENTS FOR THE COLORADO TO UTAH – U.S. HIGHWAY 40 TO BAXTER PASS TO CLOVER (COUT BAX) ALTERNATIVE ROUTES

Allotment	Jurisdiction	Total Acres of Allotment	Miles Crossed	Acres of Temporary Disturbance[1]	Acres of Permanent Disturbance[2]	Percent of Allotment Disturbed[3]
John Vetere Jr	Utah School and Institutional Trust Lands	1,915	0.5	6	2	0.0
Kirk and Kris Shiner	Utah School and Institutional Trust Lands	2,242	1.1	13	6	0.0
Randy Campbell and	Utah School and Institutional Trust Lands	1,928	0.5	6	2	0.0
Ray and Carolyn Jorgensen	Utah School and Institutional Trust Lands	3,195	1.8	21	9	0.0
Sacco Brothers Land & Livestock Company	Utah School and Institutional Trust Lands	11,189	2.2	26	11	0.0
Rex L. Sacco	Utah School and Institutional Trust Lands	3,121	2.1	24	10	0.0
Nick and Toni Sampinos	Utah School and Institutional Trust Lands	2,303	1.6	18	8	0.0
James Allen Staker	Utah School and Institutional Trust Lands	1,278	1.0	12	5	0.0
Joel Stamatakis	Utah School and Institutional Trust Lands	2,246	0.9	10	4	0.0
Steve and Vivien Stamatakis	Utah School and Institutional Trust Lands	2,246	0.9	10	4	0.0
State Total		**84,023**	**20.9**	**241**	**103**	**0.0**
Grand Total		**1,595,145**	**252.8**	**2,907**	**1,239**	**0.0**

NOTES:
The agency total allotment acreage and the miles crossed do not equal a sum of each agency's total allotment acreage or miles crossed, due to overlap of allotment boundaries. Also, the grand-total acreage and the miles crossed do not equal a sum of each agency's total allotment acreage or miles crossed due to overlap of allotment boundaries.
[1] Temporary Disturbance: Estimated area of disturbance associated with structure work areas, wire pulling-and-tensioning sites, wire-splicing sites, multi-purpose construction yards, helicopter fly yards, guard structures, and temporary access roads (refer to Environmental Impact Statement [EIS] Table 2-1).
[2] Permanent Disturbance: Estimated area of disturbance associated with the area occupied by structures-(pads), communication regeneration stations, substations and series compensation stations, and permanent access roads (refer to EIS Table 2-2).
[3] All percentages of allotments disturbed are less than 0.1 percent. Due to rounding, the percentages are shown as 0.0 percent.
[4] For the BLM White River Field Office, the unit called "Unallotted" has not been included in the numbers above.
BLM = Bureau of Land Management
USFS = U.S. Forest Service

TABLE G-3 GRAZING ALLOTMENTS FOR THE COLORADO TO UTAH – U.S. HIGHWAY 40 TO CENTRAL UTAH TO CLOVER (COUT) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
Alternative COUT-A						
Artesia	BLM White River Field Office	48,931	9.3	108	64	0.0
Massadona	BLM White River Field Office	10,871	3.6	42	25	0.0
Miller Creek	BLM White River Field Office	4,003	2.0	23	13	0.0
Red Wash	BLM White River Field Office	8,219	1.1	13	8	0.0
Spooky Mountain	BLM White River Field Office	29,666	7.2	83	49	0.0
Antelope Draw	BLM Vernal Field Office	55,904	9.0	104	62	0.0
Bohemian Bottoms	BLM Vernal Field Office	11,544	4.2	48	29	0.0
Ouray Road	BLM Vernal Field Office	11,961	4.3	49	29	0.0
Powder Wash	BLM Vernal Field Office	26,783	6.5	75	45	0.0
Snake John	BLM Vernal Field Office	10,680	3.9	45	27	0.0
Split Mountain	BLM Vernal Field Office	120,800	9.2	106	63	0.0
Twelve Mile	BLM Vernal Field Office	32,190	4.7	54	32	0.0
ISO Tract - Ludlow	BLM Salt Lake Field Office	461	0.1	1	1	0.0
BLM Total		**371,993**	**64.8**	**751**	**447**	**0.0**
Cedar Knolls S & G	Manti-La Sal National Forest	5,718	1.0	11	7	0.0
Lake Fork C & H	Manti-La Sal National Forest	30,399	0.7	8	4	0.0
Broad Hollow/Pete's Knoll	Uinta-Wasatch-Cache National Forest	5,161	2.5	29	17	0.0
Center Canyon	Uinta-Wasatch-Cache National Forest	5,324	2.8	33	19	0.0
Davis	Uinta-Wasatch-Cache National Forest	5,201	3.1	36	21	0.0
Diamond Fork	Uinta-Wasatch-Cache National Forest	90,743	6.5	75	45	0.0
Jacob/Baldy	Uinta-Wasatch-Cache National Forest	11,628	2.4	28	17	0.0
Trail Hollow	Uinta-Wasatch-Cache National Forest	2,687	1.3	15	9	0.0
USFS Total[5]		**156,859**	**20.2**	**235**	**140**	**0.0**
Cross Mountain Ranch Limited Partnership/Company	Colorado State Land Board	3,841	2.0	23	14	0.0
Jack V. Foster	Colorado State Land Board	641	1.0	12	7	0.0
Oscar S. Wyatt, Jr.	Colorado State Land Board	641	1.0	11	7	0.0
Chew Livestock, Inc.	Utah School and Institutional Trust Lands	1,281	0.2	3	2	0.0

TABLE G-3 GRAZING ALLOTMENTS FOR THE COLORADO TO UTAH – U.S. HIGHWAY 40 TO CENTRAL UTAH TO CLOVER (COUT) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
Nick Theos Family, LLP	Utah School and Institutional Trust Lands	3,376	2.8	32	19	0.0
Steven R. Pierson	Utah School and Institutional Trust Lands	1,297	1.2	13	8	0.0
State Total		**11,071**	**8.2**	**95**	**57**	**0.0**
Grand Total		**531,423**	**85.0**	**986**	**587**	**0.0**
Route Variation COUT-A-1						
Artesia	BLM White River Field Office	48,931	9.3	106	66	0.0
Massadona	BLM White River Field Office	10,871	3.6	41	26	0.0
Miller Creek	BLM White River Field Office	4,003	2.0	22	14	0.0
Red Wash	BLM White River Field Office	8,219	1.1	13	8	0.0
Spooky Mountain	BLM White River Field Office	29,666	7.2	82	51	0.0
Antelope Draw	BLM Vernal Field Office	55,904	9.0	102	64	0.0
Bohemian Bottoms	BLM Vernal Field Office	11,544	4.2	47	30	0.0
Ouray Road	BLM Vernal Field Office	11,961	4.3	48	30	0.0
Powder Wash	BLM Vernal Field Office	26,783	6.5	74	46	0.0
Snake John	BLM Vernal Field Office	10,680	3.9	44	27	0.0
Split Mountain	BLM Vernal Field Office	120,800	9.2	105	65	0.0
Twelve Mile	BLM Vernal Field Office	32,190	4.7	53	33	0.0
ISO Tract–Ludlow	BLM Salt Lake Field Office	461	0.1	1	1	0.0
BLM Total		**371,993**	**64.8**	**738**	**460**	**0.0**
Cedar Knolls S & G	Manti-La Sal National Forest	5,718	1.0	11	7	0.0
Lake Fork C & H	Manti-La Sal National Forest	30,399	0.7	7	5	0.0
Broad Hollow/Pete's Knoll	Uinta-Wasatch-Cache National Forest	5,161	2.5	29	18	0.0
Center Canyon	Uinta-Wasatch-Cache National Forest	5,324	2.8	32	20	0.0
Chipman	Uinta-Wasatch-Cache National Forest	4,602	1.1	13	8	0.0
Davis	Uinta-Wasatch-Cache National Forest	5,201	0.9	10	6	0.0
Diamond Fork	Uinta-Wasatch-Cache National Forest	90,743	6.5	74	46	0.0
Jacob/Baldy	Uinta-Wasatch-Cache National Forest	11,628	2.7	31	19	0.0
Trail Hollow	Uinta-Wasatch-Cache National Forest	2,687	1.7	19	12	0.0
USFS Total[5]		**161,461**	**19.8**	**226**	**141**	**0.0**
Cross Mountain Ranch Limited Partnership/Company	Colorado State Land Board	3,841	2.0	23	14	0.0
Jack V. Foster	Colorado State Land Board	641	1.0	12	7	0.0

TABLE G-3
GRAZING ALLOTMENTS FOR THE COLORADO TO UTAH – U.S. HIGHWAY 40 TO CENTRAL UTAH TO CLOVER (COUT) ALTERNATIVE ROUTES

Allotment	Jurisdiction	Total Acres of Allotment	Miles Crossed	Acres of Temporary Disturbance[1]	Acres of Permanent Disturbance[2]	Percent of Allotment Disturbed[3]
Oscar S. Wyatt, Jr.	Colorado State Land Board	641	1.0	11	7	0.0
Chew Livestock, Inc.	Utah School and Institutional Trust Lands	1,281	0.2	3	2	0.0
Nick Theos Family, LLP	Utah School and Institutional Trust Lands	3,376	2.8	32	20	0.0
Steven R. Pierson	Utah School and Institutional Trust Lands	1,297	1.2	13	8	0.0
State Total		**11,071**	**8.2**	**93**	**58**	**0.0**
Grand Total		**536,025**	**845.0**	**9,633**	**6,000**	**0.0**
Alternative COUT-B						
Artesia	BLM White River Field Office	48,931	9.3	108	62	0.0
Massadona	BLM White River Field Office	10,871	3.6	42	24	0.0
Miller Creek	BLM White River Field Office	4,003	2.0	23	13	0.0
Red Wash	BLM White River Field Office	8,219	1.1	13	7	0.0
Spooky Mountain	BLM White River Field Office	29,666	7.2	83	48	0.0
Antelope Draw	BLM Vernal Field Office	55,904	9.0	104	60	0.0
Bohemian Bottoms	BLM Vernal Field Office	11,544	4.2	48	28	0.0
Ouray Road	BLM Vernal Field Office	11,961	4.3	49	28	0.0
Powder Wash	BLM Vernal Field Office	26,783	6.5	75	43	0.0
Snake John	BLM Vernal Field Office	10,680	3.9	45	26	0.0
Split Mountain	BLM Vernal Field Office	120,800	9.2	106	61	0.0
Twelve Mile	BLM Vernal Field Office	32,190	4.7	54	31	0.0
Kyune I	BLM Price Field Office	14,506	4.4	51	29	0.0
Price Canyon–West	BLM Price Field Office	7,428	0.9	11	6	0.0
West Field Office, RK	BLM Price Field Office	16,706	4.8	55	32	0.0
ISO Tract–Ludlow	BLM Salt Lake Field Office	461	0.1	1	1	0.0
BLM Total		**410,633**	**74.8**	**868**	**501**	**0.0**
Sowers Canyon	Ashley National Forest	20,986	12.0	139	80	0.0
Cedar Knolls S & G	Manti-La Sal National Forest	5,718	1.0	11	6	0.0
Lake Fork C & H	Manti-La Sal National Forest	30,399	0.7	8	4	0.0
Diamond Fork	Uinta-Wasatch-Cache National Forest	90,743	2.0	24	14	0.0
Jacob/Baldy	Uinta-Wasatch-Cache National Forest	11,628	1.9	21	12	0.0
USFS Total[5]		**159,473**	**17.5**	**203**	**117**	**0.0**
Cross Mountain Ranch Limited Partnership/Company	Colorado State Land Board	3,841	2.0	23	14	0.0

TABLE G-3 GRAZING ALLOTMENTS FOR THE COLORADO TO UTAH – U.S. HIGHWAY 40 TO CENTRAL UTAH TO CLOVER (COUT) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
Jack V. Foster	Colorado State Land Board	641	1.0	12	7	0.0
Oscar S. Wyatt, Jr.	Colorado State Land Board	641	1.0	11	7	0.0
Chew Livestock, Inc.	Utah School and Institutional Trust Lands	1,281	0.2	3	1	0.0
George Lowe Children	Utah School and Institutional Trust Lands	950	1.1	12	7	0.0
James, Jerry, Dix Jensen	Utah School and Institutional Trust Lands	755	0.5	6	3	0.0
Dix Jensen	Utah School and Institutional Trust Lands	1,014	0.4	4	2	0.0
Farris A. Jensen	Utah School and Institutional Trust Lands	3,140	2.0	23	13	0.0
James T. Jensen	Utah School and Institutional Trust Lands	5,555	1.3	15	8	0.0
Nick Theos Family, LLP	Utah School and Institutional Trust Lands	3,376	2.8	32	19	0.0
Steven R. Pierson	Utah School and Institutional Trust Lands	1,297	1.2	13	8	0.0
State Total		**22,484**	**13.3**	**154**	**89**	**0.0**
Grand Total		**580,150**	**95.3**	**1,105**	**639**	**0.0**
Route Variation COUT-B-1						
Artesia	BLM White River Field Office	48,931	9.3	108	63	0.0
Massadona	BLM White River Field Office	10,871	3.6	42	25	0.0
Miller Creek	BLM White River Field Office	4,003	2.0	23	13	0.0
Red Wash	BLM White River Field Office	8,219	1.1	13	8	0.0
Spooky Mountain	BLM White River Field Office	29,666	7.2	83	49	0.0
Antelope Draw	BLM Vernal Field Office	55,904	9.0	104	61	0.0
Bohemian Bottoms	BLM Vernal Field Office	11,544	4.2	48	28	0.0
Ouray Road	BLM Vernal Field Office	11,961	4.3	49	29	0.0
Powder Wash	BLM Vernal Field Office	26,783	6.5	75	44	0.0
Snake John	BLM Vernal Field Office	10,680	3.9	45	26	0.0
Split Mountain	BLM Vernal Field Office	120,800	9.2	106	62	0.0
Twelve Mile	BLM Vernal Field Office	32,190	4.7	54	32	0.0
Kyune I	BLM Price Field Office	14,506	0.2	3	1	0.0
Kyune I	BLM Price Field Office	14,506	4.7	54	32	0.0
West Fork	BLM Price Field Office	16,706	6.2	71	42	0.0
ISO Tract - Ludlow	BLM Salt Lake Field Office	461	0.1	1	1	0.0
BLM Total		**403,205**	**75.8**	**879**	**516**	**0.0**
Avintaquin	Ashley National Forest	9,219	0.1	2	1	0.0
Horse Ridge	Ashley National Forest	17,746	0.3	4	2	0.0

TABLE G-3 GRAZING ALLOTMENTS FOR THE COLORADO TO UTAH – U.S. HIGHWAY 40 TO CENTRAL UTAH TO CLOVER (COUT) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
Sowers Canyon	Ashley National Forest	20,986	12.0	139	82	0.0
Tub Ridge	Ashley National Forest	5,604	0.4	5	3	0.0
Cedar Knolls S & G	Manti-La Sal National Forest	5,718	1.0	11	7	0.0
Lake Fork C & H	Manti-La Sal National Forest	30,399	0.7	8	4	0.0
Diamond Fork	Uinta-Wasatch-Cache National Forest	90,743	2.0	24	14	0.0
Jacob/Baldy	Uinta-Wasatch-Cache National Forest	11,628	1.9	21	13	0.0
Tabbyune	Uinta-Wasatch-Cache National Forest	8,733	1.1	13	8	0.0
USFS Total[5]		**200,768**	**19.5**	**227**	**133**	**0.0**
Cross Mountain Ranch Limited Partnership/Company	Colorado State Land Board	3,841	2.0	23	14	0.0
Jack V. Foster	Colorado State Land Board	641	1.0	12	7	0.0
Oscar S. Wyatt, Jr.	Colorado State Land Board	641	1.0	11	7	0.0
Chew Livestock, Inc.	Utah School and Institutional Trust Lands	1,281	0.2	3	1	0.0
George Lowe Children	Utah School and Institutional Trust Lands	950	1.1	12	7	0.0
J. D. Jackson	Utah School and Institutional Trust Lands	164	0.2	2	1	0.0
James, Jerry, Dix Jensen	Utah School and Institutional Trust Lands	755	0.2	2	1	0.0
James T. Jensen	Utah School and Institutional Trust Lands	5,555	0.3	3	2	0.0
Nick Theos Family, LLP	Utah School and Institutional Trust Lands	3,376	2.8	32	19	0.0
Steven R. Pierson	Utah School and Institutional Trust Lands	1,297	1.2	13	8	0.0
State Total		**18,495**	**9.9**	**114**	**67**	**0.0**
Grand Total		**610,306**	**96.6**	**1,121**	**657**	**0.0**
Route Variation COUT-B-2						
Artesia	BLM White River Field Office	48,931	9.3	108	63	0.0
Massadona	BLM White River Field Office	10,871	3.6	42	25	0.0
Miller Creek	BLM White River Field Office	4,003	2.0	23	13	0.0
Red Wash	BLM White River Field Office	8,219	1.1	13	8	0.0
Spooky Mountain	BLM White River Field Office	29,666	7.2	83	49	0.0
Antelope Draw	BLM Vernal Field Office	55,904	9.0	104	61	0.0
Bohemian Bottoms	BLM Vernal Field Office	11,544	4.2	48	28	0.0
Ouray Road	BLM Vernal Field Office	11,961	4.3	49	29	0.0
Powder Wash	BLM Vernal Field Office	26,783	6.5	75	44	0.0
Snake John	BLM Vernal Field Office	10,680	3.9	45	26	0.0

TABLE G-3 GRAZING ALLOTMENTS FOR THE COLORADO TO UTAH – U.S. HIGHWAY 40 TO CENTRAL UTAH TO CLOVER (COUT) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
Split Mountain	BLM Vernal Field Office	120,800	9.2	106	62	0.0
Twelve Mile	BLM Vernal Field Office	32,190	4.7	54	32	0.0
Kyune I	BLM Price Field Office	14,506	5.1	60	35	0.0
West Fork	BLM Price Field Office	16,706	5.9	68	40	0.0
ISO Tract–Ludlow	BLM Salt Lake Field Office	461	0.1	1	1	0.0
BLM Total		**403,205**	**75.8**	**879**	**515**	**0.0**
Avintaquin	Ashley National Forest	9,219	0.1	2	1	0.0
Horse Ridge	Ashley National Forest	17,746	0.3	4	2	0.0
Sowers Canyon	Ashley National Forest	20,986	12.0	139	82	0.0
Cedar Knolls S & G	Manti-La Sal National Forest	5,718	1.0	11	7	0.0
Lake Fork C & H	Manti-La Sal National Forest	30,399	0.7	8	4	0.0
Diamond Fork	Uinta-Wasatch-Cache National Forest	90,743	2.0	24	14	0.0
Jacob/Baldy	Uinta-Wasatch-Cache National Forest	11,628	1.9	21	13	0.0
Tabbyune	Uinta-Wasatch-Cache National Forest	8,733	1.1	13	8	0.0
USFS Total[5]		**195,163**	**19.1**	**222**	**130**	**0.0**
Cross Mountain Ranch Limited Partnership/Company	Colorado State Land Board	3,841	2.0	23	14	0.0
Jack V. Foster	Colorado State Land Board	641	1.0	12	7	0.0
Oscar S. Wyatt, Jr.	Colorado State Land Board	641	1.0	11	7	0.0
Chew Livestock, Inc.	Utah School and Institutional Trust Lands	1,281	0.2	3	1	0.0
George Lowe Children	Utah School and Institutional Trust Lands	950	1.1	12	7	0.0
J. D. Jackson	Utah School and Institutional Trust Lands	164	0.2	2	1	0.0
Farris A. Jensen	Utah School and Institutional Trust Lands	3,140	1.3	15	9	0.0
James T. Jensen	Utah School and Institutional Trust Lands	5,555	1.1	13	7	0.0
Nick Theos Family, LLP	Utah School and Institutional Trust Lands	3,376	2.8	32	19	0.0
Steven R. Pierson	Utah School and Institutional Trust Lands	1,297	1.2	13	8	0.0
William Marsing Livestock, Inc.	Utah School and Institutional Trust Lands	2,898	0.9	10	6	0.0
State Total		**23,778**	**12.7**	**147**	**86**	**0.0**
Grand Total		**610,502**	**98.1**	**1,138**	**667**	**0.0**
Route Variation COUT-B-3						
Artesia	BLM White River Field Office	48,931	9.3	108	63	0.0
Massadona	BLM White River Field Office	10,871	3.6	42	25	0.0

TABLE G-3 GRAZING ALLOTMENTS FOR THE COLORADO TO UTAH – U.S. HIGHWAY 40 TO CENTRAL UTAH TO CLOVER (COUT) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
Miller Creek	BLM White River Field Office	4,003	2.0	23	13	0.0
Red Wash	BLM White River Field Office	8,219	1.1	13	8	0.0
Spooky Mountain	BLM White River Field Office	29,666	7.2	83	49	0.0
Antelope Draw	BLM Vernal Field Office	55,904	9.0	104	61	0.0
Bohemian Bottoms	BLM Vernal Field Office	11,544	4.2	48	28	0.0
Ouray Road	BLM Vernal Field Office	11,961	4.3	49	29	0.0
Powder Wash	BLM Vernal Field Office	26,783	6.5	75	44	0.0
Snake John	BLM Vernal Field Office	10,680	3.9	45	26	0.0
Split Mountain	BLM Vernal Field Office	120,800	9.2	106	62	0.0
Twelve Mile	BLM Vernal Field Office	32,190	4.7	54	32	0.0
Kyune I	BLM Price Field Office	14,506	6.2	72	42	0.0
West Fork	BLM Price Field Office	16,706	5.0	58	34	0.0
ISO Tract–Ludlow	BLM Salt Lake Field Office	461	0.1	1	1	0.0
BLM Total		**403,205**	**76.0**	**881**	**517**	**0.0**
Sowers Canyon	Ashley National Forest	20,986	12.0	139	82	0.0
Cedar Knolls S & G	Manti-La Sal National Forest	5,718	1.0	11	7	0.0
Lake Fork C & H	Manti-La Sal National Forest	30,399	0.7	8	4	0.0
Diamond Fork	Uinta-Wasatch-Cache National Forest	90,743	2.0	24	14	0.0
Jacob/Baldy	Uinta-Wasatch-Cache National Forest	11,628	1.9	21	13	0.0
USFS Total[5]		**159,473**	**17.5**	**203**	**119**	**0.0**
Cross Mountain Ranch Limited Partnership/Company	Colorado State Land Board	3,841	2.0	23	14	0.0
Jack V. Foster	Colorado State Land Board	641	1.0	12	7	0.0
Oscar S. Wyatt, Jr.	Colorado State Land Board	641	1.0	11	7	0.0
Chew Livestock, Inc.	Utah School and Institutional Trust Lands	1,281	0.2	3	1	0.0
George Lowe Children	Utah School and Institutional Trust Lands	950	1.1	12	7	0.0
J. D. Jackson	Utah School and Institutional Trust Lands	164	0.2	2	1	0.0
Farris A. Jensen	Utah School and Institutional Trust Lands	3,140	1.1	12	7	0.0
James T. Jensen	Utah School and Institutional Trust Lands	5,555	1.1	13	7	0.0
Nick Theos Family, LLP	Utah School and Institutional Trust Lands	3,376	2.8	32	19	0.0
Steven R. Pierson	Utah School and Institutional Trust Lands	1,297	1.2	13	8	0.0
William Marsing Livestock, Inc.	Utah School and Institutional Trust Lands	2,898	0.3	3	2	0.0

TABLE G-3 GRAZING ALLOTMENTS FOR THE COLORADO TO UTAH – U.S. HIGHWAY 40 TO CENTRAL UTAH TO CLOVER (COUT) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
State Total		**23,778**	**11.8**	**137**	**80**	**0.0**
Grand Total		**574,815**	**95.9**	**1,112**	**652**	**0.0**
Route Variation COUT-B-4						
Artesia	BLM White River Field Office	48,931	9.3	108	63	0.0
Massadona	BLM White River Field Office	10,871	3.6	42	25	0.0
Miller Creek	BLM White River Field Office	4,003	2.0	23	13	0.0
Red Wash	BLM White River Field Office	8,219	1.1	13	8	0.0
Spooky Mountain	BLM White River Field Office	29,666	7.2	83	49	0.0
Antelope Draw	BLM Vernal Field Office	55,904	9.0	104	61	0.0
Bohemian Bottoms	BLM Vernal Field Office	11,544	4.2	48	28	0.0
Ouray Road	BLM Vernal Field Office	11,961	4.3	49	29	0.0
Powder Wash	BLM Vernal Field Office	26,783	6.5	75	44	0.0
Snake John	BLM Vernal Field Office	10,680	3.9	45	26	0.0
Split Mountain	BLM Vernal Field Office	120,800	9.2	106	62	0.0
Twelve Mile	BLM Vernal Field Office	32,190	4.7	54	32	0.0
Kyune I	BLM Price Field Office	14,506	5.1	60	35	0.0
West Fork	BLM Price Field Office	16,706	5.9	68	40	0.0
ISO Tract–Ludlow	BLM Salt Lake Field Office	461	0.1	1	1	0.0
BLM Total		**403,205**	**75.8**	**879**	**515**	**0.0**
Avintaquin	Ashley National Forest	9,219	0.1	2	1	0.0
Horse Ridge	Ashley National Forest	17,746	0.3	4	2	0.0
Sowers Canyon	Ashley National Forest	20,986	12.0	139	82	0.0
Cedar Knolls S & G	Manti-La Sal National Forest	5,718	1.0	11	7	0.0
Lake Fork C & H	Manti-La Sal National Forest	30,399	0.7	8	4	0.0
Diamond Fork	Uinta-Wasatch-Cache National Forest	90,743	2.0	24	14	0.0
Jacob/Baldy	Uinta-Wasatch-Cache National Forest	11,628	1.9	21	13	0.0
Tabbyune	Uinta-Wasatch-Cache National Forest	8,733	1.1	13	8	0.0
USFS Total[5]		**195,163**	**19.1**	**222**	**130**	**0.0**
Cross Mountain Ranch Limited Partnership/Company	Colorado State Land Board	3,841	2.0	23	14	0.0
Jack V. Foster	Colorado State Land Board	641	1.0	12	7	0.0
Oscar S. Wyatt, Jr.	Colorado State Land Board	641	1.0	11	7	0.0

TABLE G-3 GRAZING ALLOTMENTS FOR THE COLORADO TO UTAH – U.S. HIGHWAY 40 TO CENTRAL UTAH TO CLOVER (COUT) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
Chew Livestock, Inc.	Utah School and Institutional Trust Lands	1,281	0.2	3	1	0.0
George Lowe Children	Utah School and Institutional Trust Lands	950	1.1	12	7	0.0
J. D. Jackson	Utah School and Institutional Trust Lands	164	0.2	2	1	0.0
Farris A. Jensen	Utah School and Institutional Trust Lands	3,140	1.1	12	7	0.0
James T. Jensen	Utah School and Institutional Trust Lands	5,555	1.1	13	7	0.0
Nick Theos Family, LLP	Utah School and Institutional Trust Lands	3,376	2.8	32	19	0.0
Steven R. Pierson	Utah School and Institutional Trust Lands	1,297	1.2	13	8	0.0
William Marsing Livestock, Inc.	Utah School and Institutional Trust Lands	2,898	0.3	3	2	0.0
State Total		**23,778**	**11.8**	**137**	**80**	**0.0**
Grand Total		**610,502**	**97.2**	**1,128**	**661**	**0.0**
Route Variation COUT-B-5						
Artesia	BLM White River Field Office	48,931	9.3	107	68	0.0
Massadona	BLM White River Field Office	10,871	3.6	42	26	0.0
Miller Creek	BLM White River Field Office	4,003	2.0	22	14	0.0
Red Wash	BLM White River Field Office	8,219	1.1	13	8	0.0
Spooky Mountain	BLM White River Field Office	29,666	7.2	82	52	0.0
Antelope Draw	BLM Vernal Field Office	55,904	9.0	103	65	0.0
Bohemian Bottoms	BLM Vernal Field Office	11,544	4.2	48	30	0.0
Ouray Road	BLM Vernal Field Office	11,961	4.3	49	31	0.0
Powder Wash	BLM Vernal Field Office	26,783	6.5	74	47	0.0
Snake John	BLM Vernal Field Office	10,680	3.9	44	28	0.0
Split Mountain	BLM Vernal Field Office	120,800	9.2	105	67	0.0
Twelve Mile	BLM Vernal Field Office	32,190	4.7	54	34	0.0
Kyune I	BLM Price Field Office	14,506	6.2	72	45	0.0
West Fork	BLM Price Field Office	16,706	5.0	58	37	0.0
ISO Tract–Ludlow	BLM Salt Lake Field Office	461	0.1	1	1	0.0
BLM Total		**403,205**	**76.0**	**874**	**555**	**0.0**
Sowers Canyon	Ashley National Forest	20,986	12.0	138	88	0.0
Cedar Knolls S & G	Manti-La Sal National Forest	5,718	1.0	11	7	0.0
Lake Fork C & H	Manti-La Sal National Forest	30,399	0.7	7	5	0.0

TABLE G-3 GRAZING ALLOTMENTS FOR THE COLORADO TO UTAH – U.S. HIGHWAY 40 TO CENTRAL UTAH TO CLOVER (COUT) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
Diamond Fork	Uinta-Wasatch-Cache National Forest	90,743	2.0	23	15	0.0
Jacob/Baldy	Uinta-Wasatch-Cache National Forest	11,628	1.9	21	14	0.0
USFS Total[5]		**159,473**	**17.5**	**201**	**128**	**0.0**
Cross Mountain Ranch Limited Partnership/Company	Colorado State Land Board	3,841	2.0	23	15	0.0
Jack V. Foster	Colorado State Land Board	641	1.0	12	7	0.0
Oscar S. Wyatt ,Jr.	Colorado State Land Board	641	1.0	11	7	0.0
Chew Livestock, Inc.	Utah School and Institutional Trust Lands	1,281	0.2	3	2	0.0
George Lowe Children	Utah School and Institutional Trust Lands	950	1.1	12	8	0.0
J. D. Jackson	Utah School and Institutional Trust Lands	164	0.2	2	1	0.0
Farris A. Jensen	Utah School and Institutional Trust Lands	3,140	1.3	15	10	0.0
James T. Jensen	Utah School and Institutional Trust Lands	5,555	1.1	13	8	0.0
Nick Theos Family, LLP	Utah School and Institutional Trust Lands	3,376	2.8	32	20	0.0
Steven R. Pierson	Utah School and Institutional Trust Lands	1,297	1.2	13	8	0.0
William Marsing Livestock, Inc.	Utah School and Institutional Trust Lands	2,898	0.9	10	6	0.0
State Total		**23,778**	**12.7**	**146**	**93**	**0.0**
Grand Total		**574,815**	**96.8**	**1,113**	**707**	**0.0**
Alternative COUT-C						
Artesia	BLM White River Field Office	48,931	11.0	125	84	0.0
Massadona	BLM White River Field Office	10,871	3.6	41	28	0.0
Miller Creekeek	BLM White River Field Office	4,003	2.0	22	15	0.0
Red Wash	BLM White River Field Office	8,219	1.1	13	9	0.0
Spooky Mountain	BLM White River Field Office	29,666	7.2	82	55	0.0
Antelope Draw	BLM Vernal Field Office	55,904	3.1	35	24	0.0
Argyle Ridge	BLM Vernal Field Office	20,709	2.6	29	20	0.0
Big Wash	BLM Vernal Field Office	5,367	2.2	25	17	0.0
Bonanza	BLM Vernal Field Office	28,238	4.7	53	36	0.0
Castle Peak	BLM Vernal Field Office	51,824	3.7	43	29	0.0
Coyote Wash	BLM Vernal Field Office	107,988	9.0	102	69	0.0
Currant Canyon	BLM Vernal Field Office	6,975	0.7	8	5	0.0
Devils Canyon	BLM Vernal Field Office	22,351	0.9	10	7	0.0
Five Mile	BLM Vernal Field Office	15,622	4.9	56	38	0.0

TABLE G-3
GRAZING ALLOTMENTS FOR THE COLORADO TO UTAH – U.S. HIGHWAY 40 TO CENTRAL UTAH TO CLOVER (COUT) ALTERNATIVE ROUTES

Allotment	Jurisdiction	Total Acres of Allotment	Miles Crossed	Acres of Temporary Disturbance[1]	Acres of Permanent Disturbance[2]	Percent of Allotment Disturbed[3]
Green River Amp	BLM Vernal Field Office	9,608	0.2	2	1	0.0
Green River Bottoms	BLM Vernal Field Office	7,159	0.7	8	5	0.0
Lears Canyon	BLM Vernal Field Office	10,708	1.9	22	15	0.0
Little Desert	BLM Vernal Field Office	49,361	14.1	160	108	0.0
Olsen Amp	BLM Vernal Field Office	133,987	1.6	18	12	0.0
Parleys Canyon	BLM Vernal Field Office	16,341	7.1	81	55	0.0
Raven Ridge	BLM Vernal Field Office	10,985	3.8	43	29	0.0
Sand Wash	BLM Vernal Field Office	74,352	9.0	103	70	0.0
Seven Sisters	BLM Vernal Field Office	18,787	4.7	53	36	0.0
Snake John	BLM Vernal Field Office	10,680	0.6	6	4	0.0
Water Canyon #2	BLM Vernal Field Office	6,698	1.8	21	14	0.0
White River Bottoms	BLM Vernal Field Office	2,529	0.1	1	1	0.0
Wildhorse Bench	BLM Vernal Field Office	43,562	7.1	81	55	0.0
Kyune I	BLM Price Field Office	14,506	4.4	50	34	0.0
Price Canyon–West	BLM Price Field Office	7,428	0.9	10	7	0.0
Sulfur Canyon	BLM Price Field Office	10,941	2.9	33	22	0.0
West Field Office, RK	BLM Price Field Office	16,706	4.8	54	37	0.0
ISO Tract–Ludlow	BLM Salt Lake Field Office	461	0.1	1	1	0.0
BLM Total		**861,446**	**122.1**	**1,392**	**940**	**0.0**
Cedar Knolls S & G	Manti-La Sal National Forest	5,718	1.0	11	7	0.0
Lake Fork C & H	Manti-La Sal National Forest	30,399	0.7	7	5	0.0
Diamond Fork	Uinta-Wasatch-Cache National Forest	90,743	2.0	23	16	0.0
Jacob/Baldy	Uinta-Wasatch-Cache National Forest	11,628	1.9	21	14	0.0
USFS Total[5]		**138,487**	**5.5**	**63**	**42**	**0.0**
Cross Mountain Ranch Limited Partnership/Company	Colorado State Land Board	3,841	2.0	23	16	0.0
Jack V. Foster	Colorado State Land Board	641	1.0	12	8	0.0
Oscar S. Wyatt, Jr.	Colorado State Land Board	641	0.8	9	6	0.0
Bill Barrett Corporation	Utah School and Institutional Trust Lands	2,075	1.1	13	9	0.0
Farmland Reserve, Inc.	Utah School and Institutional Trust Lands	1,956	1.2	13	9	0.0
James, Jerry, Dix Jensen	Utah School and Institutional Trust Lands	755	0.5	6	4	0.0
Dix Jensen	Utah School and Institutional Trust Lands	1,014	0.4	4	3	0.0

TABLE G-3 GRAZING ALLOTMENTS FOR THE COLORADO TO UTAH – U.S. HIGHWAY 40 TO CENTRAL UTAH TO CLOVER (COUT) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
Farris A. Jensen	Utah School and Institutional Trust Lands	3,140	0.7	8	5	0.0
James T. Jensen	Utah School and Institutional Trust Lands	5,555	1.3	14	10	0.0
Kenneth A. Moon	Utah School and Institutional Trust Lands	482	1.0	11	8	0.0
Kirk A. Shiner	Utah School and Institutional Trust Lands	1,765	1.0	12	8	0.0
Lazy 3X Cattle, LLC	Utah School and Institutional Trust Lands	8,860	5.9	67	45	0.0
Michael Carlson	Utah School and Institutional Trust Lands	1,858	0.6	6	4	0.0
William R. Robinson	Utah School and Institutional Trust Lands	627	1.0	12	8	0.0
State Total		**33,203**	**18.4**	**209**	**141**	**0.0**
Grand Total		**1,012,329**	**129.5**	**1,476**	**997**	**0.0**
Route Variation COUT-C-1						
Artesia	BLM White River Field Office	48,931	11.0	126	86	0.0
Massadona	BLM White River Field Office	10,871	3.6	42	28	0.0
Miller Creek	BLM White River Field Office	4,003	2.0	22	15	0.0
Red Wash	BLM White River Field Office	8,219	1.1	13	9	0.0
Spooky Mountain	BLM White River Field Office	29,666	7.2	82	56	0.0
Antelope Draw	BLM Vernal Field Office	55,904	3.1	35	24	0.0
Argyle Ridge	BLM Vernal Field Office	20,709	6.5	75	51	0.0
Big Wash	BLM Vernal Field Office	5,367	2.2	25	17	0.0
Bonanza	BLM Vernal Field Office	28,238	4.7	53	36	0.0
Castle Peak	BLM Vernal Field Office	51,824	3.7	43	29	0.0
Coyote Wash	BLM Vernal Field Office	107,988	9.0	103	70	0.0
Currant Canyon	BLM Vernal Field Office	6,975	0.7	8	5	0.0
Devils Canyon	BLM Vernal Field Office	22,351	0.9	10	7	0.0
Five Mile	BLM Vernal Field Office	15,622	4.9	57	39	0.0
Green River Amp	BLM Vernal Field Office	9,608	0.2	2	1	0.0
Green River Bottoms	BLM Vernal Field Office	7,159	0.7	8	5	0.0
Lears Canyon	BLM Vernal Field Office	10,708	1.9	22	15	0.0
Little Desert	BLM Vernal Field Office	49,361	14.1	162	110	0.0
Olsen Amp	BLM Vernal Field Office	133,987	1.6	18	12	0.0
Parleys Canyon	BLM Vernal Field Office	16,341	7.1	82	55	0.0
Raven Ridge	BLM Vernal Field Office	10,985	3.8	43	29	0.0
Sand Wash	BLM Vernal Field Office	74,352	9.0	104	70	0.0

TABLE G-3
GRAZING ALLOTMENTS FOR THE COLORADO TO UTAH – U.S. HIGHWAY 40 TO CENTRAL UTAH TO CLOVER (COUT) ALTERNATIVE ROUTES

Allotment	Jurisdiction	Total Acres of Allotment	Miles Crossed	Acres of Temporary Disturbance[1]	Acres of Permanent Disturbance[2]	Percent of Allotment Disturbed[3]
Seven Sisters	BLM Vernal Field Office	18,787	4.7	54	37	0.0
Snake John	BLM Vernal Field Office	10,680	0.6	6	4	0.0
Water Canyon #1	BLM Vernal Field Office	5,121	1.9	21	15	0.0
Water Canyon #2	BLM Vernal Field Office	6,698	1.8	21	14	0.0
White River Bottoms	BLM Vernal Field Office	2,529	0.1	1	1	0.0
Wildhorse Bench	BLM Vernal Field Office	43,562	7.1	81	55	0.0
Kyune I	BLM Price Field Office	14,506	4.9	56	38	0.0
Sulfur Canyon	BLM Price Field Office	10,941	1.5	17	11	0.0
West Fork	BLM Price Field Office	16,706	6.2	71	48	0.0
ISO Tract - Ludlow	BLM Salt Lake Field Office	461	0.1	1	1	0.0
BLM Total		**859,139**	**127.5**	**1,466**	**994**	**0.0**
Avintaquin	Ashley National Forest	9,219	0.1	2	1	0.0
Horse Ridge	Ashley National Forest	17,746	0.3	4	3	0.0
Tub Ridge	Ashley National Forest	5,604	0.4	5	3	0.0
Cedar Knolls S & G	Manti-La Sal National Forest	5,718	1.0	11	8	0.0
Lake Fork C & H	Manti-La Sal National Forest	30,399	0.7	7	5	0.0
Diamond Fork	Uinta-Wasatch-Cache National Forest	90,743	2.0	23	16	0.0
Jacob/Baldy	Uinta-Wasatch-Cache National Forest	11,628	1.9	21	14	0.0
Tabbyune	Uinta-Wasatch-Cache National Forest	8,733	1.1	13	9	0.0
USFS Total[5]		**179,782**	**7.5**	**87**	**59**	**0.0**
Cross Mountain Ranch Limited Partnership/Company	Colorado State Land Board	3,841	2.0	23	16	0.0
Jack V. Foster	Colorado State Land Board	641	1.0	12	8	0.0
Oscar S. Wyatt, Jr.	Colorado State Land Board	641	0.8	9	6	0.0
Bill Barrett Corporation	Utah School and Institutional Trust Lands	2,075	1.1	13	9	0.0
George Lowe Children	Utah School and Institutional Trust Lands	950	0.5	6	4	0.0
J. D. Jackson	Utah School and Institutional Trust Lands	164	0.2	2	1	0.0
James, Jerry, Dix Jensen	Utah School and Institutional Trust Lands	755	0.2	2	1	0.0
Farris A. Jensen	Utah School and Institutional Trust Lands	3,140	0.5	6	4	0.0
James T. Jensen	Utah School and Institutional Trust Lands	5,555	0.3	3	2	0.0
Kenneth A. Moon	Utah School and Institutional Trust Lands	482	1.0	12	8	0.0
Kirk A. Shiner	Utah School and Institutional Trust Lands	1,765	1.0	12	8	0.0

TABLE G-3 GRAZING ALLOTMENTS FOR THE COLORADO TO UTAH – U.S. HIGHWAY 40 TO CENTRAL UTAH TO CLOVER (COUT) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
Lazy 3X Cattle, LLC	Utah School and Institutional Trust Lands	8,860	5.9	68	46	0.0
Michael Carlson	Utah School and Institutional Trust Lands	1,858	0.6	6	4	0.0
William R. Robinson	Utah School and Institutional Trust Lands	627	1.0	12	8	0.0
State Total		**31,347**	**16.0**	**184**	**125**	**0.0**
Grand Total		**1,049,680**	**136.1**	**1,565**	**1,062**	**0.0**
Route Variation COUT-C-2						
Artesia	BLM White River Field Office	48,931	11.0	126	86	0.0
Massadona	BLM White River Field Office	10,871	3.6	42	28	0.0
Miller Creek	BLM White River Field Office	4,003	2.0	22	15	0.0
Red Wash	BLM White River Field Office	8,219	1.1	13	9	0.0
Spooky Mountain	BLM White River Field Office	29,666	7.2	82	56	0.0
Antelope Draw	BLM Vernal Field Office	55,904	3.1	35	24	0.0
Argyle Ridge	BLM Vernal Field Office	20,709	6.5	75	51	0.0
Big Wash	BLM Vernal Field Office	5,367	2.2	25	17	0.0
Bonanza	BLM Vernal Field Office	28,238	4.7	53	36	0.0
Castle Peak	BLM Vernal Field Office	51,824	3.7	43	29	0.0
Coyote Wash	BLM Vernal Field Office	107,988	9.0	103	70	0.0
Currant Canyon	BLM Vernal Field Office	6,975	0.7	8	5	0.0
Devils Canyon	BLM Vernal Field Office	22,351	0.9	10	7	0.0
Five Mile	BLM Vernal Field Office	15,622	4.9	57	39	0.0
Green River Amp	BLM Vernal Field Office	9,608	0.2	2	1	0.0
Green River Bottoms	BLM Vernal Field Office	7,159	0.7	8	5	0.0
Lears Canyon	BLM Vernal Field Office	10,708	1.9	22	15	0.0
Little Desert	BLM Vernal Field Office	49,361	14.1	162	110	0.0
Olsen Amp	BLM Vernal Field Office	133,987	1.6	18	12	0.0
Parleys Canyon	BLM Vernal Field Office	16,341	7.1	82	55	0.0
Raven Ridge	BLM Vernal Field Office	10,985	3.8	43	29	0.0
Sand Wash	BLM Vernal Field Office	74,352	9.0	104	70	0.0
Seven Sisters	BLM Vernal Field Office	18,787	4.7	54	37	0.0
Snake John	BLM Vernal Field Office	10,680	0.6	6	4	0.0
Water Canyon #1	BLM Vernal Field Office	5,121	1.9	21	15	0.0
Water Canyon #2	BLM Vernal Field Office	6,698	1.8	21	14	0.0

TABLE G-3
GRAZING ALLOTMENTS FOR THE COLORADO TO UTAH – U.S. HIGHWAY 40 TO CENTRAL UTAH TO CLOVER (COUT) ALTERNATIVE ROUTES

Allotment	Jurisdiction	Total Acres of Allotment	Miles Crossed	Acres of Temporary Disturbance[1]	Acres of Permanent Disturbance[2]	Percent of Allotment Disturbed[3]
White River Bottoms	BLM Vernal Field Office	2,529	0.1	1	1	0.0
Wildhorse Bench	BLM Vernal Field Office	43,562	7.1	81	55	0.0
Kyune I	BLM Price Field Office	14,506	5.1	59	40	0.0
Sulfur Canyon	BLM Price Field Office	10,941	1.5	17	11	0.0
West Fork	BLM Price Field Office	16,706	5.9	68	46	0.0
ISO Tract–Ludlow	BLM Salt Lake Field Office	461	0.1	1	1	0.0
BLM Total		**859,139**	**127.4**	**1,465**	**994**	**0.0**
Avintaquin	Ashley National Forest	9,219	0.1	2	1	0.0
Horse Ridge	Ashley National Forest	17,746	0.3	4	2	0.0
Cedar Knolls S & G	Manti-La Sal National Forest	5,718	1.0	11	8	0.0
Lake Fork C & H	Manti-La Sal National Forest	30,399	0.7	7	5	0.0
Diamond Fork	Uinta-Wasatch-Cache National Forest	90,743	2.0	23	16	0.0
Jacob/Baldy	Uinta-Wasatch-Cache National Forest	11,628	1.9	21	14	0.0
Tabbyune	Uinta-Wasatch-Cache National Forest	8,733	1.1	13	9	0.0
USFS Total[5]		**174,177**	**7.1**	**82**	**55**	**0.0**
Cross Mountain Ranch Limited Partnership/Company	Colorado State Land Board	3,841	2.0	23	16	0.0
Jack V. Foster	Colorado State Land Board	641	1.0	12	8	0.0
Oscar S. Wyatt, Jr.	Colorado State Land Board	641	0.8	9	6	0.0
Bill Barrett Corporation	Utah School and Institutional Trust Lands	2,075	1.1	13	9	0.0
George Lowe Children	Utah School and Institutional Trust Lands	950	0.5	6	4	0.0
J. D. Jackson	Utah School and Institutional Trust Lands	164	0.2	2	1	0.0
Farris A. Jensen	Utah School and Institutional Trust Lands	3,140	0.5	6	4	0.0
Farris A. Jensen	Utah School and Institutional Trust Lands	3,140	1.3	15	10	0.0
James T. Jensen	Utah School and Institutional Trust Lands	5,555	1.1	13	9	0.0
Kenneth A. Moon	Utah School and Institutional Trust Lands	482	1.0	12	8	0.0
Kirk A. Shiner	Utah School and Institutional Trust Lands	1,765	1.0	12	8	0.0
Lazy 3X Cattle, LLC	Utah School and Institutional Trust Lands	8,860	5.9	68	46	0.0
Michael Carlson	Utah School and Institutional Trust Lands	1,858	0.6	6	4	0.0

TABLE G-3 GRAZING ALLOTMENTS FOR THE COLORADO TO UTAH – U.S. HIGHWAY 40 TO CENTRAL UTAH TO CLOVER (COUT) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
William Marsing Livestock, Inc.	Utah School and Institutional Trust Lands	2,898	0.9	10	7	0.0
William R. Robinson	Utah School and Institutional Trust Lands	627	1.0	12	8	0.0
State Total		**33,491**	**18.8**	**217**	**147**	**0.0**
Grand Total		**1,046,797**	**137.7**	**1,584**	**1,074**	**0.0**
Route Variation COUT-C-3 (Agency Preferred Alternative)						
Artesia	BLM White River Field Office	48,931	11.0	126	88	0.0
Massadona	BLM White River Field Office	10,871	3.6	42	29	0.0
Miller Creek	BLM White River Field Office	4,003	2.0	22	16	0.0
Red Wash	BLM White River Field Office	8,219	1.1	13	9	0.0
Spooky Mountain	BLM White River Field Office	29,666	7.2	82	57	0.0
Antelope Draw	BLM Vernal Field Office	55,904	3.1	35	25	0.0
Argyle Ridge	BLM Vernal Field Office	20,709	6.5	75	52	0.0
Big Wash	BLM Vernal Field Office	5,367	2.2	25	17	0.0
Bonanza	BLM Vernal Field Office	28,238	4.7	53	37	0.0
Castle Peak	BLM Vernal Field Office	51,824	3.7	43	30	0.0
Coyote Wash	BLM Vernal Field Office	107,988	9.0	103	72	0.0
Currant Canyon	BLM Vernal Field Office	6,975	0.7	8	6	0.0
Devils Canyon	BLM Vernal Field Office	22,351	0.9	10	7	0.0
Five Mile	BLM Vernal Field Office	15,622	4.9	57	40	0.0
Green River Amp	BLM Vernal Field Office	9,608	0.2	2	1	0.0
Green River Bottoms	BLM Vernal Field Office	7,159	0.7	8	5	0.0
Lears Canyon	BLM Vernal Field Office	10,708	1.9	22	15	0.0
Little Desert	BLM Vernal Field Office	49,361	14.1	162	112	0.0
Olsen Amp	BLM Vernal Field Office	133,987	1.6	18	13	0.0
Parleys Canyon	BLM Vernal Field Office	16,341	7.1	82	57	0.0
Raven Ridge	BLM Vernal Field Office	10,985	3.8	43	30	0.0
Sand Wash	BLM Vernal Field Office	74,352	9.0	104	72	0.0
Seven Sisters	BLM Vernal Field Office	18,787	4.7	54	38	0.0
Snake John	BLM Vernal Field Office	10,680	0.6	6	4	0.0
Water Canyon #1	BLM Vernal Field Office	5,121	1.9	21	15	0.0
Water Canyon #2	BLM Vernal Field Office	6,698	1.8	21	14	0.0
White River Bottoms	BLM Vernal Field Office	2,529	0.1	1	1	0.0

TABLE G-3 GRAZING ALLOTMENTS FOR THE COLORADO TO UTAH – U.S. HIGHWAY 40 TO CENTRAL UTAH TO CLOVER (COUT) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
Wildhorse Bench	BLM Vernal Field Office	43,562	7.1	81	57	0.0
Kyune I	BLM Price Field Office	14,506	6.2	72	50	0.0
Sulfur Canyon	BLM Price Field Office	10,941	1.5	17	12	0.0
West Field Office, RK	BLM Price Field Office	16,706	5.0	58	40	0.0
ISO Tract–Ludlow	BLM Salt Lake Field Office	461	0.1	1	1	0.0
BLM Total		**859,139**	**127.6**	**1,468**	**1,021**	**0.0**
Cedar Knolls S & G	Manti-La Sal National Forest	5,718	1.0	11	8	0.0
Lake Fork C & H	Manti-La Sal National Forest	30,399	0.7	7	5	0.0
Diamond Fork	Uinta-Wasatch-Cache National Forest	90,743	2.0	23	16	0.0
Jacob/Baldy	Uinta-Wasatch-Cache National Forest	11,628	1.9	21	15	0.0
USFS Total[5]		**138,487**	**5.5**	**63**	**44**	**0.0**
Cross Mountain Ranch Limited Partnership/Company	Colorado State Land Board	3,841	2.0	23	16	0.0
Jack V. Foster	Colorado State Land Board	641	1.0	12	8	0.0
Oscar S. Wyatt, Jr.	Colorado State Land Board	641	0.8	9	6	0.0
Bill Barrett Corporation	Utah School and Institutional Trust Lands	2,075	1.1	13	9	0.0
George Lowe Children	Utah School and Institutional Trust Lands	950	0.5	6	4	0.0
J. D. Jackson	Utah School and Institutional Trust Lands	164	0.2	2	1	0.0
Farris A. Jensen	Utah School and Institutional Trust Lands	3,140	0.5	6	4	0.0
Farris A. Jensen	Utah School and Institutional Trust Lands	3,140	1.3	15	11	0.0
James T. Jensen	Utah School and Institutional Trust Lands	5,555	1.1	13	9	0.0
Kenneth A. Moon	Utah School and Institutional Trust Lands	482	1.0	12	8	0.0
Kirk A. Shiner	Utah School and Institutional Trust Lands	1,765	1.0	12	8	0.0
Lazy 3X Cattle, LLC	Utah School and Institutional Trust Lands	8,860	5.9	68	47	0.0
Michael Carlson	Utah School and Institutional Trust Lands	1,858	0.6	6	4	0.0
William Marsing Livestock, Inc.	Utah School and Institutional Trust Lands	2,898	0.9	10	7	0.0
William R. Robinson	Utah School and Institutional Trust Lands	627	1.0	12	8	0.0
State Total		**33,491**	**18.8**	**217**	**151**	**0.0**
Grand Total		**1,011,110**	**136.3**	**1,567**	**1,090**	**0.0**
Route Variation COUT-C-4						
Artesia	BLM White River Field Office	48,931	11.0	126	81	`
Massadona	BLM White River Field Office	10,871	3.6	42	27	0.0

TABLE G-3 GRAZING ALLOTMENTS FOR THE COLORADO TO UTAH – U.S. HIGHWAY 40 TO CENTRAL UTAH TO CLOVER (COUT) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
Miller Creek	BLM White River Field Office	4,003	2.0	22	14	0.0
Red Wash	BLM White River Field Office	8,219	1.1	13	8	0.0
Spooky Mountain	BLM White River Field Office	29,666	7.2	82	53	0.0
Antelope Draw	BLM Vernal Field Office	55,904	3.1	35	23	0.0
Argyle Ridge	BLM Vernal Field Office	20,709	3.3	38	24	0.0
Big Wash	BLM Vernal Field Office	5,367	2.2	25	16	0.0
Bonanza	BLM Vernal Field Office	28,238	4.7	53	34	0.0
Castle Peak	BLM Vernal Field Office	51,824	3.7	43	28	0.0
Coyote Wash	BLM Vernal Field Office	107,988	9.0	103	67	0.0
Currant Canyon	BLM Vernal Field Office	6,975	0.7	8	5	0.0
Devils Canyon	BLM Vernal Field Office	22,351	0.9	10	7	0.0
Five Mile	BLM Vernal Field Office	15,622	4.9	57	37	0.0
Green River Amp	BLM Vernal Field Office	9,608	0.2	2	1	0.0
Green River Bottoms	BLM Vernal Field Office	7,159	0.7	8	5	0.0
Lears Canyon	BLM Vernal Field Office	10,708	1.9	22	14	0.0
Little Desert	BLM Vernal Field Office	49,361	14.1	162	104	0.0
Olsen Amp	BLM Vernal Field Office	133,987	1.6	18	12	0.0
Parleys Canyon	BLM Vernal Field Office	16,341	7.1	82	52	0.0
Raven Ridge	BLM Vernal Field Office	10,985	3.8	43	28	0.0
Sand Wash	BLM Vernal Field Office	74,352	9.0	104	67	0.0
Seven Sisters	BLM Vernal Field Office	18,787	4.7	54	35	0.0
Snake John	BLM Vernal Field Office	10,680	0.6	6	4	0.0
Water Canyon #1	BLM Vernal Field Office	5,121	3.3	38	24	0.0
Water Canyon #2	BLM Vernal Field Office	6,698	1.8	21	13	0.0
White River Bottoms	BLM Vernal Field Office	2,529	0.1	1	1	0.0
Wildhorse Bench	BLM Vernal Field Office	43,562	7.1	81	52	0.0
Kyune I	BLM Price Field Office	14,506	5.1	59	38	0.0
Sulfur Canyon	BLM Price Field Office	10,941	2.9	33	21	0.0
West Fork	BLM Price Field Office	16,706	5.9	68	44	0.0
ISO Tract - Ludlow	BLM Salt Lake Field Office	461	0.1	1	1	0.0
BLM Total		**859,139**	**127.0**	**1,461**	**940**	**0.0**

TABLE G-3 GRAZING ALLOTMENTS FOR THE COLORADO TO UTAH – U.S. HIGHWAY 40 TO CENTRAL UTAH TO CLOVER (COUT) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
Avintaquin	Ashley National Forest	9,219	0.1	2	1	0.0
Horse Ridge	Ashley National Forest	17,746	0.3	4	2	0.0
Cedar Knolls S & G	Manti-La Sal National Forest	5,718	1.0	11	7	0.0
Lake Fork C & H	Manti-La Sal National Forest	30,399	0.7	7	5	0.0
Diamond Fork	Uinta-Wasatch-Cache National Forest	90,743	2.0	23	15	0.0
Jacob/Baldy	Uinta-Wasatch-Cache National Forest	11,628	1.9	21	14	0.0
Tabbyune	Uinta-Wasatch-Cache National Forest	8,733	1.1	13	8	0.0
USFS Total[5]		**174,177**	**7.1**	**82**	**53**	**0.0**
Cross Mountain Ranch Limited Partnership/Company	Colorado State Land Board	3,841	2.0	23	15	0.0
Jack V. Foster	Colorado State Land Board	641	1.0	12	7	0.0
Oscar S. Wyatt, Jr.	Colorado State Land Board	641	0.8	9	6	0.0
Bill Barrett Corporation	Utah School and Institutional Trust Lands	2,075	1.1	13	8	0.0
Farmland Reserve, Inc.	Utah School and Institutional Trust Lands	1,956	1.0	12	8	0.0
J. D. Jackson	Utah School and Institutional Trust Lands	164	0.2	2	1	0.0
Jacquelyn B. Oman	Utah School and Institutional Trust Lands	648	1.0	12	7	0.0
James Allen Staker	Utah School and Institutional Trust Lands	648	1.0	12	7	0.0
Farris A. Jensen	Utah School and Institutional Trust Lands	3,140	1.8	21	14	0.0
James T. Jensen	Utah School and Institutional Trust Lands	5,555	1.1	13	8	0.0
JTJJ Enterprises, Ltd.	Utah School and Institutional Trust Lands	605	1.0	12	8	0.0
Kenneth A. Moon	Utah School and Institutional Trust Lands	482	1.0	12	7	0.0
Kirk A. Shiner	Utah School and Institutional Trust Lands	1,765	1.0	12	8	0.0
Lazy 3X Cattle, LLC	Utah School and Institutional Trust Lands	8,860	5.9	68	44	0.0
Michael Carlson	Utah School and Institutional Trust Lands	1,858	0.6	6	4	0.0
William Marsing Livestock, Inc.	Utah School and Institutional Trust Lands	2,898	0.3	3	2	0.0
William R. Robinson	Utah School and Institutional Trust Lands	627	1.0	12	7	0.0
State Total		**35,749**	**20.8**	**239**	**154**	**0.0**
Grand Total		**1,047,803**	**137.3**	**1,579**	**1,016**	**0.0**
Route Variation COUT-C-5						
Artesia	BLM White River Field Office	48,931	11.0	126	81	0.0
Massadona	BLM White River Field Office	10,871	3.6	42	27	0.0
Miller Creek	BLM White River Field Office	4,003	2.0	22	14	0.0

TABLE G-3
GRAZING ALLOTMENTS FOR THE COLORADO TO UTAH – U.S. HIGHWAY 40 TO CENTRAL UTAH TO CLOVER (COUT) ALTERNATIVE ROUTES

Allotment	Jurisdiction	Total Acres of Allotment	Miles Crossed	Acres of Temporary Disturbance[1]	Acres of Permanent Disturbance[2]	Percent of Allotment Disturbed[3]
Red Wash	BLM White River Field Office	8,219	1.1	13	8	0.0
Spooky Mountain	BLM White River Field Office	29,666	7.2	82	53	0.0
Antelope Draw	BLM Vernal Field Office	55,904	3.1	35	23	0.0
Argyle Ridge	BLM Vernal Field Office	20,709	3.3	38	24	0.0
Big Wash	BLM Vernal Field Office	5,367	2.2	25	16	0.0
Bonanza	BLM Vernal Field Office	28,238	4.7	53	34	0.0
Castle Peak	BLM Vernal Field Office	51,824	3.7	43	28	0.0
Coyote Wash	BLM Vernal Field Office	107,988	9.0	103	67	0.0
Currant Canyon	BLM Vernal Field Office	6,975	0.7	8	5	0.0
Devils Canyon	BLM Vernal Field Office	22,351	0.9	10	7	0.0
Five Mile	BLM Vernal Field Office	15,622	4.9	57	37	0.0
Green River Amp	BLM Vernal Field Office	9,608	0.2	2	1	0.0
Green River Bottoms	BLM Vernal Field Office	7,159	0.7	8	5	0.0
Lears Canyon	BLM Vernal Field Office	10,708	1.9	22	14	0.0
Little Desert	BLM Vernal Field Office	49,361	14.1	162	104	0.0
Olsen Amp	BLM Vernal Field Office	133,987	1.6	18	12	0.0
Parleys Canyon	BLM Vernal Field Office	16,341	7.1	82	52	0.0
Raven Ridge	BLM Vernal Field Office	10,985	3.8	43	28	0.0
Sand Wash	BLM Vernal Field Office	74,352	9.0	104	67	0.0
Seven Sisters	BLM Vernal Field Office	18,787	4.7	54	35	0.0
Snake John	BLM Vernal Field Office	10,680	0.6	6	4	0.0
Water Canyon #1	BLM Vernal Field Office	5,121	3.3	38	24	0.0
Water Canyon #2	BLM Vernal Field Office	6,698	1.8	21	13	0.0
White River Bottoms	BLM Vernal Field Office	2,529	0.1	1	1	0.0
Wildhorse Bench	BLM Vernal Field Office	43,562	7.1	81	52	0.0
Kyune I	BLM Price Field Office	14,506	6.2	72	46	0.0
Sulfur Canyon	BLM Price Field Office	10,941	2.9	33	21	0.0
West Fork	BLM Price Field Office	16,706	5.0	58	37	0.0
ISO Tract–Ludlow	BLM Salt Lake Field Office	461	0.1	1	1	0.0
BLM Total		**859,139**	**127.3**	**1,464**	**942**	**0.0**
Cedar Knolls S & G	Manti-La Sal National Forest	5,718	1.0	11	7	0.0
Lake Fork C & H	Manti-La Sal National Forest	30,399	0.7	7	5	0.0

TABLE G-3 GRAZING ALLOTMENTS FOR THE COLORADO TO UTAH – U.S. HIGHWAY 40 TO CENTRAL UTAH TO CLOVER (COUT) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
Diamond Fork	Uinta-Wasatch-Cache National Forest	90,743	2.0	23	15	0.0
Jacob/Baldy	Uinta-Wasatch-Cache National Forest	11,628	1.9	21	14	0.0
USFS Total[5]		**138,487**	**5.5**	**63**	**41**	**0.0**
Cross Mountain Ranch Limited Partnership/Company	Colorado State Land Board	3,841	2.0	23	15	0.0
Jack V. Foster	Colorado State Land Board	641	1.0	12	7	0.0
Oscar S. Wyatt, Jr.	Colorado State Land Board	641	0.8	9	6	0.0
Bill Barrett Corporation	Utah School and Institutional Trust Lands	2,075	1.1	13	8	0.0
Farmland Reserve, Inc.	Utah School and Institutional Trust Lands	1,956	1.0	12	8	0.0
J. D. Jackson	Utah School and Institutional Trust Lands	164	0.2	2	1	0.0
Jacquelyn B. Oman	Utah School and Institutional Trust Lands	648	1.0	12	7	0.0
James Allen Staker	Utah School and Institutional Trust Lands	648	1.0	12	7	0.0
Farris A. Jensen	Utah School and Institutional Trust Lands	3,140	1.8	21	14	0.0
James T. Jensen	Utah School and Institutional Trust Lands	5,555	1.1	13	8	0.0
JTJJ Enterprises, Ltd.	Utah School and Institutional Trust Lands	605	1.0	12	8	0.0
Kenneth A. Moon	Utah School and Institutional Trust Lands	482	1.0	12	7	0.0
Kirk A. Shiner	Utah School and Institutional Trust Lands	1,765	1.0	12	8	0.0
Lazy 3X Cattle, LLC	Utah School and Institutional Trust Lands	8,860	5.9	68	44	0.0
Michael Carlson	Utah School and Institutional Trust Lands	1,858	0.6	6	4	0.0
William Marsing Livestock, Inc.	Utah School and Institutional Trust Lands	2,898	0.3	3	2	0.0
William R. Robinson	Utah School and Institutional Trust Lands	627	1.0	12	7	0.0
State Total		**35,749**	**20.8**	**239**	**154**	**0.0**
Grand Total		**1,012,115**	**135.9**	**1,563**	**1,006**	**0.0**
Alternative COUT-H (Applicant Preferred Alternative)						
Artesia	BLM White River Field Office	48,931	11.0	125	77	0.0
Massadona	BLM White River Field Office	10,871	3.6	41	25	0.0
Miller Creek	BLM White River Field Office	4,003	2.0	22	14	0.0
Red Wash	BLM White River Field Office	8,219	1.1	13	8	0.0
Spooky Mountain	BLM White River Field Office	29,666	7.2	82	50	0.0
Antelope Draw	BLM Vernal Field Office	55,904	3.1	35	22	0.0
Argyle Ridge	BLM Vernal Field Office	20,709	2.6	29	18	0.0
Big Wash	BLM Vernal Field Office	5,367	2.2	25	15	0.0

TABLE G-3
GRAZING ALLOTMENTS FOR THE COLORADO TO UTAH – U.S. HIGHWAY 40 TO CENTRAL UTAH TO CLOVER (COUT) ALTERNATIVE ROUTES

Allotment	Jurisdiction	Total Acres of Allotment	Miles Crossed	Acres of Temporary Disturbance[1]	Acres of Permanent Disturbance[2]	Percent of Allotment Disturbed[3]
Bonanza	BLM Vernal Field Office	28,238	4.7	53	33	0.0
Castle Peak	BLM Vernal Field Office	51,824	3.7	43	26	0.0
Coyote Wash	BLM Vernal Field Office	107,988	9.0	102	63	0.0
Currant Canyon	BLM Vernal Field Office	6,975	0.7	8	5	0.0
Devils Canyon	BLM Vernal Field Office	22,351	0.9	10	6	0.0
Five Mile	BLM Vernal Field Office	15,622	4.9	56	35	0.0
Green River Amp	BLM Vernal Field Office	9,608	0.2	2	1	0.0
Green River Bottoms	BLM Vernal Field Office	7,159	0.7	8	5	0.0
Lears Canyon	BLM Vernal Field Office	10,708	1.9	22	14	0.0
Little Desert	BLM Vernal Field Office	49,361	14.1	160	98	0.0
Olsen Amp	BLM Vernal Field Office	133,987	1.6	18	11	0.0
Parleys Canyon	BLM Vernal Field Office	16,341	7.1	81	50	0.0
Raven Ridge	BLM Vernal Field Office	10,985	3.8	43	26	0.0
Sand Wash	BLM Vernal Field Office	74,352	9.0	103	63	0.0
Seven Sisters	BLM Vernal Field Office	18,787	4.7	53	33	0.0
Snake John	BLM Vernal Field Office	10,680	0.6	6	4	0.0
Water Canyon #2	BLM Vernal Field Office	6,698	1.8	21	13	0.0
White River Bottoms	BLM Vernal Field Office	2,529	0.1	1	1	0.0
Wildhorse Bench	BLM Vernal Field Office	43,562	7.1	81	50	0.0
Consumers Wash	BLM Price Field Office	10,723	4.9	56	34	0.0
Gordon Creek Withdrawal	BLM Price Field Office	21,837	5.2	59	36	0.0
Sulfur Canyon	BLM Price Field Office	10,941	2.9	33	20	0.0
Trail Canyon	BLM Price Field Office	5,860	3.8	43	26	0.0
Willow Creek	BLM Price Field Office	15,025	6.1	69	42	0.0
Hop Creek	BLM Richfield Field Office	2,566	1.3	14	9	0.0
Uinta	BLM Richfield Field Office	1,028	1.2	13	8	0.0
BLM Total		**879,383**	**134.2**	**1,530**	**940**	**0.0**
Beaver Dams/Boulger	Manti-La Sal National Forest	4,801	0.7	8	5	0.0
Burnout	Manti-La Sal National Forest	4,254	3.0	35	21	0.0
Gooseberry–Cottonwood	Manti-La Sal National Forest	4,668	2.8	32	20	0.0
Private Land	Manti-La Sal National Forest	6,491	2.1	24	15	0.0

TABLE G-3 GRAZING ALLOTMENTS FOR THE COLORADO TO UTAH – U.S. HIGHWAY 40 TO CENTRAL UTAH TO CLOVER (COUT) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
Private Land Permit	Manti-La Sal National Forest	9,053	1.4	16	10	0.0
Swens Canyon	Manti-La Sal National Forest	2,072	1.2	14	8	0.0
USFS Total		**31,339**	**11.3**	**129**	**79**	**0.0**
Cross Mountain Ranch Limited Partnership/Company	Colorado State Land Board	3,841	2.0	23	14	0.0
Jack V. Foster	Colorado State Land Board	641	1.0	12	7	0.0
Oscar S. Wyatt, Jr.	Colorado State Land Board	641	0.8	9	5	0.0
Bill Barrett Corporation	Utah School and Institutional Trust Lands	2,075	1.1	13	8	0.0
Farmland Reserve, Inc.	Utah School and Institutional Trust Lands	1,956	1.2	13	8	0.0
James T. Jensen	Utah School and Institutional Trust Lands	5,555	0.0	0	0	0.0
Kenneth A. Moon	Utah School and Institutional Trust Lands	482	1.0	11	7	0.0
Kirk A. Shiner	Utah School and Institutional Trust Lands	1,765	1.0	12	7	0.0
Lazy 3X Cattle, LLC	Utah School and Institutional Trust Lands	8,860	5.9	67	41	0.0
Michael Carlson	Utah School and Institutional Trust Lands	1,858	0.6	6	4	0.0
Pete Stamatakis	Utah School and Institutional Trust Lands	2,252	2.1	24	15	0.0
Steve Stamatakis	Utah School and Institutional Trust Lands	2,252	2.1	24	15	0.0
William R. Robinson	Utah School and Institutional Trust Lands	627	1.0	12	7	0.0
State Total		**30,546**	**17.7**	**202**	**124**	**0.0**
Grand Total		**922,312**	**146.7**	**1,672**	**1,027**	**0.0**
Alternative COUT-I						
Artesia	BLM White River Field Office	48,931	11.0	125	73	0.0
Massadona	BLM White River Field Office	10,871	3.6	41	24	0.0
Miller Creek	BLM White River Field Office	4,003	2.0	22	13	0.0
Red Wash	BLM White River Field Office	8,219	1.1	13	7	0.0
Spooky Mountain	BLM White River Field Office	29,666	7.2	82	48	0.0
Antelope Draw	BLM Vernal Field Office	55,904	3.1	35	21	0.0
Argyle Ridge	BLM Vernal Field Office	20,709	2.6	29	17	0.0
Big Wash	BLM Vernal Field Office	5,367	2.2	25	15	0.0
Bonanza	BLM Vernal Field Office	28,238	4.7	53	31	0.0
Castle Peak	BLM Vernal Field Office	51,824	3.7	43	25	0.0
Coyote Wash	BLM Vernal Field Office	107,988	9.0	102	60	0.0
Currant Canyon	BLM Vernal Field Office	6,975	0.7	8	5	0.0

TABLE G-3 GRAZING ALLOTMENTS FOR THE COLORADO TO UTAH – U.S. HIGHWAY 40 TO CENTRAL UTAH TO CLOVER (COUT) ALTERNATIVE ROUTES						
Allotment	**Jurisdiction**	**Total Acres of Allotment**	**Miles Crossed**	**Acres of Temporary Disturbance[1]**	**Acres of Permanent Disturbance[2]**	**Percent of Allotment Disturbed[3]**
Devils Canyon	BLM Vernal Field Office	22,351	0.9	10	6	0.0
Five Mile	BLM Vernal Field Office	15,622	4.9	56	33	0.0
Green River Amp	BLM Vernal Field Office	9,608	0.2	2	1	0.0
Green River Bottoms	BLM Vernal Field Office	7,159	0.7	8	4	0.0
Lears Canyon	BLM Vernal Field Office	10,708	1.9	22	13	0.0
Little Desert	BLM Vernal Field Office	49,361	14.1	160	94	0.0
Olsen Amp	BLM Vernal Field Office	133,987	1.6	18	11	0.0
Parleys Canyon	BLM Vernal Field Office	16,341	7.1	81	48	0.0
Raven Ridge	BLM Vernal Field Office	10,985	3.8	43	25	0.0
Sand Wash	BLM Vernal Field Office	74,352	9.0	103	61	0.0
Seven Sisters	BLM Vernal Field Office	18,787	4.7	53	31	0.0
Snake John	BLM Vernal Field Office	10,680	0.6	6	4	0.0
Water Canyon #2	BLM Vernal Field Office	6,698	1.8	21	12	0.0
White River Bottoms	BLM Vernal Field Office	2,529	0.1	1	1	0.0
Wildhorse Bench	BLM Vernal Field Office	43,562	7.1	81	47	0.0
Bench	BLM Price Field Office	1,366	2.2	25	15	0.0
Cat Canyon	BLM Price Field Office	2,204	3.4	39	23	0.0
Coal Creek	BLM Price Field Office	17,973	6.0	69	40	0.0
Corner	BLM Price Field Office	3,127	0.6	6	4	0.0
Mathis Wash	BLM Price Field Office	5,230	2.0	23	14	0.0
Mounds	BLM Price Field Office	23,077	0.6	7	4	0.0
North Olsen Lake	BLM Price Field Office	4,074	4.2	48	28	0.0
Oviatt	BLM Price Field Office	453	1.3	15	9	0.0
Poison Spring Bench	BLM Price Field Office	11,859	2.9	33	19	0.0
Soldiers Canyon	BLM Price Field Office	22,667	1.6	18	11	0.0
South Olsen Lake	BLM Price Field Office	1,897	2.7	31	18	0.0
Staker	BLM Price Field Office	679	0.8	9	5	0.0
Sulfur Canyon	BLM Price Field Office	10,941	2.9	33	19	0.0
Washboard	BLM Price Field Office	11,222	5.0	57	33	0.0
Wellington	BLM Price Field Office	328	0.4	4	2	0.0
West Huntington	BLM Price Field Office	17,384	3.2	36	21	0.0
Apple Spring	BLM Richfield Field Office	3,806	2.7	30	18	0.0

TABLE G-3
GRAZING ALLOTMENTS FOR THE COLORADO TO UTAH – U.S. HIGHWAY 40 TO CENTRAL UTAH TO CLOVER (COUT) ALTERNATIVE ROUTES

Allotment	Jurisdiction	Total Acres of Allotment	Miles Crossed	Acres of Temporary Disturbance[1]	Acres of Permanent Disturbance[2]	Percent of Allotment Disturbed[3]
Hop Creek	BLM Richfield Field Office	2,566	2.0	22	13	0.0
Indian Hollow	BLM Richfield Field Office	1,774	1.4	16	9	0.0
BLM Total		**954,029**	**154.8**	**1,764**	**1,037**	**0.0**
Booth Canyon	Manti-La Sal National Forest	2,671	0.9	11	6	0.0
East Mountain	Manti-La Sal National Forest	11,028	2.4	28	16	0.0
Gentry	Manti-La Sal National Forest	5,162	2.3	26	15	0.0
Joes Valley	Manti-La Sal National Forest	8,185	1.7	19	11	0.0
Out	Manti-La Sal National Forest	7,830	0.6	6	4	0.0
Potter Canyon	Manti-La Sal National Forest	2,577	2.7	31	18	0.0
Private Land Permit	Manti-La Sal National Forest	9,053	2.3	26	16	0.0
Skyline S & G	Manti-La Sal National Forest	8,011	2.0	23	14	0.0
South Skyline S & G	Manti-La Sal National Forest	11,683	0.4	4	3	0.0
Trail Mountain	Manti-La Sal National Forest	23,763	4.6	53	31	0.0
USFS Total		**89,963**	**20.0**	**228**	**134**	**0.0**
Cross Mountain Ranch Limited Partnership/Company	Colorado State Land Board	3,841	2.0	23	14	0.0
Jack V. Foster	Colorado State Land Board	641	1.0	12	7	0.0
Oscar S. Wyatt, Jr.	Colorado State Land Board	641	0.8	9	5	0.0
Anderson Brothers	Utah School and Institutional Trust Lands	568	1.1	12	7	0.0
Bill Fasselin	Utah School and Institutional Trust Lands	2,101	1.0	12	7	0.0
Bill Barrett Corporation	Utah School and Institutional Trust Lands	2,075	1.1	13	8	0.0
Cory Cloward	Utah School and Institutional Trust Lands	989	0.7	8	5	0.0
Courtney Guymon	Utah School and Institutional Trust Lands	13,117	5.9	67	39	0.0
Donna Lemmon	Utah School and Institutional Trust Lands	12,895	5.9	67	40	0.0
Earl and Sheila Gordon	Utah School and Institutional Trust Lands	12,870	5.8	66	39	0.0
Farmland Reserve, Inc.	Utah School and Institutional Trust Lands	1,956	1.4	16	9	0.0
Bill and Jennie Fasselin	Utah School and Institutional Trust Lands	3,583	1.7	19	11	0.0
Courtney Guymon	Utah School and Institutional Trust Lands	11,147	3.1	36	21	0.0
Hatch Livestock	Utah School and Institutional Trust Lands	26,095	9.4	107	63	0.0
Ira W. Hatch	Utah School and Institutional Trust Lands	13,117	5.9	67	39	0.0
Jordan W. Hatch	Utah School and Institutional Trust Lands	12,830	5.8	66	39	0.0
Keith A. Larsen	Utah School and Institutional Trust Lands	13,750	5.9	67	39	0.0

TABLE G-3
GRAZING ALLOTMENTS FOR THE COLORADO TO UTAH – U.S. HIGHWAY 40 TO CENTRAL UTAH TO CLOVER (COUT) ALTERNATIVE ROUTES

Allotment	Jurisdiction	Total Acres of Allotment	Miles Crossed	Acres of Temporary Disturbance[1]	Acres of Permanent Disturbance[2]	Percent of Allotment Disturbed[3]
Kenneth A. Moon	Utah School and Institutional Trust Lands	482	1.0	11	7	0.0
Kirk A. Shiner	Utah School and Institutional Trust Lands	1,765	1.0	12	7	0.0
Lazy 3X Cattle, LLC	Utah School and Institutional Trust Lands	8,860	5.9	67	40	0.0
Lee McElprang	Utah School and Institutional Trust Lands	24,264	9.0	102	60	0.0
Leon McElprang	Utah School and Institutional Trust Lands	9,592	0.0	0	0	0.0
Leon McElprang	Utah School and Institutional Trust Lands	9,592	0.0	0	0	0.0
Leon McElprang	Utah School and Institutional Trust Lands	9,592	1.4	16	9	0.0
Leon McElprang	Utah School and Institutional Trust Lands	9,592	1.5	18	10	0.0
Linda M. Muth	Utah School and Institutional Trust Lands	6,208	3.1	35	21	0.0
Leon McElprang,	Utah School and Institutional Trust Lands	23,977	8.9	102	60	0.0
Thomas McElprang	Utah School and Institutional Trust Lands	9,946	2.9	33	19	0.0
Michael Carlson	Utah School and Institutional Trust Lands	1,858	0.6	6	4	0.0
The Earl and Sheila Gordon Trust	Utah School and Institutional Trust Lands	22,810	8.7	100	59	0.0
Sherrel Ward	Utah School and Institutional Trust Lands	13,117	5.9	67	39	0.0
William R. Robinson	Utah School and Institutional Trust Lands	627	1.0	12	7	0.0
State Total		**64,261**	**33.0**	**376**	**221**	**0.0**
Grand Total		**1,070,971**	**183.7**	**2,094**	**1,231**	**0.0**

NOTES:
The agency total allotment acreage and the miles crossed do not equal a sum of each agency's total allotment acreage or miles crossed, due to overlap of allotment boundaries. Also, the grand-total acreage and the miles crossed do not equal a sum of each agency's total allotment acreage or miles crossed due to overlap of allotment boundaries.
[1] Temporary Disturbance: Estimated area of disturbance associated with structure work areas, wire pulling-and-tensioning sites, wire-splicing sites, multi-purpose construction yards, helicopter fly yards, guard structures, and temporary access roads (refer to Environmental Impact Statement [EIS] Table 2-1).
[2] Permanent Disturbance: Estimated area of disturbance associated with the area occupied by structures (pads), communication regeneration stations, substations and series compensation stations, and permanent access roads (refer to EIS Table 2-2).
[3]All percentages of allotments disturbed are less than 0.1 percent. Due to rounding, the percentages are shown as 0.0 percent.
[4]For the BLM White River Field Office, the unit called "Unallotted" has not been included in the numbers above.
[5]The unit in Uinta–Wasatch-Cache National Forest called "Watershed Closure" has not been included in the numbers above.
BLM = Bureau of Land Management
USFS = U.S. Forest Service