Final Environmental Impact Statement for Eagle Take Permits for the Chokecherry and Sierra Madre Phase I Wind Energy Project

Volume 1 — Final Environmental Impact Statement

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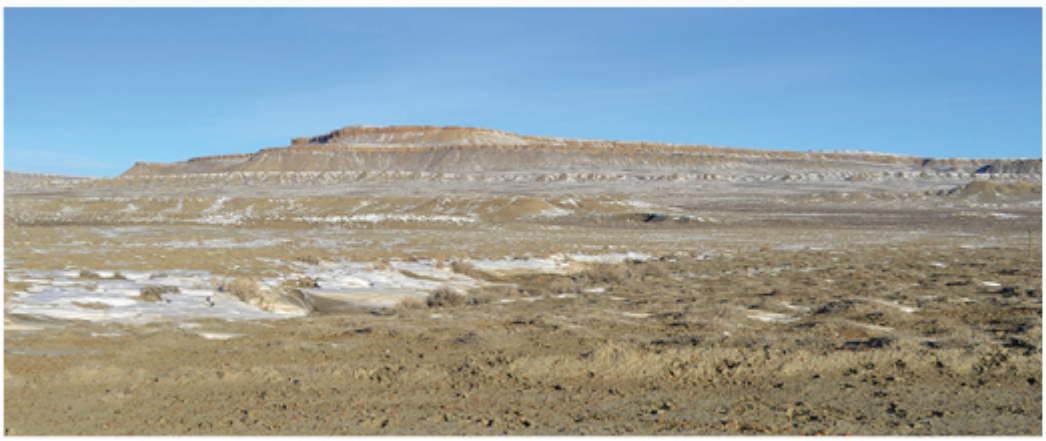

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Executive Summary

ES.1 Purpose and Need

We, the U.S. Fish and Wildlife Service (USFWS), have prepared this Final Environmental Impact Statement (EIS) pursuant to the National Environmental Policy Act (NEPA). This EIS evaluates the effects of issuing both a standard and a programmatic Eagle Take Permit (ETP) for non-purposeful take of eagles that is incidental to otherwise lawful activities under the Bald and Golden Eagle Protection Act (BGEPA) for construction and operational activities associated with the Chokecherry and Sierra Madre (CCSM) Phase I Wind Energy Project.

On June 16, 2015, the Power Company of Wyoming LLC (PCW or the Applicant) applied for two ETPs: a standard ETP for construction of the wind turbine development and infrastructure components for the CCSM Phase I Project, and a programmatic ETP for operation of the CCSM Phase I Project. PCW's Eagle Conservation Plan (ECP), provided in Attachment A, is the foundation of PCW's ETP applications.

We are obligated to review the application package, complete the associated NEPA process, identify a Preferred Alternative, and decide whether or not to issue ETPs under BGEPA for the CCSM Phase I Project. To issue ETPs, we must determine that the CCSM Phase I Project is consistent with the BGEPA regulatory standards, currently defined as maintaining stable or increasing breeding populations of bald and golden eagles. In making this determination, we will endeavor to follow Secretarial Order 3285, which encourages development of renewable energy generation projects in the United States.

ES.1.1 General Project Overview

PCW proposes to construct, operate, and maintain the CCSM Phase I Project in Carbon County, Wyoming, south of the city of Rawlins, as shown in Chapter 1.0, Figure 1-1. The CCSM Phase I Project would consist of approximately 500 wind turbines and a variety of supporting infrastructure. PCW has applied for ETPs for the CCSM Phase I Project as a viable stand-alone project, independent of Phase II. The CCSM Phase II Project, which could be developed at a later date, would consist of up to an additional 500 wind turbines; this reasonably foreseeable project is analyzed for cumulative impacts in Chapter 4.0 of this EIS. The northern portion of the proposed project is termed Chokecherry, and the southern portion is termed Sierra Madre. The CCSM Phase I Project would occur in the western portions of both the Chokecherry and Sierra Madre Wind Development Areas (WDAs).

ES.1.2 Previous and Ongoing Environmental Review

About half of the CCSM Project would be located on federal lands and would require a right-of-way (ROW) grant from the Bureau of Land Management (BLM). The BLM NEPA review for the ROW grant is a tiered review. In 2012, the BLM completed a Final EIS and a Record of Decision for the CCSM Project as it was proposed to them at that time, consisting of

1,000 wind turbines over an area that would encompass both the CCSM Phase I Project and the CCSM Phase II Project. Starting in late 2013, the BLM began conducting detailed NEPA review of PCW's site-specific plans of development for the CCSM Phase I Project in the form of two Environmental Assessments (EAs).

The first EA, called EA1 and titled "Environmental Assessment for Infrastructure Components: Phase I Haul Road and Facilities, West Sinclair Rail Facility, and Road Rock Quarry," was finalized in December 2014 (BLM 2014). The second EA, called EA2 and titled "Environmental Assessment for Phase I Wind Turbine Development," is for the 500 wind turbines and pads, access roads, and associated components for the CCSM Phase I Project (BLM 2016a).

We have an independent obligation to comply with NEPA. The analysis in our EIS incorporates by reference many portions of BLM's documents in accordance with 40 Code of Federal Regulations (CFR) 1502.21. This EIS explicitly states what documents are incorporated by reference wherever that occurs and describes the information that we have determined to be adequate for our analysis. New analysis provided in this EIS focuses primarily on eagles and related resources (such as habitat and prey), as well as migratory birds and other wildlife, that would potentially be affected by ETPs for the CCSM Phase I Project and other alternatives. Although we are preparing a separate NEPA document for the CCSM Phase I Project, we are closely coordinating with the BLM.

ES.1.3 Policy, Authority, and Legal Overview

ES.1.3.1 National Environmental Policy Act

We have determined that several factors pertaining to the context and intensity of potential impacts of the CCSM Phase I Project are "significant" (as defined in 40 CFR 1508.27) and warrant the preparation of an EIS for ETPs for the CCSM Phase I Project.

ES.1.3.2 Bald and Golden Eagle Protection Act

We oversee the administration, implementation, and enforcement of BGEPA. Under the Eagle Permit Rule issued in 2009, we can issue two types of permits for eagle take: standard permits and programmatic permits. Both types of permits can authorize take of bald and golden eagles or their nests when the take is associated with, but not the purpose of, an otherwise lawful activity and cannot practicably be avoided.

Standard ETPs authorize individual instances of take (including nest disturbance during construction activities) where the location, timing, and amount of take are all known. Programmatic ETPs authorize take that may recur through the life of a project and are applicable where the location, timing, and amount of take are all unknown. The maximum duration for ETPs is 5 years. If we receive an application to renew an ETP after 5 years, we will conduct any additional NEPA analysis that is determined to be appropriate at that time.

To be authorized under a permit, any non-purposeful (that is, incidental) take and associated compensatory mitigation must result in maintaining stable or increasing breeding populations of bald and golden eagles. Under the regulations, any take must be unavoidable even after the

implementation of advanced conservation practices (ACPs). ACPs are defined as "scientifically supportable measures that are approved by the [USFWS] and represent the best available techniques to reduce eagle disturbance and ongoing mortalities to a level where remaining take is unavoidable" (50 CFR 22.3). We have not currently approved any ACPs for wind energy projects; therefore, ACPs are implemented at wind energy facilities on an experimental basis and are referred to as EACPs. The EACPs for the CCSM Phase I Project are described in the ECP.

ES.1.3.3 Other Federal Environmental Acts and Related Requirements

We administer the Migratory Bird Treaty Act (MBTA), which protects migratory birds and prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when authorized by our agency under a permit. Most of the bird species that occur in the vicinity of the CCSM Phase I Project are protected under the MBTA. We also administer the Endangered Species Act (ESA) together with the Department of Commerce National Marine Fisheries Service, and we have primary responsibility for terrestrial and freshwater organisms.

Other major federal policies, plans, and programs potentially relevant to the CCSM Phase I Project are presented in Chapter 1.0, Table 1-1. The EIS and subsequent ETPs, if ETPs are issued, would not conflict with or supersede those requirements.

ES.1.4 Public, Agency, and Tribal Participation

ES.1.4.1 Scoping

We held a 60-day scoping period for the EIS, from December 4, 2013, to February 3, 2014. Background information and documents regarding our consideration of whether or not to issue ETPs for the CCSM Phase I Project are found on our Mountain-Prairie Region website. We held two public scoping meetings for our EIS, on December 16, 2013, in Rawlins, Wyoming and on December 17, 2013, in Saratoga, Wyoming. On January 21, 2014, we mailed letters regarding the EIS to 115 federal, state, and local agencies and other potentially interested parties.

During the scoping period, we received 48 comment letters from project stakeholders (that is, members of the public, non-governmental agencies, and elected officials) and agencies. We considered the information and input contained in these letters in the EIS process, as described in Chapter 1.0.

ES.1.4.2 Draft EIS Review

We held a 60-day public review period for the Draft EIS from April 29, 2016, to June 27, 2016. Additionally, the comment period was reopened July 15, 2016, through July 29, 2016, for members of the public to resubmit comments. On April 21, 2016, and again on July 19, 2016, a postcard notice was sent to all 471 contacts on the project mailing list we maintain announcing the availability of the Draft EIS, the Draft EIS review period, and the public meetings. We held two public Draft EIS review meetings on June 6, 2016, in Saratoga, Wyoming and on June 7, 2016, in Rawlins, Wyoming.

During the Draft EIS public review period, we received a total of 36 comment letters from project stakeholders and agencies. These letters contained information and input that was sorted into 28 topic categories that we considered in the Final EIS. These comments are summarized and addressed in Section 5.6 of this Final EIS.

ES.1.4.3 Cooperating Agencies

Five agencies requested to be, and have been accepted as, cooperating agencies on the EIS: the BLM; Carbon County Board of County Commissioners; Saratoga-Encampment-Rawlins Conservation District; Wyoming Game and Fish Department; and Wyoming Department of Environmental Quality, Industrial Siting Council. A cooperating agency has jurisdiction by law or special expertise with respect to environmental impacts involved with the proposal, and is involved in the NEPA analysis. These agencies have cooperated in the preparation of this EIS by participating in alternatives development meetings, reviewing preliminary versions of the Draft EIS and Final EIS, and providing us with their comments for consideration.

ES.1.4.4 Tribal Consultation

We have engaged in tribal consultation specific to the issue of eagle take. We invited 72 tribes to participate in government-to-government consultation regarding this action, of which 9 have engaged in ongoing consultation. These tribes are the Cheyenne River Sioux Tribe of the Cheyenne River Reservation, Chippewa Cree Indians of the Rocky Boy's Reservation, Comanche Nation, Eastern Shoshone Tribe/Eastern Shoshone Business Council, Northern Arapaho Tribe/Northern Arapaho Business Council, Northern Cheyenne Nation, Pueblo of San Felipe, Santa Clara Pueblo, and Shoshone-Bannock Tribes of the Fort Hall Reservation.

ES.2 Description of Alternatives

We considered input received from the public, agencies, and tribes regarding the range of alternatives to be considered in this EIS and identification of a preferred alternative. While developing alternatives, we considered the potential direct and indirect effects on eagles of the proposed project activities that would be covered by the ETPs. This approach is consistent with 40 CFR 1500.1, the purpose of NEPA, which states that "NEPA documents must concentrate on the issues that are truly significant to the action in question, rather than amassing needless detail."

The four reasonable alternatives evaluated in the Final EIS are described below. Alternative 1 is our Preferred Alternative; if a permit is issued, it would reflect any and all additional conditions that we feel are necessary. Chapter 2.0 includes more detailed descriptions of each alternative.

ES.2.1 Alternative 1 – Proposed Action: Issue ETPs for Phase I Wind Turbine Development and Infrastructure Components

Alternative 1 (Proposed Action) is for the USFWS to issue two ETPs for the CCSM Phase I Project based on the ETP applications. The standard ETP would cover the activities that would result in the unavoidable disturbance of eagles (including nest disturbance) during the construction of the infrastructure components and Phase I wind turbine development. The programmatic ETP would cover the ongoing take of eagles that is likely to occur during the operation of the CCSM Phase I Project. The CCSM Phase I Project could be constructed and put into full operation even if the USFWS declines to issue an ETP. While some or all of the effects of the CCSM Phase I Project are therefore neither direct nor indirect effects of USFWS's decision to issue ETPs, we have elected in this EIS to analyze the environmental effects of the CCSM Phase I Project. We have also chosen to analyze the construction and operation of the infrastructure components as part of the CCSM Phase I Project because these components would have no independent utility without the wind turbine development.

ES.2.1.1 Description of the CCSM Phase I Project

The activities covered under the standard ETP for Alternative 1 would include the construction activities for the Phase I wind turbine development and the infrastructure components for the CCSM Phase I Project that may result in disturbance take of eagles. The programmatic ETP would cover the operation of the CCSM Phase I Project that is anticipated to result in eagle fatalities and other types of take, as described in Section 1.7.2.

The CCSM Phase I Project would include 500 wind turbines in the western portions of the Chokecherry and Sierra Madre WDAs. As shown in Chapter 2.0, Figure 2-3, 202 turbines would be constructed within the Chokecherry WDA and 298 turbines in the Sierra Madre WDA. In addition to the turbines, as shown in Chapter 2.0, Figures 2-4 and 2-5, the Phase I wind turbine development would include roads, laydown yards (including a temporary construction camp and parking areas), electrical systems (including electrical lines and substations), water facilities, operation and maintenance buildings, meteorological towers, utilities, and other temporary features. PCW would also construct the following infrastructure components that would be covered by the ETPs:

- Phase I Haul Road (Haul Road) and Facilities: The Haul Road would begin at the North Entrance to the CCSM Project area, off of I-80, connect to the West Sinclair Rail Facility, and continue south through the center of the Chokecherry and Sierra Madre WDAs. Associated facilities would include access roads, water stations, a water extraction facility (including pump stations and buried water pipeline), and laydown yards.
- West Sinclair Rail Facility: The West Sinclair Rail Facility would consist of a rail connection to the Union Pacific Railroad main line between Rawlins and Sinclair, consisting of approximately 14 miles of new track. The facility would include a laydown area and an access road.
- Road Rock Quarry: The Road Rock Quarry would provide a local source of aggregate and most of the road construction material for the CCSM Phase I Project. The quarry

would be within the Chokecherry WDA and would include the excavation area, material processing area, material storage piles, and a 5-mile-long quarry access road.

Construction of the infrastructure components, beginning with Phase I Haul Road and Facilities and the West Sinclair Rail Facility, began in 2016 when BLM issued a limited right-of-way grant and notice to proceed for these facilities. We concurred on August 9, 2016, that these activities were not likely to take bald or golden eagles and that no eagle take permit was required for these activities (USFWS 2016a). Construction of the infrastructure components is expected to continue through 2018. PCW would install turbines, beginning with Phase I of the Sierra Madre WDA, in 2018 to 2020. The peak construction workforce is anticipated to be 761 workers in 2018. The construction schedule would comply with the requirements of the BLM NEPA process and with applicable wildlife timing stipulations.

Surface modifications for Alternative 1 would include 4,465 acres of initial clearing and grading areas, 850 acres of long-term modification areas, and 440 acres of activity areas (where grasses may be mowed and shrubs may be cut or partially cut for a short period during construction but no clearing or grading would occur).

The combination of the Phase I turbine layout, the proposed conservation measures, best management practices (BMPs), EACPs, and monitoring and adaptive management measures have been developed and proposed with the intent that they would avoid and minimize impacts on bald and golden eagles such that remaining take is unavoidable.

Avoidance and Minimization Measures: Between 2007 and 2014, PCW, the BLM, and the USFWS cooperated to develop measures to avoid and minimize potential impacts on eagles and other wildlife species. PCW removed several areas of high wind potential as wind turbine sites, reconfigured the layout of turbines and other components to avoid eagle nests and areas of high eagle and raptor use, and agreed to construction timing windows. PCW agreed to curtail operation of wind turbines within 1 mile of unoccupied golden eagle nests during daylight hours between February 1 and April 30 while determining nest activity, to curtail operation within 2.2 miles if a nest were to become active during this period, and to continue curtailment until the young fledge and are no longer dependent on the nest or until the nest becomes unoccupied. The avoidance and minimization measures are described in detail in Section 2.2.1.3.2.

Eagle Fatality Predictions: We developed a peer-reviewed Bayesian model that has been used to predict the annual fatality rate for bald and golden eagles for the CCSM Phase I Project, incorporating site-specific values such as eagle observation data collected during pre-construction monitoring efforts, turbine rotor radius, and the number of hours in a year that turbines could be spinning when eagles may be active. Our model also incorporates exposure rates and collision probability for eagles based on data collected at existing wind energy facilities.

We used our eagle fatality model to estimate programmatic eagle take for bald and golden eagles separately, as described in Section 2.2.1.3.3 and Attachment C. Because the wind turbine blade diameter has not been finalized, the fatality modeling for the CCSM Phase I Project used rotor diameters of 338 feet (103 meters) and 394 feet (120 meters), which would

likely be the smallest and largest sizes used. The estimated annual take for the 120-meter-diameter turbine would be 2 bald eagles and 14 golden eagles. The estimated annual take for the 103-meter-diameter turbine would be 1 bald eagle and 10 golden eagles. The different eagle take predictions do not represent a "range" or an uncertainty factor, but rather are specific take predictions for those two turbine diameters. If the programmatic ETP is granted, PCW would provide us with the exact turbine blade diameter, and the predicted annual eagle take would be recalculated.

The standard ETP would cover disturbance take of 2 bald eagles at one nest and 8 golden eagles at four nests on an annual basis until project construction is completed. Disturbance take would include injury to eagles at these nests, any reduction of productivity at these nests, or abandonment of these nests. The term of the standard ETP would extend from the time it is issued through construction (until the first turbine is operating), but would not exceed 5 years.

Conservation Measures and Best Management Practices: Section 2.2.1.3.4 and Attachment A describe the conservation measures and best management practices (BMPs) that PCW would implement to reduce risk to eagles and decrease eagle fatalities.

Permit Stipulations: If granted, we would attach stipulations to the standard and programmatic ETPs. These stipulations would include the permit duration; EACPs and additional BMPs; monitoring; adaptive management; and compensatory mitigation requirements, as described in Section 2.2.1.4.

Compensatory Mitigation: PCW would retrofit high-risk power poles within the four Bird Conservation Regions (BCRs) contiguous with the CCSM Phase I Project to compensate for predicted golden eagle fatalities during operation. The four BCRs are the Eagle Management Unit (EMU) for golden eagles potentially impacted by the Proposed Action. Eagles in each of these BCRs may migrate to or from the Phase I development and infrastructure areas.

The cooperating agencies and scoping comments have expressed a preference for retrofitting power poles near the CCSM Phase I Project area, in particular within Carbon County. Retrofitting power poles with a high risk of avian electrocution in accordance with Avian Power Line Interaction Committee (APLIC) guidelines is the only form of compensatory mitigation for eagle take that has been approved by USFWS at this time, though other mitigation approaches are considered under Alternative 2. As discussed in Section 2.2.1.4.5, the number of power pole retrofits that would be needed to offset the take of golden eagles from the CCSM Phase I Project would be between 1,492 and 3,778, depending on the turbine blade diameter and the number of years for which the retrofit would prevent loss of eagles. PCW would work with us and with utilities to identify power poles with high risk to eagles and then develop a power pole retrofit plan for our approval as part of the ETP review process.

ES.2.2 Alternative 2 – Proposed Action with Different Mitigation

Under Alternative 2, we would issue to PCW a standard ETP for disturbance during construction of the Phase I wind turbine development and infrastructure components for the

CCSM Phase I Project, and a programmatic ETP for operation of the CCSM Phase I Project, as described under Alternative 1 (Proposed Action). However, under Alternative 2, we would require PCW to implement a different form of compensatory mitigation within the four BCRs contiguous with the CCSM Phase I Project than proposed in its programmatic ETP application. Compensatory mitigation can address pre-existing causes of eagle mortality, such as eagle electrocutions from power poles, or it can address increasing the carrying capacity of the eagle population in the affected EMU. PCW has indicated in its programmatic ETP application that it would perform power pole retrofits, which would reduce the risk of mortality from existing transmission lines. We are considering the following forms of different mitigation and evaluating their applicability and effectiveness in providing for compensatory mitigation for predicted golden eagle take:

- Mitigation of older wind facilities
- Lead abatement
- Carcass removal
- Carcass avoidance
- Wind conservation easement
- Habitat enhancement, with prey enhancement as an essential component
- Rehabilitation of injured eagles

One or more of the mitigation options could be selected. PCW has stated that it would be willing to consider one or more alternative compensatory mitigation measures, either in place of or in addition to power pole retrofits, if the USFWS quantifies the benefit of the mitigation measure to eagles and approves the use of these measures as mitigation for the CCSM Phase I Project. If additional compensatory mitigation measures are approved in the future, we would evaluate the use of those measures for this Project. However, for us to accept a potential compensatory mitigation option when issuing a programmatic ETP, we would need scientifically supportable evidence as a foundation for the conclusion that implementing the alternative compensatory mitigation action would achieve the desired beneficial offset in mortality or carrying capacity.

ES.2.3 Alternative 3 – Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project

We received numerous comments during the EIS scoping process requesting that we examine a different development scenario from the one proposed by PCW as part of Alternative 1 (Proposed Action). We must analyze a project with specific wind turbines and layout rather than issuing a permit allowing a level of take and then devising a project layout to meet that permit. When we have completed the ETP application review and the associated NEPA processes, it is possible that we would determine that the applications would meet the criteria for issuing ETPs, but not at the scale of the proposed project, and the applicant would need to present an alternative project scenario. Therefore, we are considering Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) as an example of a different development scenario. In other words, Alternative 3 would be eligible for selection only if we were to determine that Alternative 1 (Proposed Action) does not meet regulatory criteria for a programmatic ETP. If, after review of the programmatic ETP application and

completion of the NEPA process, we determine that Alternative 1 meets ETP criteria, Alternative 3 would not be selected.

Activities covered under the standard and programmatic ETPs for Alternative 3 would include the Phase I activities related to only the Sierra Madre WDA and all infrastructure components of the CCSM Phase I Project. Phase I of the Sierra Madre WDA would include 298 turbines, roads, electrical systems (including electrical lines and substations), operation and maintenance buildings, meteorological towers, utilities, and temporary features within the Sierra Madre portion of the Phase I boundary. Alternative 3 would include 3,262 acres of initial clearing and grading areas (27 percent less than under Alternative 1), 658 acres of long-term modification areas (22 percent less than under Alternative 1), and 288 acres of activity areas (35 percent less than under Alternative 1).

Eagle Fatality Predictions: Using our eagle fatality model, we estimated programmatic eagle take for bald and golden eagles for Alternative 3. The estimated annual take for the 120-meter-diameter turbine would be 1 bald eagle and 10 golden eagles. The estimated annual take for the 103-meter-diameter turbine would be 1 bald eagle and 7 golden eagles. The two predictions are specific to the two turbine diameters and do not represent a “range” or uncertainty factor. If a programmatic ETP is granted and Alternative 3 is selected, the actual predicted take would be determined by the actual turbine blade size used.

The standard ETP for Alternative 3 would cover the same disturbance take as Alternative 1, which would be 2 bald eagles at one nest and 8 golden eagles at four nests on an annual basis until project construction is completed.

Compensatory Mitigation: The number of power pole retrofits that would be needed to offset the take of golden eagles from the CCSM Phase I Project would be between 1,015 and 2,556, depending on the turbine blade diameter and the number of years for which the retrofit would prevent loss of eagles. The actual level of mitigation required would be based on the actual predicted take, based on the turbine size selected and the duration the retrofit would prevent eagle loss.

ES.2.4 Alternative 4 – No Action: Denial of ETPs

Under Alternative 4, we would deny PCW standard and programmatic ETPs for construction and operation of the CCSM Phase I Project. We could deny the ETPs because the permit applications failed to meet criteria under 50 CFR 22.26 or because we have determined that the risk to eagles is so low that ETPs are unnecessary. ETPs are not required in order for PCW to construct and operate a wind energy facility. However, any unpermitted eagle take, if it occurs, would constitute a violation of BGEPA.

If we deny or do not issue ETPs to PCW for the proposed project, PCW may take one of two actions: PCW may decide not to construct the proposed project, which we refer to as the No Build scenario, or PCW may construct the proposed project, as approved by the BLM and other permitting agencies, without ETPs and without adhering to an ECP, which we refer to as the Build Without ETPs scenario.

Under the No Build scenario, no wind turbines or infrastructure components would be constructed, and the ECP would not be implemented. PCW's purpose of generating 1,500 megawatts (MW) of electricity from wind from the CCSM Phase I Project to serve 790,000 households in California, Nevada, and Arizona to help meet the renewable energy mandates of these states would not be met. If not constructed, the CCSM Phase I Project would not help meet the goal of Secretarial Order 3285, which encourages development of renewable energy generation projects in the United States.

Under the Build Without ETPs scenario, PCW would build the CCSM Phase I Project as described in the BLM-approved site-specific plans of development for the project, but we assume that our permit stipulations would not be implemented, including monitoring, adaptive management, compensatory mitigation, and EACPs. PCW would still be required to comply with BGEPA, and we could make a referral to the U.S. Department of Justice that PCW be prosecuted for any bald and golden eagles taken without a permit.

We note that PCW may also choose to construct the project and voluntarily adhere to the proposed ECP, even without an ETP. In this case, impacts would be sufficiently similar to Alternative 1 that we have decided not to analyze that scenario separately in this document.

ES.3 Affected Environment and Environmental Consequences

ES.3.1 Introduction

Emphasis in our EIS is on biological resources, with other resources described and evaluated in detail with regard to their potential for being affected by the take of bald and golden eagles and other special status species. This focused analysis will provide the basis for our decision to issue or not issue standard and programmatic ETPs. Section 3.2 includes resources commonly described and assessed for potential impacts in many EISs but that are not evaluated in detail in this EIS.

The resources evaluated in full in this EIS are water resources (Section 3.3); vegetation and wetlands (Section 3.4); fish, amphibians, and reptiles (Section 3.5); mammals (Section 3.6); birds (other than eagles) (Section 3.7); eagles (Section 3.8); and cultural resources (Section 3.9). Each of these topics was evaluated in the BLM FEIS and ROD, EA1, and EA2, and we have addressed each of these resources in greater detail in our EIS for one or more of the following reasons:

- The resource is the subject of our decision to be made regarding potentially issuing standard and programmatic ETPs (that is, eagles).
- The resource falls under our trust as a result of another federal regulation (for example, the MBTA or ESA).
- The topic requires discussion to provide background for resources under our jurisdiction (for example, resources that serve as habitat or prey for eagles).

We defined the impact criteria for each resource to evaluate the level of impact of the Proposed Action and alternatives. Impacts were categorized by magnitude, duration,

potential to occur, and geographic extent. Within these categories, impact types were defined for each resource, as shown in the impact criteria tables in Chapter 3.0.

ES.3.2 Water Resources

Water resources influence habitat for eagle prey species, special status species, and migratory birds. The impact criteria for water resources are defined in Chapter 3.0, Table 3-3. Under Alternative 1, construction would result in probable, minor to moderate, temporary to long-term impacts on water resources over a limited area due to increased surface runoff, increased erosion, and stream channel instability. Surface water use would have a probable, minor impact over an extensive area that would be temporary (during construction) or long-term (during operation) on the Platte River system as it applies to ESA recovery programs. Potential hazardous materials spills and use of magnesium chloride for dust control could result in possible, minor, temporary impacts on surface water quality over a limited area during construction and operation. Operation under Alternative 1 would result in probable, minor, long-term impacts on water resources over a limited area due to localized increases in erosion and channel instability.

Under Alternative 2, construction impacts on water resources would be the same as those described under Alternative 1. Operation under Alternative 2 would also have similar impacts on water resources except that decommissioning of older wind facilities, if chosen as an alternative mitigation measure, could be beneficial to water resources depending on whether roads and water crossing structures are removed and rehabilitated. Habitat enhancement would result in probable, minor to moderate, long-term, local to regional beneficial effects on water resources. Under Alternative 3, construction and operation would result in impacts similar to those under Alternative 1, except impacts would not occur in the Chokecherry WDA. Under the No Build scenario under Alternative 4, neither direct nor indirect impacts on water resources would occur. If PCW decides to build without ETPs, impacts on water resources during construction and operation would be expected to be consistent with those described under Alternative 1.

ES.3.3 Vegetation and Wetlands

Vegetation and wetlands provide habitat for eagles, eagle prey species, special status species, and migratory birds. The impact criteria for vegetation and wetlands are defined in Chapter 3.0, Table 3-8. Construction under all alternatives (except the No Build scenario under Alternative 4) would affect vegetation communities through clearing, grading, cutting, partial cutting, or long-term modification of vegetated areas. The magnitude and duration of impacts would be highest in riparian/mesic lowlands, riparian woodlands, and wetlands. The potential spread of noxious weeds and invasive plants during construction would be limited by weed control measures and site-specific reclamation techniques to probable, minor, medium-term impacts at and immediately adjacent to surface modification areas. During operation under each alternative, with implementation of BMPs such as dust control, erosion control, weed management, and reclamation, impacts on vegetation, wetlands, and riparian zones would be negligible. Habitat improvement and reclamation, as proposed in the sage

grouse conservation plan, would have probable moderate to major,[1] long-term, regionally beneficial effects on vegetation and wetlands.

The potential to occur, magnitude, duration, and extent of potential impacts on vegetation and wetlands from construction and operation would be less under Alternative 3, because impacts would not occur in the Chokecherry WDA, and under the No Build scenario under Alternative 4. Under the Build Without ETPs scenario, impacts would be the same as under Alternative 1 (Proposed Action). Impacts on vegetation and wetlands under Alternative 2 (Proposed Action with Different Mitigation) would be similar to those under Alternative 1, but may differ depending on the compensatory mitigation option selected.

ES.3.4 Fish, Amphibians, and Reptiles

Most of the fish, amphibian, and reptile species present in the CCSM Phase I development and infrastructure areas are prey for eagles and migratory birds. The impact criteria for fish, amphibians, and reptiles are defined in Chapter 3.0, Table 3-12. Construction would result in temporary to long-term impacts on amphibian and reptile habitat, and the crossing of streams could directly impact fish, amphibians, and reptiles. Construction-caused disruption, displacement, and fatality would likely result in probable, minor, temporary to medium-term impacts on amphibians and reptiles in a limited area. Surface water use would have a probable, minor, temporary impact over an extensive area on the pallid sturgeon and on fish habitat in the North Platte River. Operation under each alternative would result in fewer direct and indirect impacts on amphibians and reptiles and aquatic habitat. BMPs would minimize habitat alteration and degradation.

The potential to occur, magnitude, duration, and extent of potential impacts on fish, amphibians, and reptiles from construction and operation would be less under Alternative 3, because impacts would not occur in the Chokecherry WDA, and under the No Build scenario under Alternative 4. Impacts on fish, amphibians, and reptiles under Alternative 2 (Proposed Action with Different Mitigation) would be similar to those under Alternative 1 (Proposed Action), but may differ depending on the compensatory mitigation option selected. If PCW decides to build without ETPs, impacts on fish, amphibians, and reptiles during construction and operation would be expected to be consistent with those described under Alternative 1.

ES.3.5 Mammals

Many mammals found in the Phase I infrastructure and development areas provide prey and carrion for eagles, particularly small game and furbearers, and big game. The impact criteria for mammals are defined in Chapter 3.0, Table 3-17. Both direct and indirect effects on mammals could occur from construction and operation under Alternative 1 (Proposed Action), including habitat loss, modification, and fragmentation associated with construction clearing and grading; sedimentation, erosion, and runoff during construction and operation; behavioral modification such as avoidance of, and disruption and displacement from,

[1] Major is defined as an action that would noticeably change the amount or condition of vegetation or wetlands in the study area. Major beneficial impacts would result in a large increase or enhancement of vegetation types and wetlands that provide habitat for special status species, migratory birds, or eagle prey species.

habitats; disruption of suspected migratory routes; and mortality and fatality associated with construction clearing and grading, collisions with construction and maintenance vehicles, and collisions with turbines.

During construction under Alternative 1, the removal and degradation of mammal habitat would result in probable, limited, minor, temporary to long-term impacts on habitat for small game and furbearers, big game, bats, and special status mammal species. Small game and furbearers could be displaced due to construction activities, and their abundance could temporarily decrease in the project footprint due to loss of habitat and crushing by construction equipment or vehicles. Minor to moderate behavioral disruption and displacement of big game from suspected migration routes and crucial winter habitat is possible. Injury and fatality of bats are unlikely during construction. Minor impacts on aquatic insects that are prey for bats could occur. Minor, temporary impacts on special status mammals are probable, including behavioral disruption, displacement, injury, and fatality.

During operation under Alternative 1, major,[2] long-term impacts on bats are probable due to fatalities resulting from collision with wind turbines. Injury to or fatality of small game and furbearers, and big game would be possible due to collision with vehicles. Moderate, long-term impacts are possible from surface modification in mule deer crucial winter range and from disruption of suspected migration routes for mule deer, elk, and pronghorn. Continued impacts due to the loss, alteration, and fragmentation of habitat range from possible to probable, including changes in foraging areas or emigration to adjacent habitats that may be less suitable. Displacement or disruption of mammals ranges from possible to probable due to operation of turbines or human activity, which could result in increased stress levels or reduced fitness.

The potential to occur, magnitude, duration, and extent of potential impacts from construction and operation would be similar under each alternative, except they would be greater under the Build Without ETPs scenario under Alternative 4, and they would be less under the No Build scenario under Alternative 4. Impacts on mammals under Alternative 2 (Proposed Action with Different Mitigation) would be similar to those under Alternative 1 (Proposed Action), but may differ depending on the compensatory mitigation option selected.

ES.3.6 Birds (Other than Eagles)

The impact criteria for birds (other than eagles) are defined in Chapter 3.0, Table 3-23. Construction under Alternative 1 (Proposed Action) could result in the following impacts on birds (other than eagles): (1) habitat loss, degradation, and fragmentation from construction of roads, power lines, wind turbines, turbine pads, and other facilities; (2) disruption, displacement, and avoidance due to construction activities and equipment; and (3) injury and fatality due to collisions with construction vehicles or equipment. During construction, injuries and fatalities of birds (other than eagles) are possible for some species. Habitat loss, degradation, and fragmentation would result in direct and indirect impacts on bird habitat. The loss of foraging and nesting habitat would range in magnitude from minor to moderate depending on the range and sensitivity of the species, but would persist for the long-term.

[2] Major is defined as an action that would result in substantial direct fatality or injury of mammals.

The fragmentation of the landscape and associated displacement and disruption would create a gradient of impacts that could extend large distances beyond the construction footprint. Human development also increases the prevalence of nest predators and parasites such as coyotes and ravens, which could result in moderate, long-term impacts on nesting birds. Additionally, construction would include the use of surface water and potential for increased erosion or chemical spills, which could result in minor impacts on waterbirds, waterfowl, and shorebirds.

No threatened or endangered bird species occur in the Phase I infrastructure and development areas, but other special status species, including USFWS Birds of Conservation Concern and those designated by the Wyoming Game and Fish Department as Species of Greatest Conservation Need could occur. In general, impacts on these species would be similar as to other waterbirds, waterfowl, shorebirds, passerines, and raptors. It is probable that displacement and disruption due to construction could result in major[3] impacts on greater sage-grouse, and associated habitat loss and increases in nest predation could have moderate impacts on this species. The potential to occur, magnitude, duration, and extent of potential impacts from construction would be similar under each alternative, except they would be greater under the Build Without ETPs scenario under Alternative 4, and they would be less under the No Build scenario under Alternative 4.

Operation under Alternative 1 (Proposed Action) could result in the following impacts on birds (other than eagles): (1) continued indirect effects from habitat loss, alteration, and fragmentation; (2) continued disruption, displacement, and avoidance due to operation and maintenance of the CCSM Phase I Project; and (3) injury and fatality due to collisions with wind turbines, power lines, meteorological towers, communication towers, operation and maintenance buildings, or maintenance vehicles. We anticipate moderate to major[3] impacts on birds (other than eagles) due to fatalities as a result of collisions with wind turbines and other project infrastructure. Passerines are expected to experience the highest fatality rates, but raptors, waterbirds, and waterfowl may also experience high rates of collision fatalities. The continuation of impacts from habitat loss, alteration, and fragmentation from construction would persist for the long-term. Raptors, passerines, and some shorebirds are particularly susceptible to the indirect and habitat-based impacts of habitat loss, fragmentation, displacement, and disruption. Special status bird species would experience impacts similar to those on more common species, but these impacts could be amplified due to smaller populations, stringent habitat requirements, and restricted ranges. The potential to occur, magnitude, duration, and extent of potential impacts from operation of the CCSM Phase I Project would be similar under each alternative, except they would be greater under the Build Without ETPs scenario under Alternative 4, and they would be less under the No Build scenario under Alternative 4.

The compensatory mitigation of power pole retrofits proposed under Alternative 1 (Proposed Action) would primarily benefit large birds, such as raptors, and would provide lesser benefits to other bird species. The alternative compensatory mitigation options under

[3] Major is defined as an action that would result in substantial indirect impacts on habitat from a large reduction or alteration of habitat, resulting in a substantial reduction in use by birds for nesting, foraging, wintering, or other life history activities. Major impacts could also include in direct injury or fatality of birds, including special status species, resulting in a local population-level effect on a bird species.

Alternative 2 are also focused on maximizing benefits to golden eagles, and as such, the benefits to other birds would vary depending on the species. Some mitigation options could be highly beneficial to certain species, while others could have no impact, and still others may result in minor, localized, adverse impacts, such as increased predation. In general, a wind conservation easement could provide the greatest benefit to the most bird species by preventing future injuries or fatalities caused by a wind facility. Habitat enhancements and the mitigation of existing wind facilities would provide minor or moderate benefits to all birds. Mitigation options that would remove carcasses, avoid carcasses, or reduce the use of lead during hunting would benefit primarily carcass-feeding birds, but would have little effect on other birds. Increased funding for rehabilitation of injured eagles would benefit only eagles, unless funds were also distributed for the rehabilitation of other birds.

ES.3.7 Eagles

Bald and golden eagles would be affected by construction and operation under Alternative 1 (Proposed Action). The impact criteria for eagles are defined in Chapter 3.0, Table 3-28. Potential construction-related impacts on eagles would include (1) injury or fatality due to collision with construction vehicles or equipment; (2) habitat loss, degradation, and fragmentation from construction of roads, power lines, turbine pads, and other surface use facilities; and (3) disturbance and displacement due to construction activities and equipment. Injuries and fatalities of eagles are unlikely during construction under Alternative 1, but would range from minor to moderate in magnitude and limited to the area of the project were they to occur. Construction could also result in impacts on eagle prey base, including deterrence from foraging areas and degradation of habitat for key prey species. While the deterrence of bald eagles from riparian habitat is unlikely, it is possible that construction could result in minor impacts on aquatic habitats in the region. It is also possible that construction could result in minor impacts on golden eagle prey, such as small mammals and ungulates, or deterrence of golden eagles from foraging habitat. Moderate disturbance to one bald eagle nesting pair and four golden eagle nesting pairs due to construction is probable within the Phase I infrastructure and development areas. The standard ETP, if issued, would allow for this level of disturbance take of up to two adult bald eagles (one nest) and eight adult golden eagles (four nests), but would not permit injury or fatality due to construction. Construction-related impacts would be temporary in duration. The potential to occur, magnitude, duration, and extent of potential impacts from construction would be similar under each alternative, except they would be greater under the Build Without ETPs scenario under Alternative 4, and they would be less under the No Build scenario under Alternative 4.

Operation-related impacts on eagles under Alternative 1 (Proposed Action) would include (1) injury and fatality of bald and golden eagles due to collision with wind turbines; (2) injury or fatality of eagles due to collisions with overhead power lines, meteorological or communication towers, buildings, or operation vehicles; (3) injury or fatality of eagles due to electrocution from overhead power lines; (4) continued effects from habitat loss, degradation, and fragmentation; and (5) continued disturbance and displacement due to operation and maintenance of the facility. Our eagle fatality model predicts that operation under Alternative 1 would result in 1 or 2 bald eagle and 10 or 14 golden eagle fatalities each year due to collision with wind turbines, depending on wind turbine blade diameter. Issuance of a programmatic ETP would permit this level of mortality, with a number of mitigation and

minimization measures intended to moderate the impacts of fatality on the local bald and golden eagle populations. Continued disturbance at nest sites due to operation activities is possible and would be moderate in magnitude. It is also probable that operation under Alternative 1 could result in minor impacts on golden eagle foraging areas, disturbance to small mammal prey, and an increase in raven abundance at a regional extent. Impacts on big game prey due to operation under Alternative 1 are unlikely. Operation-related impacts would be long-term in duration. The potential to occur, magnitude, duration, and extent of potential impacts from operation of the CCSM Phase I Project would be similar under each alternative, except they would be greater under the Build Without ETPs scenario under Alternative 4, and they would be less under the No Build scenario under Alternative 4.

Under Alternative 1 (Proposed Action), PCW would retrofit existing power poles to compensate for predicted golden eagle fatalities due to operation of the CCSM Phase I Project. Power pole retrofits are a credible, quantifiable, and USFWS-approved form of compensatory mitigation. However, we would consider other forms of mitigation if their benefits to golden eagles were proven credible and quantifiable, and could achieve no-net-loss of golden eagles. Under Alternative 2 (Proposed Action with Different Mitigation), one or more of the following mitigation measures would be selected: mitigation of existing wind facilities, lead abatement, carcass removal, carcass avoidance, wind conservation easement, habitat enhancement, or the rehabilitation of injured eagles. The benefits to bald eagles would vary slightly depending on the mitigation option chosen, but the benefits to golden eagles would not differ because each option would be required to achieve no-net-loss of golden eagles.

Under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), our eagle fatality model predicts 1 bald eagle fatality and 7 or 10 golden eagle fatalities per year; however, as a result of mitigation and minimization measures that would be required in the programmatic ETP, the intensity of impacts would remain the same as under the other alternatives.

ES.3.8 Cultural Resources

Bald and golden eagles are important symbolic and traditional religious resources for American and Native American cultures. Environmental justice is also considered because potential impacts may disproportionately affect Native American tribes for whom eagles, particularly golden eagles, have a central role in their beliefs, traditions, and worldview.

The impact criteria for eagles are defined in Chapter 3.0, Table 3-29. Construction of the alternatives would not be expected to adversely affect eagles as a cultural resource.

Operation under Alternative 1 is not expected to adversely affect the cultural relationship between eagles and the broader American public; however, golden eagle take would probably result in adverse impacts that would be minor to moderate in magnitude, regional to extensive in geographic scope, and long-term in duration on Native American tribes and their cultural relationship with eagles. In addition, operation under Alternative 1 would have no effect on Native American access to eagles, feathers, or parts or on segments of the American

population attributing symbolic value to bald eagles. Operation under Alternative 1 would not raise environmental justice concerns.

Operation under Alternative 2 would result in impacts similar to those under Alternative 1, except that funding for eagle rehabilitation as an alternative mitigation measure could have possible beneficial impacts on tribes' cultural relationships with eagles and access to eagles, feathers, and parts that would be moderate in magnitude, regional to extensive in geographic scope, and long-term in duration. Operation under Alternative 3 would result in impacts similar to those under Alternative 1. Although lower numbers of eagle fatalities would reduce impacts on Native American tribes, the impacts would still be minor to moderate in magnitude. Under the No Build scenario under Alternative 4, cultural resource impacts would not occur. If PCW decides to build without ETPs under Alternative 4, operation would not impact the cultural relationship between eagles and the broader American public. However, unmitigated eagle take would probably result in adverse impacts on Native American tribes and their cultural relationship with eagles that would be major[4] in magnitude, regional to extensive in geographic scope, and long-term in duration. In addition, unmitigated eagle take would probably have an adverse impact on Native American access to eagles (live and deceased), feathers, or parts for religious use that would be minor to major[4] in magnitude, regional to extensive in geographic scope, and long-term in duration. These operational impacts could result in disproportionately high and adverse impacts on Native American communities, raising environmental justice concerns.

ES.4 Cumulative Impacts

ES.4.1 Introduction

A cumulative impact, as defined in 40 CFR 1508.7, is "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" by federal, state, or local agencies or by individuals. Reasonably foreseeable future actions consist of activities that are generally in the planning stage and can be evaluated with respect to their impacts.

Our approach to evaluating cumulative impacts on eagles considers the effects of programmatic take on eagle populations at three scales: (1) Eagle Management Unit (EMU); (2) local area population (LAP), and (3) project vicinity. This approach is consistent with our ECP guidance. These three scales are defined as follows:

[4] Major is defined as an action that would clearly change resource conditions. Adverse impacts would result in blocked or greatly reduced access to eagles, feathers, or parts, or would alter the relationship between eagles and a cultural group's practices and beliefs to the extent that the survival of those practices and beliefs would be jeopardized. The impacts would substantially deteriorate or destabilize eagles' condition or culturally valued elements. These conditions and elements may be tangible, such as the stability of local eagle populations, or intangible, such as the perception of eagles' ability to give power to tribal members. Beneficial impacts would facilitate access, empower groups in their traditional practices or beliefs, or substantially improve the quality of the resource.

- EMU: For the CCSM Phase I Project, the EMUs for bald eagles are the Northern Rocky Mountains EMU and the Rocky Mountains and Plains EMU, as described in Section 2.1.2.1 and shown in Chapter 2.0, Figure 2-1. The EMUs for golden eagles are the four BCRs described in Section 2.1.2.2 and shown in Chapter 2.0, Figure 2-2. These four BCRs are the Northern Rockies (BCR 10), Southern Rockies/Colorado Plateau (BCR 16), Badlands and Prairies (BCR 17), and Shortgrass Prairie (BCR 18).
- LAP: The LAP for bald eagles is the population within a 43-mile radius and the LAP for golden eagles is the population within a 140-mile radius around the CCSM Phase I Project, as described in Section 2.1.2.3. The size of the LAP is based on the median distance to which eagles are thought to disperse from the nest where they are hatched to where they settle to breed, known as the natal dispersal distance.
- CCSM Phase I Project vicinity: The CCSM Phase I Project area and the infrastructure boundaries are as shown in Figures 2-3, 2-4 and 2-5. As described in Section 2.2.1, this area encompasses the Phase I wind turbine development and the infrastructure components that would be covered by the standard and programmatic ETPs (the Phase I Haul Road and Facilities, West Sinclair Rail Facility, and Road Rock Quarry).

The goal of the cumulative impacts analysis is to qualitatively assess cumulative eagle take within the EMUs, quantitatively assess take of bald and golden eagles within the LAPs, and assess cumulative impacts on other resources in consideration of their impacts on a local and regional basis relevant to the resources.

Reasonably foreseeable future actions within the local area scale for eagles include electric transmission lines, other wind energy development (including the CCSM Phase II Project), mineral and energy development, new transportation infrastructure, and hunting.

ES.4.2 Water Resources

Water resources in the local and regional area are affected by continued expansion of human development that strains water supplies and results in reduced surface water, hydrologic modifications, degradation of floodplain functions, groundwater depletions, and impacts on water quality. If climate change results in reduced annual precipitation or modified precipitation patterns, these impacts would be magnified. The CCSM Phase I Project includes avoidance and minimization measures and BMPs to reduce anticipated project-related impacts on surface waters, and conservation measures that would benefit water resources. With implementation of these measures under Alternative 1 (Proposed Action), the cumulative effects of past, present, and reasonably foreseeable future actions on surface water resources and surface water quality within and immediately near the CCSM Phase I Project would have probable, moderate to minor, temporary to long-term, local to regional, adverse effects. Surface water use would have a probable, extensive, minor, long-term impact on the Platte River system as it applies to ESA recovery programs.

The impacts under Alternative 2 (Proposed Action with Different Mitigation) and Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would be comparable to the impacts under Alternative 1, but would be slightly less because of different options for mitigation occurring in the local and regional area, and a smaller area of

disturbance, respectively. The No Build scenario under Alternative 4 (No Action: Denial of ETPs) would cause fewer impacts than the other alternatives, and the Build Without ETPs scenario under Alternative 4 would likely cause impacts similar to those under Alternative 1. On a cumulative basis with the CCSM Phase II Project, all but the No Build scenario under Alternative 4 would likely have comparable impacts on water resources.

ES.4.3 Vegetation and Wetlands

Human development in the local and regional area has extensively impacted vegetation and wetlands by dramatically altering native vegetation communities, entirely removing them in some places, and substantially reducing the amount and condition of wetlands and riparian zones. Agricultural modifications in some instances have enhanced habitat for eagles through providing food sources for prey animals, and water sources for mammals, birds, and other species. Climate change would further reduce wetlands and riparian zones if it results in reduced annual precipitation in the local and regional areas. The CCSM Phase I Project includes avoidance and minimization measures and BMPs that would reduce anticipated project-related impacts on vegetation and wetlands, and conservation measures that would provide probable benefits to vegetation and wetlands. With implementation of these measures under Alternative 1 (Proposed Action), the cumulative effects of past, present, and reasonably foreseeable future actions within the Phase I development and infrastructure areas would have probable moderate, long-term, regional, adverse effects on vegetation and wetlands. Probable minor, medium-term impacts to a local area from potential spread of noxious and invasive plants would likely occur.

Alternative 2 (Proposed Action with Different Mitigation) and Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would cause impacts comparable to those under Alternative 1 (Proposed Action), but with slightly less intensity because of different options for mitigation (especially habitat enhancement and wind conservation easements) occurring in the local and regional area, and a smaller area of disturbance, respectively. The No Build scenario under Alternative 4 (No Action: Denial of ETPs) would not contribute to cumulative impacts, and the Build Without ETPs scenario under Alternative 4 would likely cause impacts similar to the impacts under Alternative 1.

ES.4.4 Fish, Amphibians, and Reptiles

Fish, amphibians, and reptiles in the local and regional area have been notably impacted by human development that has resulted in direct habitat loss, alteration, and fragmentation across aquatic and terrestrial habitats. Climate change could exacerbate habitat degradation. Human development has also caused disturbance and direct mortality to fish, amphibians, and reptiles, including the creation of movement barriers that prevent these species from completing life-cycle requirements. The CCSM Phase I Project includes avoidance and minimization measures and BMPs to reduce anticipated project-related impacts on fish, amphibians, and reptiles, and conservation measures that would provide probable benefits. With implementation of these measures under Alternative 1 (Proposed Action), the cumulative effects of past, present, and reasonably foreseeable future actions within and immediately near the CCSM Phase I Project would have probable minor, long-term, local, adverse effects on fish and fish habitat, amphibians, and reptiles.

Alternative 2 (Proposed Action with Different Mitigation) and Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would cause impacts comparable to those under Alternative 1 (Proposed Action), but with slightly less intensity because of different options for mitigation (especially habitat enhancement and wind conservation easements) occurring in the local and regional area, and a smaller area of disturbance, respectively. The No Build scenario under Alternative 4 (No Action: Denial of ETPs) would not contribute to cumulative impacts, and the Build Without ETPs scenario under Alternative 4 would likely cause impacts similar to those under Alternative 1.

ES.4.5 Mammals

Cumulative impacts of past, present, and reasonably foreseeable future actions on mammals within the Phase I development and infrastructure areas could result in disturbance and displacement from development; habitat loss, degradation, and fragmentation from energy development and agriculture; water diversion leading to changes in hydrology, wetland loss, and habitat suitability; and global climate change resulting in shifting geographic ranges, seasonal activities, migration patterns, and abundances.

Construction and operation of the CCSM Phase I Project (under all alternatives) would result in long-term, minor to moderate disturbance and displacement impacts for all species and species groups (small game and furbearers, big game, bats, and special status species). Global climate change could exacerbate these effects, on big game in particular, by resulting in shifting geographic ranges, seasonal activities, and migration patterns. The CCSM Phase I Project would contribute negligible to minor impacts on the cumulatively significant impact of habitat loss and disturbance, when considered in context with the impacts of development, agriculture, and global climate.

Construction and operation of the CCSM Phase I Project under Alternative 1 (Proposed Action) would impact mule deer and mule deer crucial winter range. Operation could also affect suspected mule deer migration routes. When considered in context with these factors and the effects of climate change, Alternative 1 of the CCSM Phase I Project could contribute a minor amount to cumulatively significant impacts on the Platte Valley herd. Alternative 2 (Proposed Action with Different Mitigation) could result in beneficial impacts on mule deer through the construction of wildlife crossing structures to reduce vehicle collisions or through the protection or enhancement of habitat through conservation easements or enhancement projects. Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would cause impacts similar to Alternative 1, but impacts on non-crucial range would be less. The No Build scenario under Alternative 4 (No Action: Denial of ETPs) would not contribute to cumulative impacts, and the Build Without ETPs scenario under Alternative 4 would likely cause impacts similar to those under Alternative 1.

Direct impacts on bats from operation of the CCSM Phase I Project under Alternative 1 (Proposed Action) would be major,[5] long-term, and probable. When considered in context with other development projects that would result in bat fatalities, including the reasonably

[5] Major is defined as an action that would result in substantial direct fatality or injury of mammals.

foreseeable CCSM Phase II Project and the effects of climate change, the CCSM Phase I Project could contribute a minor amount to cumulatively significant impacts on bats. Alternative 2 (Proposed Action with Different Mitigation) could result in beneficial effects on bats by decommissioning or upgrading existing wind energy facilities. Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would cause impacts comparable to those under Alternative 1 (Proposed Action), but the impacts would be slightly less because of a smaller area of disturbance. The No Build scenario under Alternative 4 (No Action: Denial of ETPs) would not contribute to cumulative impacts, and the Build Without ETPs scenario under Alternative 4 would likely cause impacts similar to those under Alternative 1.

Within the local area, the cumulative impacts on mammals from transmission lines, mineral and energy development, transportation infrastructure, and hunting include habitat loss and degradation, conversion, and fragmentation; behavioral changes such as avoidance, disturbance, and displacement; and increases in fatalities from construction activities, vehicle collisions, hunting, and turbine operations. Overall, these cumulative impacts on mammals are adverse and significant. The CCSM Phase I Project would contribute minor to moderate impacts on cumulative impacts on mammals in the local area, causing probable temporary to long-term impacts on habitat and species during construction, and probable long-term impacts on habitat and species during operation.

ES.4.6 Birds (Other than Eagles)

Impacts on birds (other than eagles) could include injury or fatality from collision with wind turbines, overhead power lines, meteorological or communication towers, buildings, or vehicles, as well as electrocution by power lines. Habitat loss, degradation, fragmentation, disturbance, and displacement could also occur as a result of construction and operation of wind facilities, which could result in various detrimental impacts on the bird community. Many of the impacts could be compounded by the cumulative impacts from past, present, and reasonably foreseeable future development in addition to other land uses and regional- or global-scale environmental changes. Many of the cumulative impacts on birds (other than eagles) are expected to occur within and immediately adjacent to the CCSM Phase I Project. Reasonably foreseeable future wind energy development may include the CCSM Phase II Project, which would compound impacts in the area and contribute to population-level impacts throughout the region and local area. The CCSM Phase I Project would include multiple avoidance and minimization measures to reduce the anticipated impacts at and near the site.

Under Alternative 1 (Proposed Action), the cumulative effects of past, present, and reasonably foreseeable future impacts on birds (other than eagles) could result in large-scale, population-level impacts for some bird species. The cumulative effects of past, present, and reasonably foreseeable future impacts on birds (other than eagles) within and immediately near the CCSM Phase I Project would have possible to probable, moderate, long-term, local

to regional, adverse effects on some bird species. Some species, could incur probable, major,[6] long-term, and limited to local impacts.

The impacts under Alternative 2 (Proposed Action with Different Mitigation) would be comparable to those under Alternative 1 (Proposed Action), but slightly less because more mitigation (especially habitat enhancement and wind conservation easements) would occur in the local and regional areas. Mitigation to remove or avoid carcasses would also benefit other scavenger species. Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would cause slightly less impacts than Alternative 1 (Proposed Action) because it would affect a smaller area. The No Build scenario under Alternative 4 (No Action: Denial of ETPs) would not contribute to cumulative impacts, and the Build Without ETPs scenario under Alternative 4 would likely cause impacts similar to those under Alternative 1.

ES.4.7 Eagles

The cumulative effect of past, present, and reasonably foreseeable future impacts on bald and golden eagles in combination with the CCSM Phase I Project were evaluated in detail for the LAP. Reasonably foreseeable future actions that could affect eagles include conversion of habitat to agriculture, fire suppression, water diversion, mineral and energy development projects (including other wind development and transmission line projects), and climate change.

The LAP boundary for bald eagles is delimited by a circle with a radius of 43 miles around the Phase I infrastructure and development areas. This area includes the Northern Rocky Mountains and Rocky Mountains and Plains EMUs. The current LAP for bald eagles is approximately 117 eagles, which results in 1 percent and 5 percent benchmarks of 1 and 6 bald eagles, respectively. Within the LAP, there were 11 reported bald eagle fatalities between 2005 and 2014, which when combined with predicted take of 1 or 2 bald eagles per year (depending on wind turbine blade diameter) due to the CCSM Phase I Project, results in approximately 3.4 bald eagle fatalities annually. When combined with 1 or 2 predicted bald eagle fatalities due to the CCSM Phase II Project, we estimate a combined take of about 7 bald eagle fatalities per year in the LAP, which would be about 6 percent (exceeding the 5 percent benchmark). Based on our Final EA for the eagle take permit rule (USFWS 2009), the combined take threshold for the Rocky Mountain and Rocky Mountains and Plains EMUs is 44 bald eagles. The estimated take of 3.4 bald eagles per year (estimated from the CCSM Phase I Project plus other ongoing eagle take) leaves 40.6 bald eagles per year that could still be taken from the combined EMUs in Region 6. It is probable that the CCSM Phase I Project combined with past, present, and reasonably foreseeable future actions within the LAP boundary would result in impacts on bald eagles that are minor to moderate in magnitude, long-term in duration, and extensive in geographic extent.

[6] Major is defined as an action that would result in substantial indirect impacts on habitat from a large reduction or alteration of habitat, resulting in a substantial reduction in use by birds for nesting, foraging, wintering, or other life history activities. Major impacts could also include direct injury or fatality of birds, including special status species, resulting in a local population-level effect on a bird species.

The LAP boundary for golden eagles is comprised of eagles within a 140-mile radius around the project footprint. The current LAP for golden eagles is approximately 1,932 eagles, which results in 1 percent and 5 percent benchmarks of 19 and 97 golden eagles, respectively. Within the LAP, there were 430 reported golden eagle fatalities between 2005 and 2014, which when combined with predicted annual take of either 10 or 14 golden eagles (depending on wind turbine blade diameter) due to the CCSM Phase I Project, results in approximately 59 golden eagle fatalities annually, or about 3 percent of the LAP. When combined with predicted golden eagle fatalities due to the CCSM Phase II Project of up to 25 or 32 additional eagles per year (depending on wind turbine blade diameter), there would be an estimated 91 golden eagle fatalities per year in the LAP, which is still below the current 5 percent benchmark level. Based on our Final EA for the eagle take permit rule (USFWS 2009), the combined take threshold for golden eagles is zero; therefore, any predicted golden eagle take would need to be mitigated. It is probable that the CCSM Phase I Project combined with past, present, and reasonably foreseeable future actions within the LAP boundary would result in impacts on golden eagles that are minor to moderate in magnitude, long-term in duration, and extensive in geographic extent.

Under Alternative 2 (Proposed Action with Different Mitigation) impacts would be comparable to those under Alternative 1 (Proposed Action), but with slightly less impact if more occurred in the local and regional areas. Under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), there would be slightly less impact because of the smaller number of eagle fatalities and smaller area of disturbance. The No Build scenario under Alternative 4 would not contribute to cumulative impacts. However, under the Build Without ETPs scenario under Alternative 4, the impacts would be greater than the impacts under Alternative 1 because many of the provisions of the ECP would not be implemented and compensatory mitigation for eagle take would not occur.

During development of this Final EIS, we separately but concurrently considered revision to the existing regulations concerning ETPs. However, for the standard and programmatic ETPs for this project, we will be using the existing Eagle Rule promulgated in 2009 and the ECP Guidance issued in 2013.

ES.4.8 Cultural Resources

Cumulative impacts on the cultural value of eagles were assessed across the BCR and EMU areas, and we considered broader national implications for Native American tribes. Cumulative impacts on eagles as a cultural resource are caused by eagle mortality, the resulting impact on the stability of eagle populations, and the cultural impacts of the administration of religious-use permits under BGEPA. BGEPA and its implementing regulations have historically reduced tribes' access to eagles and have precipitated changes in traditional cultural practices. These regulatory impacts may make Native American cultural practices and beliefs regarding eagles more vulnerable to the effects of eagle take and population-level decline. Eagles that are killed by the CCSM Phase I Project would be required to be sent to the National Eagle Repository, which distributes eagles and eagle feathers and parts to Native Americans.

Under Alternative 1 (Proposed Action), the CCSM Phase I Project would contribute to probable cumulative impacts that are minor to moderate in magnitude, long-term in duration, and regional to extensive in geographic extent on the cultural value of eagles to tribes by contributing to the moderate impacts on bald and golden eagle populations in the LAP. Alternative 2 (Proposed Action with Different Mitigation) could possibly contribute a minor, long-term, extensive beneficial impact under the rehabilitation option if funding were made available to tribes to develop or expand rehabilitation facilities that would provide tribes with an alternate means of interacting with eagles and acquiring naturally molted feathers. Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would cause impacts comparable to those under Alternative 1 (Proposed Action), but the impacts would be slightly less because of a smaller area of disturbance. The No Build scenario under Alternative 4 (No Action: Denial of ETPs) would not contribute to cumulative impacts. However, the Build Without ETPs scenario under Alternative 4 could possibly contribute to major[7] cumulative impacts on tribes' access to eagles, feathers, and parts if local or regional eagle populations were to decline and fewer eagles were available through the National Eagle Repository; this would represent a disproportionately high and adverse impact on Native American tribes and a possible environmental justice issue.

The cumulative effects of past, present, and reasonably foreseeable future impacts combined with the CCSM Phase I Project under Alternative 1 (Proposed Action) would result in possible impacts on the value of bald eagles as a national and environmental symbol that are minor in magnitude, long-term in duration, and extensive in geographic extent. Alternative 2 (Proposed Action with Different Mitigation) and Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would cause impacts comparable to those under Alternative 1 (Proposed Action), but with slightly less impact because of different options for mitigation occurring in the local and regional area, and a smaller area of disturbance, respectively. The No Build scenario under Alternative 4 (No Action: Denial of ETPs) would not contribute to cumulative impacts, and the Build Without ETPs scenario under Alternative 4 would likely cause impacts similar to those under Alternative 1.

[7] Major is defined as an action that would clearly change resource conditions. Adverse impacts would result in blocked or greatly reduced access to eagles, feathers, or parts, or would alter the relationship between eagles and a cultural group's practices and beliefs to the extent that the survival of those practices and beliefs would be jeopardized. The impacts would substantially deteriorate or destabilize eagles' condition or culturally valued elements. These conditions and elements may be tangible, such as the stability of local eagle populations, or intangible, such as the perception of eagles' ability to give power to tribal members. Beneficial impacts would facilitate access, empower groups in their traditional practices or beliefs, or substantially improve the quality of the resource.

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Attachment B Phase I Bird and Bat Conservation Strategy
Attachment C USFWS Eagle Fatality Modeling
Attachment D Bird Species Known or Likely to Occur in the CCSM Phase I Project Area
Attachment E Chokecherry and Sierra Madre Phase I Wind Energy Project Local Area Population Analysis for Golden and Bald Eagles

List of Abbreviations, Acronyms, and Short Forms

Abbreviation	Definition
ACM	applicant-committed measure
ACP	advanced conservation practice
APLIC	Avian Power Line Interaction Committee
AWWI	American Wind Wildlife Institute
BBCS	Bird and Bat Conservation Strategy
BCC	Bird of Conservation Concern
BCR	Bird Conservation Region
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BLM FEIS	BLM's Final Environmental Impact Statement for the CCSM Project, published in July 2012
BLM ROD	BLM's Record of Decision for the Chokecherry and Sierra Madre Wind Energy Project and Approved Visual Resource Management Plan Amendment on Public Lands Administered by the Bureau of Land Management Rawlins Field Office, Carbon County, Wyoming, signed in October 2012
BMP	best management practice
BO	biological opinion
CCSM	Chokecherry and Sierra Madre
CCSM Phase I Project	Chokecherry and Sierra Madre Phase I Wind Energy Project, consisting of the Phase I wind turbine development and infrastructure components
CCSM Phase II Project	Chokecherry and Sierra Madre Phase II Wind Energy Project
CCSM Project	Chokecherry and Sierra Madre Wind Energy Project, including both the Phase I and Phase II projects
CDNST	Continental Divide National Scenic Trail
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CR	County Road
DEIS or Draft EIS	Draft Environmental Impact Statement
DOI	U.S. Department of the Interior
DPS	distinct population segment
EA	Environmental Assessment

Abbreviation	Definition
EA1	BLM's Environmental Assessment for Infrastructure Components: Phase I Haul Road and Facilities, West Sinclair Rail Facility, and Road Rock Quarry, Chokecherry and Sierra Madre Wind Energy Project, final EA published in December 2014
EA2	BLM's Environmental Assessment for Phase I Wind Turbine Development, Chokecherry and Sierra Madre Wind Energy Project, draft EA dated November 2014
EACP	experimental advanced conservation practice
ECP	Eagle Conservation Plan
EIA	U.S. Energy Information Administration
EIS	Environmental Impact Statement
EMU	eagle management unit
EO	Executive Order
ESA	Endangered Species Act
ETP	Eagle Take Permit
FAA	Federal Aviation Administration
FEIS or Final EIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FR	*Federal Register*
HUC	hydrologic unit code
I-80	Interstate 80
IPCC	Intergovernmental Panel on Climate Change
IWJV	Intermountain West Joint Venture
kV	kilovolt
LAP	local area population
MBPM-2	USFWS' Migratory Bird Permit Memorandum
MBTA	Migratory Bird Treaty Act
MIND	mean inter-nest distance
mph	miles per hour
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NER	National Eagle Repository
NRCS	Natural Resources Conservation Service
NREL	National Renewable Energy Laboratory

Abbreviation	Definition
PBO	programmatic biological opinion
PCW	Power Company of Wyoming LLC
PLJV	Playa Lakes Joint Venture
ROD	Record of Decision
ROW	right-of-way
SCADA	Supervisory Control and Data Acquisition
SGCN	Species of Greatest Conservation Need
SPCC	spill prevention, control, and countermeasure
SPOD	site-specific plan of development
SRMA	Special Recreation Management Area
SWPPP	storm water pollution prevention plan
TCP	traditional cultural property
TOTCO	The Overland Trail Cattle Company LLC
UPRR	Union Pacific Railroad
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WDA	Wind Development Area
WDEQ	Wyoming Department of Environmental Quality
WGFD	Wyoming Game and Fish Department
WNS	white-nose syndrome
WYO	Wyoming State Highway

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Chapter 1.0
Purpose and Need

1.1 Introduction

We, the U.S. Fish and Wildlife Service (USFWS), have prepared this Final Environmental Impact Statement (EIS) pursuant to the National Environmental Policy Act (NEPA) (42 United States Code [U.S.C.] 4321 et seq.). This EIS evaluates the effects of issuing both a standard and a programmatic Eagle Take Permit (ETP) for non-purposeful take of eagles that is incidental to otherwise lawful activities under the Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668–668d and 50 Code of Federal Regulations [CFR] 22.26) for construction and operational activities associated with the Chokecherry and Sierra Madre (CCSM) Phase I Wind Energy Project.

On June 16, 2015, the Power Company of Wyoming LLC (PCW or the Applicant) applied for a standard ETP for construction of the Phase I wind turbine development and infrastructure components for the CCSM Phase I Project, and a programmatic ETP for operation of the CCSM Phase I Project. PCW's Eagle Conservation Plan (ECP), provided in Attachment A, is the foundation of PCW's ETP applications. Our consideration of whether or not to issue ETPs constitutes a discretionary federal action that is subject to NEPA. In this EIS, we independently analyze the risk of eagle take associated with the construction and operation of the infrastructure components and the CCSM Phase I Project and assess the potential effects of the proposed action and alternatives on the human and natural environment.

1.2 General Project Overview

PCW is proposing to construct, operate, and maintain the CCSM Phase I Project in Carbon County, Wyoming, south of the city of Rawlins, as shown in Figure 1-1. As stated in Section 1.1, PCW has applied for a standard ETP and a programmatic ETP under BGEPA for construction of the Phase I wind turbine development, and infrastructure components and operation of the CCSM Phase I Project, respectively. The infrastructure components associated with the CCSM Phase I Project include the Phase I Haul Road and Facilities, West Sinclair Rail Facility, and Road Rock Quarry. The CCSM Phase I Project would consist of approximately 500 wind turbines capable of producing 1,000 to 1,500 megawatts (MW) of wind energy, and a variety of supporting infrastructure. PCW has applied for ETPs for the CCSM Phase I Project as a viable stand-alone project, independent of Phase II. The CCSM Phase II Project, which could be developed at a later date, would consist of up to an additional 500 wind turbines. The CCSM Phase II Project is analyzed in the Cumulative Impacts section of this EIS and would also be subject to additional environmental review at the time an ETP application is received for that project.

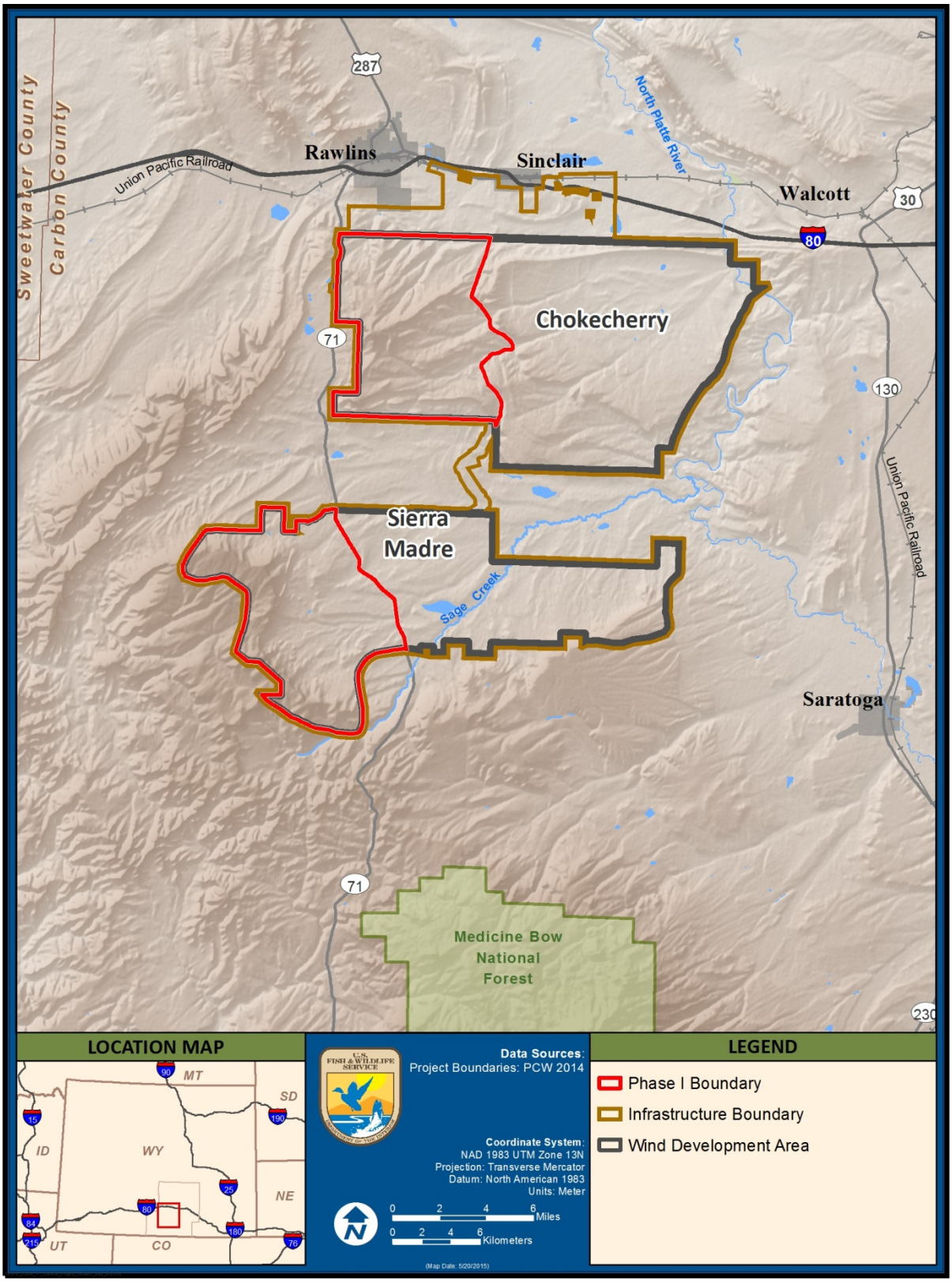

Figure 1-1. Location of the Chokecherry and Sierra Madre Phase I Wind Energy Project in Carbon County, Wyoming

The northern portion of the CCSM Project is termed Chokecherry. The Chokecherry Wind Development Area (WDA) is situated entirely east of Wyoming State Highway (WYO) 71/County Road (CR) 401. Under the development scenario proposed by PCW, the Chokecherry WDA would be divided east-west by a haul road that would be built to serve construction and operation of the CCSM Project. The southern portion of the proposed project is termed Sierra Madre. The Sierra Madre WDA is divided by WYO 71/CR 401, and the majority of the wind development acreage would be located west of the highway. The CCSM Phase I Project would occur in the western portions of both the Chokecherry and Sierra Madre WDAs. Topographic features of the area and location of the proposed wind turbines are shown in Figure 1-2.

In south-central Wyoming where the CCSM Project would be situated, land ownership is in a checkerboard pattern, where alternating sections of land are federally administered by the Bureau of Land Management (BLM) and privately owned, with a small amount of state land interspersed. As a result, approximately one-half of the CCSM Project would be located on federal lands administered by the BLM and one-half of the CCSM Project would be on privately owned land. The majority of the privately owned land is owned by The Overland Trail Cattle Company LLC (TOTCO), a PCW affiliate, which operates a ranch throughout the area. Additionally, both the State of Wyoming and the Anadarko Land Corporation own small amounts of land underlying the CCSM Project area. Land ownership is shown in Figure 1-3.

PCW has obtained a special use lease from the State of Wyoming, Board of Land Commissioners to use certain state lands for the CCSM Project. PCW and the Anadarko Land Corporation have executed an agreement relating to the Anadarko-owned lands located on the periphery of the northwest boundary of the ranch. The portion of the CCSM Project on BLM administered lands would require a right-of-way (ROW) grant from the BLM.

1.3 USFWS Mission

We, the USFWS, are an agency under the U.S. Department of the Interior (DOI). Our primary responsibility is the conservation and enhancement of the nation's fish and wildlife populations and their habitats. Our mission is "working with others to conserve, protect, and enhance fish, wildlife, plants, and their habitats for the continuing benefit of the American people" (USFWS 2013a). We also have trust responsibilities for migratory birds, federally listed threatened and endangered species, certain anadromous fish, marine mammals, and National Wildlife Refuge lands, and we are responsible for the administration, implementation, and enforcement of certain federal wildlife laws, including BGEPA and the Migratory Bird Treaty Act (MBTA).

More information on the regulatory framework guiding our development of this EIS, including NEPA, BGEPA, and MBTA, among others, is provided in Section 1.6.

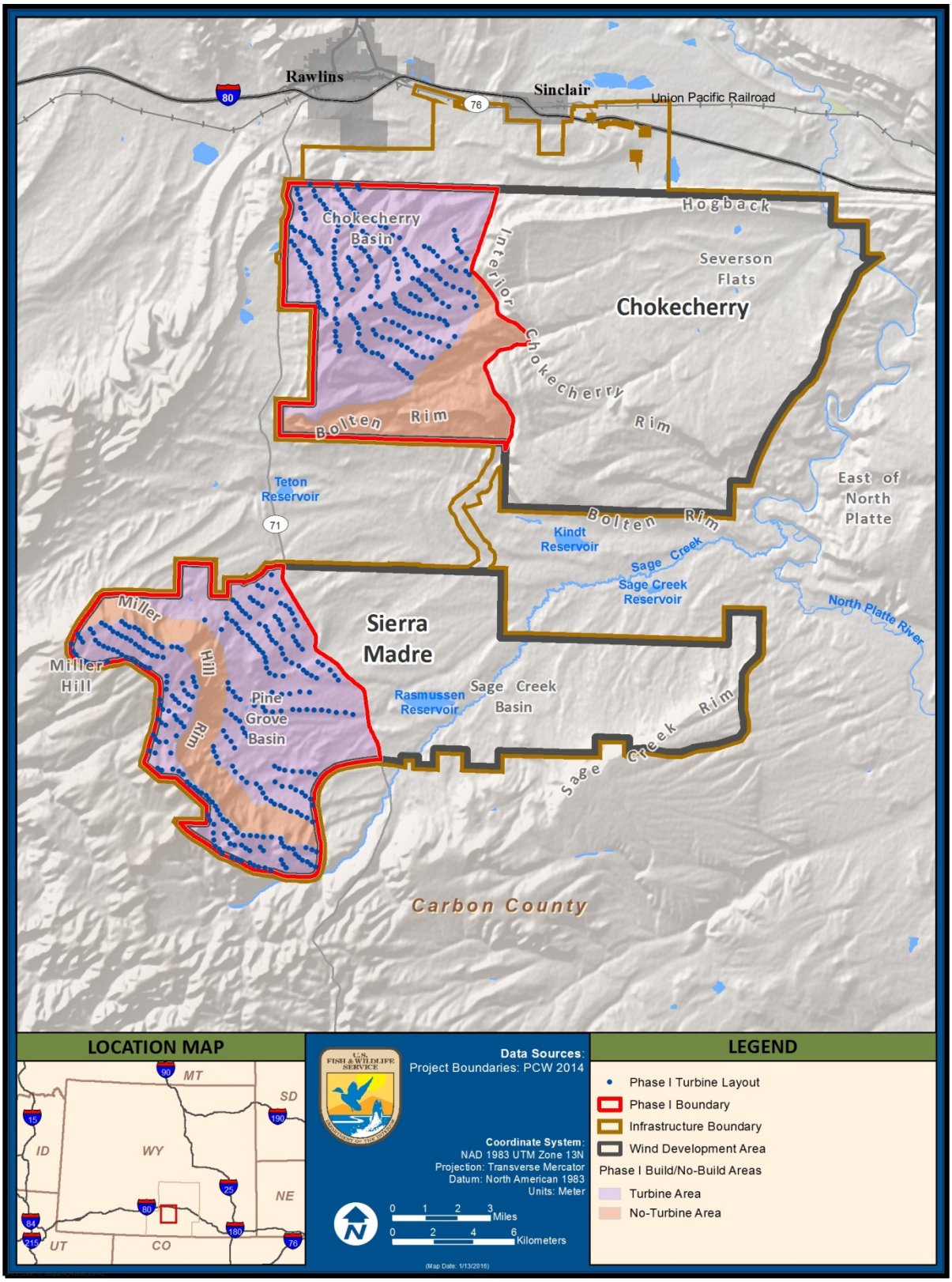

Figure 1-2. Land Features in and near the CCSM Phase I Project in Wyoming

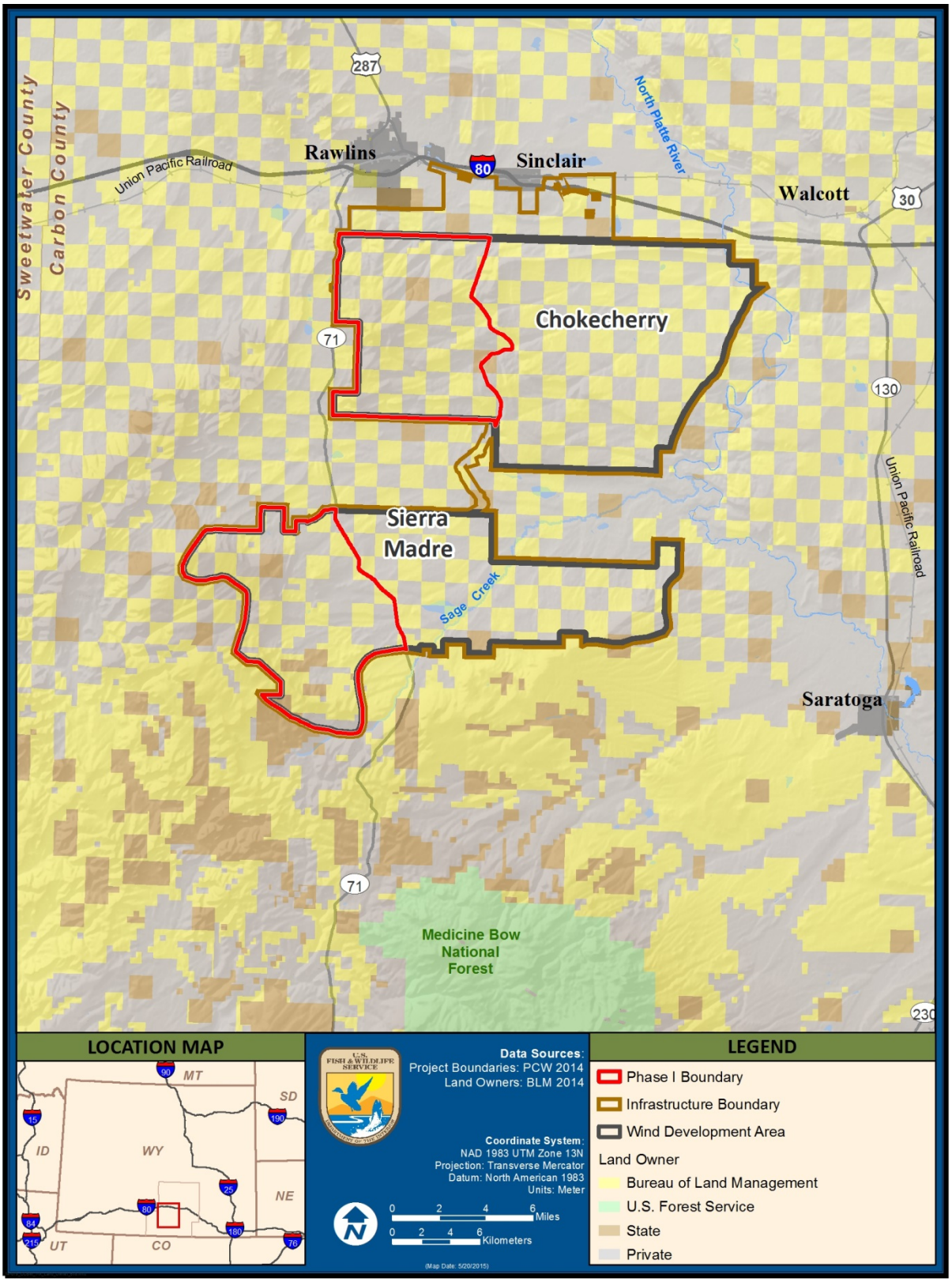

Figure 1-3. Land Ownership in and near the CCSM Phase I Project in Wyoming

1.4 Purpose of and Need for Action

On June 16, 2015, we received an application package from PCW for two ETPs under BGEPA for the CCSM Phase I Project. As the action agency, we are obligated to review the application package. Upon completion of our review of the application package and the associated NEPA process, we are also obligated to decide whether or not to issue ETPs under BGEPA for the CCSM Phase I Project and, if so, under what conditions. To issue ETPs, we must determine that the CCSM Phase I Project is consistent with the BGEPA regulatory standards, currently defined as maintaining stable or increasing breeding populations of bald and golden eagles. In making this determination, we will endeavor to follow Secretarial Order 3285, which encourages development of renewable energy generation projects in the United States.

We will consider alternatives to the proposed action that meet our purpose and need and reduce potential adverse effects of the proposed action on the human and natural environment.

1.5 Previous and Ongoing Environmental Review

As noted in Section 1.2, approximately half of the CCSM Project would be located on federal lands and would require a ROW grant from the BLM. The BLM review under NEPA for the ROW grant is a tiered review. In 2012, the BLM completed a Final Environmental Impact Statement (FEIS) and a Record of Decision (ROD) for the CCSM Project, as described in Section 1.5.1. Starting in late 2013, the BLM began conducting detailed NEPA review of PCW's site-specific plans of development (SPODs) for the CCSM Phase I Project in the form of two Environmental Assessments (EAs), as described in Section 1.5.2.

We, as a permitting agency with jurisdiction by law over the ETP, have an independent obligation to comply with NEPA. As part of our NEPA review, the BLM NEPA documents provide a foundation for the assessment of many elements of the CCSM Project related to the human and natural environment. Consequently, the analysis in our EIS incorporates by reference many portions of BLM's documents in accordance with 40 CFR 1502.21. This EIS explicitly states what documents are incorporated by reference wherever that occurs and describes the information that we have determined to be adequate for our analysis. New analysis provided in this EIS focuses primarily on eagles and related resources (such as habitat and prey), as well as migratory birds and other wildlife, that would potentially be affected by ETPs for the CCSM Phase I Project and other alternatives. The documents incorporated by reference are discussed below.

1.5.1 2012 BLM Final Environmental Impact Statement and Record of Decision

In 2012, the BLM issued an FEIS and a ROD for the CCSM Project as it was proposed to them at that time, consisting of 1,000 wind turbines over an area that would encompass both the CCSM Phase I Project and the CCSM Phase II Project. The BLM FEIS evaluated the CCSM Project at a broad level of review and was published in July 2012 (BLM 2012a). The BLM ROD, signed in October 2012, addressed whether portions of the Chokecherry and

Sierra Madre WDAs are suitable for wind development, and identified design features and mitigation to be incorporated in future BLM authorizations (BLM 2012b).

The physical components of the proposed CCSM Project were described in the BLM FEIS as follows:

- A 2,000- to 3,000-MW wind energy facility consisting of approximately 1,000 wind turbine generators with a nameplate capacity ranging from 1.5 to 3 MW
- Step-up transformers, underground and overhead electric collection and communication lines, electric substations, rail distribution facility, operations and maintenance facilities, and laydown areas
- A haul road dedicated to transporting project materials during construction and for project access during operation
- An overhead transmission line connection between the Chokecherry and Sierra Madre sites
- A network of new access roads and turbine pads and upgrades to existing roads
- Overhead electric transmission lines connecting to a new substation to be constructed in the CCSM Project area
- Construction of an operations control center
- An onsite quarry that will supply road rock for project roads

The BLM ROD does not authorize site-specific construction associated with the siting or location of individual project components. Rather, the ROD stipulates that BLM will conduct subsequent detailed NEPA reviews of SPODs before issuing ROW grants.

The ROD signed by the BLM (2012b) states:

> It is my decision that portions of the Chokecherry and Sierra Madre (CCSM) Application Area are suitable for wind development and that design features and mitigation measures must be incorporated into any future CCSM wind energy development authorizations. The decision is made to accept and evaluate future right-of-way applications for wind energy development and facilities on public lands subject to the requirements for all future wind development as described herein and under the Preferred Alternative in the CCSM project Final EIS, herein referred to as the Selected Alternative. This decision is effective on the date this Record of Decision is signed. [BLM Acting Director, September 28, 2012]

In the BLM ROD, Appendix C contains a plan for BLM's subsequent detailed NEPA review and permitting of the CCSM Project. Under the procedures outlined in the BLM ROD, PCW will submit SPODs to the BLM for detailed NEPA review that will be tiered to the BLM FEIS. The BLM ROD, Appendix C, Section 4.1 describes our review process and how it relates to the BLM's NEPA review and the overall CCSM Project. In particular, the BLM ROD, Appendix C, Section 4.1.3 outlines our requirements under BGEPA for considering the adequacy of ECP(s) developed for the CCSM Project. The BLM ROD, Appendix C, Section 7.0 outlines the anticipated coordination between our review of ETP applications and BLM's review of the ROW grant application.

As described further in our EIS, Chapter 2.0, the general permitting and coordination process outlined in the BLM ROD has been implemented, and the result is the ECP and ETP applications that we are currently evaluating in this EIS.

1.5.2 2013-2016 Tiered BLM Environmental Assessments

In 2014, PCW submitted SPODs to BLM for the Phase I wind turbine development (PCW 2014a), the Phase I Haul Road and Facilities (PCW 2014b), the West Sinclair Rail Facility (PCW 2014c), and the Road Rock Quarry (PCW 2014d) under the selected alternative in the BLM FEIS and ROD. The CCSM Phase I Project is proposed to be developed in the western portions of both the Sierra Madre and Chokecherry WDAs. The BLM has completed the first EA tiered to the 2012 BLM FEIS; the second tiered EA is in progress. The first EA, called EA1 and titled "Environmental Assessment for Infrastructure Components: Phase I Haul Road and Facilities, West Sinclair Rail Facility, and Road Rock Quarry," was finalized in December 2014 (BLM 2014). The second EA, called EA2 and titled "Environmental Assessment for Phase I Wind Turbine Development," is for the 500 wind turbines and pads, access roads, and associated components for the CCSM Phase I Project (BLM 2016a). Because they are tiered to the 2012 BLM FEIS, BLM's EAs use the same project boundary, which includes the Phase II Wind Turbine Development. Our EIS does not include the Phase II Wind Turbine Development; therefore, the project boundaries are not the same in the BLM EAs and in this EIS. The two EAs are further described below.

EA1 covers the following major components of the CCSM Project infrastructure:

- Phase I Haul Road and Facilities
- West Sinclair Rail Facility
- Road Rock Quarry

The BLM held public scoping meetings for EA1 on September 23 and 24, 2013, in Saratoga and Rawlins, Wyoming, respectively.

EA2 is based on the SPOD for the Phase I wind turbines and associated site-specific impacts of supporting infrastructure. The BLM initiated its review for this EA in fall 2013. EA2 involves detailed review of the following physical components and associated construction impacts:

- Approximately 170 miles of access roads
- 500 wind turbines and pads
- Laydown areas and construction staging areas
- Approximately 65 miles of overhead and underground electrical and communication lines
- A temporary construction camp in the CCSM Project area

The BLM held public scoping meetings for EA2 on December 16 and 17, 2013, in Rawlins and Saratoga, respectively. The BLM held public Draft EA review meetings for EA2 on March 28 and 29, 2016, in Saratoga and Rawlins, respectively.

Although we are preparing separate NEPA documents from the BLM for the CCSM Phase I Project, including the Phase I wind turbine development and supporting infrastructure components, we are closely communicating with the BLM. The BLM is a cooperating agency on our EIS, and we are a cooperating agency on the BLM's tiered EAs.

1.6 Regulatory Framework

Federal energy regulations and policies have led to an increased demand to develop cleaner, more reliable domestic supplies of energy. We consider these policies as part of the overall purpose of our action and analysis. One of the main directives related to our consideration of the ETPs is the DOI's Secretarial Order 3285.

Secretarial Order 3285, Renewable Energy Development by the Department of the Interior: This Secretarial Order was signed on March 11, 2009, to call on DOI agencies to prioritize development of renewable energy. The Secretarial Order identifies "encouraging the production, development, and delivery of renewable energy" as one of DOI's highest priorities, and directs the agencies and bureaus within the DOI to work collaboratively to "encourage the timely and responsible development of renewable energy and associated transmission while protecting and enhancing the Nation's water, wildlife, and other natural resources" (DOI 2009).

In addition to endeavoring to follow the Secretarial Order, we also consider the following policies and orders.

Executive Order (EO) 13212, Actions to Expedite Energy-Related Projects: This EO was signed on May 18, 2001, to implement recommendations from the National Energy Policy Development Group to establish a policy that federal agencies should take appropriate actions, to the extent consistent with applicable law, to expedite projects to increase the production, transmission, or conservation of energy.

Energy Policy Act of 2005 (Public Law 109-58): This act was signed into law on August 8, 2005. Section 211 of the act states, "It is the sense of the Congress that the Secretary of the Interior should, before the end of the 10-year period beginning on the date of enactment of this Act, seek to have approved non-hydropower renewable energy projects located on public lands with a generation capacity of at least 10,000 megawatts of electricity."

2009 DOI Adaptive Management Implementation Policy: This policy states that DOI agencies, including the USFWS, should incorporate the operational components identified in *Adaptive Management: The U.S. Department of the Interior Technical Guide* (Williams et al. 2009). Adaptive management is a process promoting flexible decision making in the face of uncertainties that can be adjusted as results of management actions and other events become better understood through the life of a project. Careful monitoring of the results of management actions and changing circumstances both advances scientific understanding and helps adjust policies or operations as part of an iterative process. We incorporated adaptive management as part of our consideration of the ETPs for the CCSM Phase I Project because of the challenges and uncertainties associated with avoiding, minimizing, and mitigating the take of eagles. Therefore, we have proposed an adaptive management framework by which

advanced conservation practices (ACPs) can be applied to this project to address long-term effects. ACPs are defined as "scientifically supportable measures that are approved by the USFWS and represent the best available techniques to reduce eagle disturbance and ongoing mortalities to a level where remaining take is unavoidable" (50 CFR 22.3). Because we have not currently approved any ACPs for wind energy projects, ACPs are implemented at wind energy facilities on an experimental basis and are referred to as experimental ACPs (EACPs). Additional information on adaptive management and EACPs considered in our analysis are provided in Chapter 2.0, Description of Alternatives.

EO 13604, Improving Performance of Federal Permitting and Review of Infrastructure Projects: This EO was signed on March 22, 2012, to call on Executive agencies to institutionalize best practices and identify additional actions to improve federal review and permitting of major infrastructure projects. The Federal Chief Performance Officer at the Office of Management and Budget oversees the implementation of EO 13604. The Chief Performance Officer also chairs the interagency Steering Committee on Federal Infrastructure Permitting and Review Process Improvement established under the EO in consultation with the Chair of the Council on Environmental Quality (CEQ). The Steering Committee, which included representatives from the DOI, developed a federal plan titled *Implementing Executive Order 13604 on Improving Performance of Federal Permitting and Review of Infrastructure Projects: A Federal Plan for Modernizing the Federal Permitting and Review Process for Better Projects, Improved Environmental and Community Outcomes, and Quicker Decisions*, published in June 2012, that outlines the approach to implementation of EO 13604.

Subsequently, the DOI developed its own plan (DOI Agency Plan) to implement EO 13604 on July 31, 2012. For purposes of the DOI implementation, "major infrastructure projects" are defined as "renewable energy generation projects, electricity transmission lines, pipelines, surface transportation, aviation, ports and waterways, water resource projects and broadband projects, which provide a regional economic benefit and typically involve multiple Federal, state, local and tribal permitting authorities" (DOI 2012).

Pursuant to EO 13604 and the federal plan (Steering Committee on Federal Infrastructure Permitting and Review Process Improvement 2012), the DOI Agency Plan has the following three overarching goals, which we endeavor to follow in our action on the CCSM Phase I Project (DOI 2012):

1. Implement the Federal Plan.
2. Institutionalize best practices and implement new measures where necessary to achieve a coordinated, efficient and expeditious permitting process for major infrastructure projects, while ensuring appropriate siting and compliance with the National Environmental Policy Act (NEPA), the Endangered Species Act (ESA), the National Historic Preservation Act (NHPA) and other applicable laws.
3. Achieve transparency, predictability, accountability, and continuous improvement of permitting and review processes for major infrastructure projects.

1.7 Policy, Authority, and Legal Overview

NEPA, BGEPA, MBTA, and the Endangered Species Act (ESA), as well as regulations and guidance under those statutes, provide the primary framework for our review of the ETP applications for the CCSM Phase I Project. The following sections provide information regarding the governing legal authorities and the relationship between this NEPA document, the ETP process, and ECP implementation.

1.7.1 National Environmental Policy Act

Our consideration of whether to issue ETPs to PCW for the CCSM Phase I Project is a major federal action that significantly affects the quality of the human environment as defined in 40 CFR 1508.27 under NEPA.

The intent of NEPA is to support decision makers in making well-informed decisions based on an understanding of the potential environmental consequences of their action. NEPA established the CEQ, which was charged with the development and implementation of regulations and ensuring federal agency compliance with NEPA. The CEQ regulations mandate that all federal agencies use a prescribed structured approach to environmental impact analysis. This approach also requires federal agencies to use an interdisciplinary and systematic approach in their decision-making process. This process evaluates potential environmental consequences associated with a proposed action and considers alternative courses of action.

The process for implementing NEPA is codified in 40 CFR Parts 1500–1508, Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act, and in Department of Interior regulations in 46 CFR Part 46, Implementation of the National Environmental Policy Act of 1969. The CEQ regulations specify that an EIS be prepared when a federal agency is proposing a major action with potential to "significantly affect the quality of the human environment" (40 CFR Part 1501). Significance is determined by evaluating the context and intensity of the impact.

With respect to the BLM's proposed action in approving the CCSM Phase I Project, we have identified no new significant impacts that have not already been disclosed and analyzed in BLM's NEPA documents. In accordance with CEQ regulations at 40 CFR 1502.21, we have decided to incorporate by reference certain sections of the BLM's 2012 Final EIS. Those sections adequately analyze project impacts and are incorporated herein to cut down on bulk without impeding agency and public review of the action.

Five agencies are cooperating with us in preparing this EIS: the BLM; Carbon County Board of County Commissioners; Saratoga-Encampment-Rawlins Conservation District; Wyoming Game and Fish Department; and the Wyoming Department of Environmental Quality, Industrial Siting Council. A cooperating agency has jurisdiction by law or special expertise with respect to environmental impacts involved with the proposal and is involved in the NEPA analysis. These agencies have cooperated in the preparation of this EIS by reviewing it and providing us with their comments.

This EIS has been prepared in compliance with the requirements of NEPA (Public Law 91-190, 42 U.S.C. 4321–4347); the requirements set forth in the CEQ Regulations for Implementing the Procedural Provisions of NEPA relating to USFWS compliance with NEPA for USFWS actions (40 CFR Parts 1500–1508); the DOI NEPA procedures (43 CFR Part 46); and the USFWS NEPA Reference Handbook (USFWS 2005).

To assess the environmental effects, an independent third-party contractor assisted us with environmental analysis and preparation of the EIS. For this project, as in all DOI NEPA analyses where third-party contractors are retained, the independent third-party contractor's scope of work, approach, and activities are administered under USFWS' supervision, direction, and control. Personnel from the independent contractor (HDR) work as an extension of our staff to conduct independent analysis, develop appropriate environmental methodologies, and provide technical support. Use of agency-approved, independent third-party contractors is specifically permitted by the CEQ and the DOI's own environmental regulations (40 CFR 1506.5(c) and 43 CFR 46.105, respectively).

1.7.2 Bald and Golden Eagle Protection Act

We oversee the administration, implementation, and enforcement of BGEPA (16 U.S.C. 668–668d), which makes it illegal to import, export, take, sell, purchase, or barter any bald eagle or golden eagle or parts thereof without a permit from the USFWS. Under BGEPA, "take" is defined as to "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, or disturb" (50 CFR 22.3). "Disturb" is defined as "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior" (50 CFR 22.3).

In 2007, bald eagles were removed from the ESA list of threatened and endangered species. While the bald eagle was listed under the ESA, a permit from the USFWS was available to allow eagle take incidental to an otherwise lawful activity. Because there were no provisions for issuing permits under BGEPA for activities that may disturb or incidentally take bald or golden eagles, we subsequently issued regulations that allow for the limited take of bald and golden eagles under BGEPA, where the take that may be authorized is associated with otherwise lawful activities. We published the Eagle Permit Rule on September 11, 2009 (74 *Federal Register* [FR] 46836–46879; 50 CFR 22.26 and 22.27), and the related Final Environmental Assessment: Proposal to Permit Take as Provided Under the Bald and Golden Eagle Protection Act (USFWS 2009) to fulfill our NEPA compliance requirements.

Under these 2009 rules, we can issue two types of permits for eagle take: standard permits and programmatic permits. Both types of permits can authorize take of bald and golden eagles or their nests when the take is associated with, but not the purpose of, an otherwise lawful activity and cannot practicably be avoided. To be authorized under a permit, any non-purposeful (that is, incidental) take must result in maintaining stable or increasing breeding populations of bald and golden eagles.

Standard ETPs authorize individual instances of take (including nest disturbance during construction activities) where the location, timing, and amount of take are all known. Programmatic ETPs authorize take that may recur through the life of a project and are applicable where the location, timing, and amount of take are all unknown. The programmatic ETPs are the most relevant permit type for operation of wind energy facilities, but both types may apply. Under the regulations, any take must be unavoidable even after the implementation of EACPs that are described in the ECP for the project. We developed ECP guidance to provide recommendations for the development of ECPs in support of issuance of programmatic ETPs for wind facilities. The draft ECP guidance was published in the *Federal Register* on February 18, 2011 (76 FR 9529), and a revised version was published on May 2, 2013 (78 FR 25758). Applicants are directed to identify, where appropriate, specific additional mitigation and adaptive management measures that will be triggered if the level of take authorized by the ETP is exceeded, or if new scientific information on eagles demonstrates a need for such actions.

On December 9, 2013, we published a final rule revising the BGEPA implementation regulations (78 FR 73704). The final rule extended the maximum term for programmatic permits for take of bald and golden eagles from 5 years to up to 30 years. However, on August 11, 2015, a court decision (*Shearwater v. Ashe*, Case No. 14-cv-02830-LHK, N.D. Cal. Aug. 11, 2015) set aside the portion of the rule authorizing 30-year permits, finding that we must conduct an analysis under NEPA prior to being able to adopt a longer maximum permit duration. As a result of the court's decision, the current maximum duration for standard and programmatic ETPs remains 5 years. The ETP applications for the CCSM Phase I Wind Energy Project that are the subject of this EIS are analyzed under the current eagle permitting regulations that were promulgated in 2009, and the Eagle Conservation Plan Guidance from 2013. Concurrent but separate to preparation of this EIS, USFWS proposed revised BGEPA implementation regulations, which include extending the maximum programmatic permit duration to 30 years. We are separately conducting a Programmatic EIS review of the proposed revised regulations, but that review does not impact the analysis provided in this EIS.

1.7.3 Migratory Bird Treaty Act

We also administer the MBTA, which protects migratory birds and prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when authorized by our agency under a permit (16 U.S.C. 703; 50 CFR 21; 50 CFR 10). Under the MBTA, "take" is defined as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture or collect" (50 CFR 10.12). Most actions that result in taking or the permanent or temporary possession of a protected species or nests containing eggs or young constitute violations of the MBTA. The list of the bird species protected by the MBTA is located in 50 CFR 10.13. Most of the bird species that occur in the vicinity of the CCSM Phase I Project are protected under the MBTA.

Our Migratory Bird Permit Memorandum (MBPM-2) (USFWS 2003), dated April 15, 2003, states that the destruction of most unoccupied bird nests (containing no birds or eggs) is an allowable action under the MBTA. However, unoccupied nests of eagles and federally listed

threatened or endangered bird species are fully protected under BGEPA (16 U.S.C. 668) and the ESA (16 U.S.C. 1531, 1543), respectively, and they cannot be removed without a permit from the USFWS.

We have coordinated for many years with the wind industry to develop guidelines to avoid and minimize impacts on wildlife from construction and operation of wind energy facilities. In our 2012 *U.S. Fish and Wildlife Service Land-Based Wind Energy Guidelines*, we urge "voluntary adherence to the Guidelines and communication with the Service when planning and operating a facility" (USFWS 2012a). We will regard such actions as "appropriate means of identifying and implementing reasonable and effective measures to avoid the take of species protected under the MBTA" (USFWS 2012a). We will also consider such voluntary adherence and communication when exercising our discretion with regard to any potential referrals to the U.S. Department of Justice for prosecution related to the take of species protected under the MBTA (USFWS 2012a).

In coordination with us, PCW has prepared a revised Phase I Bird and Bat Conservation Strategy (BBCS), provided in Attachment B, which addresses migratory birds and sets forth measures to avoid, minimize, and implement voluntary conservation measures to offset effects of the CCSM Phase I Project on those species. The MBTA has no provision for allowing unintentional or unauthorized (that is, incidental) take, and issuance of ETPs shall not be interpreted as providing any authorization for take of migratory birds other than eagles.

Although eagles are protected by both the MBTA and BGEPA, MBTA authorization for eagle take is not required for those who hold ETPs because the regulations concerning eagle take permits contain an exemption from the requirement to obtain an MBTA permit (50 CFR 22.11[a]).

1.7.4 Endangered Species Act

The ESA was passed by Congress in 1973 to protect our nation's native plants and animals that were in danger of becoming extinct and to conserve their habitats (16 U.S.C. 1531-1544). We administer the law together with the Department of Commerce National Marine Fisheries Service. We have primary responsibility for terrestrial and freshwater organisms, while the National Marine Fisheries Service has primary responsibility for marine life. Section 7 (a)(1) of the ESA charges all federal agencies to aid in the conservation of listed species, and Section 7 (a)(2) requires the agencies, through consultation with the USFWS and/or the National Marine Fisheries Service, to ensure that their activities are not likely to jeopardize the continued existence of listed species or species that are candidates for listing, or, adversely modify designated critical habitats.

We work with agencies and project proponents to help plan or modify projects with a federal nexus or connected actions to minimize impacts on listed species and their habitats.

1.7.5 Other Federal Environmental Acts and Related Requirements

Other major federal policies, plans, and programs potentially relevant to the CCSM Phase I Project are presented in Table 1-1. The EIS and subsequent ETPs, if ETPs are issued, would not conflict with or supersede those requirements.

Table 1-1. Federal Regulatory Framework Potentially Applicable to the CCSM Phase I Project in Wyoming

Federal Code, Act, or Rule	Legal Citation
American Indian Religious Freedom Act of 1978	42 U.S.C. 1996
Antiquities Act of 1906	54 U.S.C. 320301
Archaeological and Historic Preservation Act of 1974	54 U.S.C. 312505
Archaeological Resources Protection Act of 1979	16 U.S.C. 470a, 470cc, 470ee
Clean Air Act of 1990	42 U.S.C. 7401, 7642
Clean Water Act of 1987	33 U.S.C. 1251
Consultation and Coordination with Indian Tribal Governments, November 9, 2000	EO 13175
Emergency Planning and Community Right-to-Know Act of 1986, as extended to federal facilities, August 3, 1993	EO 12856
Farmland Protection and Policy Act of 1994	7 U.S.C. 4201 et seq.
Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, February 11, 1994	EO 12898
Federal Insecticide, Fungicide, and Rodenticide Act of 1947	7 U.S.C. 136 et seq.
Federal Land Policy Management Act of 1976	43 U.S.C. 1701 et seq.
Fish and Wildlife Coordination Act of 1934, as amended 1946, 1958, 1977	16 U.S.C. 661-667e
Floodplain Management, May 21, 1977	EO 11988
Hazardous Materials Transportation Law	49 U.S.C. 5101-5127
Historic Sites Act	54 U.S.C. 320101
Indian Sacred Sites, May 24, 1996	EO 13007
Invasive Species, February 3, 1999	EO 13112
National Historic Preservation Act of 1966	54 U.S.C. 300101 et seq.
National Trails System Act of 1968	16 U.S.C. 1241–1249
Native American Graves Protection and Repatriation Act of 1990	25 U.S.C. 3001

Federal Code, Act, or Rule	Legal Citation
Noise Control Act of 1972, as amended by the Quiet Communities Act of 2005	42 U.S.C. 4901 et seq.
Noxious Weed Act of 1974, as amended by Section 15, Management of Undesirable Plants on Federal Lands 1990	7 U.S.C. 2801-2813
Objects Affecting Navigable Airspace	14 CFR 77
Oil Pollution Control Act of 1990	33 U.S.C. 2701 et seq.
Pollution Prevention Act of 1990	42 U.S.C. 13101 et seq.
Preserve America, March 3, 2003	EO 13287
Protection and Enhancement of the Cultural Environment, May 15, 1971	EO 11593
Protection of Wetlands, May 24, 1977	EO 11990
Religious Freedom Restoration Act of 1993	42 U.S.C. 2000bb et seq.
Responsibilities of Federal Agencies to Protect Migratory Birds, February 10, 2001	EO 13186
Rivers and Harbors Act of 1899	33 U.S.C. 401 et seq.
Safe Drinking Water Act of 1974	42 U.S.C. 300(f) et seq.
Safe Drinking Water Act, Protection of Underground Sources of Drinking Water	42 U.S.C. 300h-7
Soil and Water Conservation Act of 1977	16 U.S.C. 2001 et seq.
Solid Waste Disposal Act of 1976, as amended by the Resource Conservation and Recovery Act of 1976 and the Hazardous Solid Waste Amendment of 1984	42 U.S.C. 6901 et seq.
Structures Interfering with Air Commerce Act	49 U.S.C. 44718
Taylor Grazing Act of 1934	43 U.S.C. 315
Toxic Substances Control Act of 1976	15 U.S.C. 2605(e)
Trails for America in the 21st Century, January 18, 2001	EO 13195
Wild and Scenic Rivers Act of 1968	16 U.S.C. 1271 et seq.

1.8 Public, Agency, and Tribal Participation

1.8.1 Scoping

The scoping phase of the EIS is the first formal step in engaging and soliciting public, agency, and tribal participation in the EIS process. Scoping gives individuals and organizations the opportunity to comment and offer input on alternatives, issues, concerns, and opportunities that should be considered in a NEPA document.

We held a 60-day scoping period for the EIS, from December 4, 2013, to February 3, 2014. The scoping period was announced through a Notice of Intent published on December 4, 2013, in the *Federal Register* (78 FR 7296–7298), a press release, and newspaper notices. During the scoping period, we administered a variety of outreach methods to the public, agencies, and tribes in order to raise awareness of the EIS and solicit comments for our consideration.

We held two public scoping meetings for our EIS, on December 16, 2013, in Rawlins, Wyoming and on December 17, 2013, in Saratoga, Wyoming. These meetings were held in conjunction with the BLM's scoping meetings for EA2 on the CCSM Phase I Project. The meetings were organized in an open house format with brief formal presentations.

Additionally, on January 21, 2014, we mailed letters regarding the EIS to 115 federal, state, and local agencies and other potentially interested parties. The letters included information on the CCSM Phase I Project, the scoping period, and how to provide comments.

1.8.2 Overview of Scoping Comments

During the scoping period, we received 48 comment letters from project stakeholders (that is, members of the public, non-governmental agencies, and elected officials) and agencies. These letters contained information and input that was sorted into 35 topic categories that we are considering in the EIS process. An overview of the comments received that directly informed the scope of the EIS, by topic, is provided below.

1.8.2.1 Environmental Impact Statement Process

Comments received on the EIS process, in large part, focused on a desire for increased transparency by, and coordination among, involved agencies. Comments noted that the data and analysis contained in the EIS should be accurate and transparent, and available for review by the public as soon as it is generated.

1.8.2.2 Purpose and Need

Four comments were received regarding the purpose and need for the EIS. These comments all indicated a preference that we define the purpose and need broadly to reflect the statutory authorities and goals applicable under BGEPA, rather than narrowly framed as whether to "approve or deny" the ETPs, in order to allow us latitude to consider alternatives outside of the current plan of development for the CCSM Phase I Project.

1.8.2.3 Alternatives

Fifteen commenters provided feedback regarding the range of alternatives to be analyzed in the EIS. These comments included suggestions on ETP duration, mitigation measures, monitoring protocols, adaptive management strategies, and project development and siting specifications (including project location and size).

1.8.2.4 Eagle Data

Several commenters noted that robust, scientifically accurate, and objective eagle baseline data need to be collected both for the location of the CCSM Project and regionally in order to adequately characterize the affected eagle population. Many commenters noted that these data should be made publically available to help the public make more informed comments. Additionally, many commenters expressed their desire to review the ECP as soon as it is available.

Comments received regarding what eagle data and analysis need to be considered in the EIS included the following:

- Site assessments must examine project impacts on eagle foraging habitat, nesting, roosting sites, wintering habitat, migratory stopover sites, migratory corridors, and defended eagle territories.
- The prey base within the footprint of the development should be considered in the analysis.
- Direct impacts include collisions with the turbines, stabilizing wires, transmission lines, communication lines, and meteorological towers. Other impacts, such as the access roads, power facilities, railroad spur, and quarry, will further contribute to the decline of the local population by degrading habitat and increasing habitat loss and fragmentation, which will move eagles out of their preferred habitat and into marginal habitat.

1.8.2.5 Wildlife

In addition to the potential impacts of the project on eagles, several commenters noted that the EIS needs to analyze the project's impacts on, and mitigation measures for, other birds; bats; elk, mule deer, and pronghorn (that is, big game); and aquatic resources. Several comments proposed specific monitoring and mitigation measures to protect greater sage-grouse.

1.8.2.6 Additional Resource Areas

Comments on direct and indirect impacts on several resource areas were received, including impacts on tribal resources, historic and cultural resources, visual and recreational resources, and land use. Eleven commenters provided considerations for the cumulative impacts assessment in the EIS. Climate change, other sources of eagle take, the CCSM Phase II Project, and projects such as area transmission lines (including the TransWest Express Transmission Project) and oil and gas drilling and associated infrastructure (including the Atlantic Rim Natural Gas Project as well as the proposed Continental Divide-Creston Natural Gas Development Project) were encouraged to be cumulatively assessed for their impacts on eagles, other wildlife, habitat, and visual and recreational resources.

1.8.3 Draft EIS Review

The second formal step in engaging and soliciting public, agency, and tribal participation in the NEPA process was releasing the Draft EIS for review. The Draft EIS review period was used to gather input from interested parties on the alternatives and resources analyzed in the document.

We held a 60-day public review period for the Draft EIS from April 29, 2016, to June 27, 2016. Additionally, the review period was reopened July 15, 2016, through July 29, 2016, for members of the public to resubmit comments. The public review period, availability of the Draft EIS, and public meeting schedule were announced through a Notice of Availability published in the *Federal Register* on April 29, 2016 (81 FR 25688-25690). An amended notice was published in the *Federal Register* on July 15, 2016 (81 FR 46077) to announce the reopening of the EIS review comment period. The public review periods and public meetings for the Draft EIS were also announced in press releases and newspaper notices.

On April 21, 2016, and again on July 19, 2016, a postcard notice was sent to all contacts on the project mailing list we maintain announcing the availability of the Draft EIS, the Draft EIS review period, and the public meetings. The mailing list includes 471 individuals identified as being potentially interested in the EIS. Individuals on the mailing list include elected state, federal, and local officials; agency contacts; special interest groups; community businesses and gathering places; and interested members of the public that have contacted us throughout the NEPA process. Copies of the Draft EIS, as well as the permit application and the supporting ECP, were made available during the public review period at the Carbon County Library System at 215 West Buffalo Street, Rawlins, Wyoming; the Saratoga Public Library at 503 West Elm Street, Saratoga, Wyoming; USFWS Wyoming Ecological Services Office at 5353 Yellowstone Rd, Suite 308A, Cheyenne, Wyoming; and USFWS Region 6 Office at 134 South Union Boulevard, Lakewood, Colorado. The Draft EIS was also published on our project specific website.

We held two public Draft EIS review meetings on June 6, 2016, in Saratoga, Wyoming and on June 7, 2016, in Rawlins, Wyoming. Each meeting shared the same format, one hour of informal open-house style conversation followed by a formal presentation and question answer session. The purpose of the meetings was to share information about the Draft EIS and solicit feedback.

1.8.4 Overview of Draft EIS Comments

During the Draft EIS public review period, we received a total of 36 comment letters from project stakeholders and agencies. These letters contained information and input that was sorted into 366 discrete comments within 28 topic categories that we considered in the Final EIS. Comments received which directly informed the content of the Final EIS included comments on eagles and eagle data, monitoring, advanced conservation practices, compensatory mitigation, avoidance and minimization measures, and adaptive management.

Comments received on the alternatives analyzed in full included 18 comments related to Alternative 1, 24 comments related to Alternative 2, six comments related to Alternative 3,

and five comments related to Alternative 4. Cumulative Impacts of the project were noted in 39 comments. Several commenters expressed concern that we did not offer a robust enough current and future analysis of the cumulative impact of the CCSM Phase I project when combined with other regional threats to eagle populations, including ongoing threats to eagles from rodenticide and lead poisoning. The comments received during the Draft EIS review phase, and our responses, are discussed in greater detail in Section 5.6 of this EIS.

1.8.5 Cooperating Agencies' Roles and Responsibilities

A cooperating agency is defined as any agency, except the NEPA lead agency, that has jurisdiction by law or has special expertise with respect to any environmental issue that should be addressed in the EIS. We sent formal notification of the EIS planning process and subsequent public comment period to 19 federal, state, and local agencies at the beginning of the scoping period. We invited these agencies to become a cooperating agency on our EIS for ETPs for the CCSM Phase I Project. Five agencies requested to be, and have been accepted as, cooperating agencies on the EIS: the BLM; Carbon County Board of County Commissioners; Saratoga-Encampment-Rawlins Conservation District; Wyoming Game and Fish Department; and Wyoming Department of Environmental Quality, Industrial Siting Council.

On September 10, 2014, we held a meeting with the cooperating agencies in Cheyenne, Wyoming, in support of EIS development. The purpose and goals of the meeting were to review our EIS process, engage cooperating agencies further in the EIS development process, and methodically work through all cooperating agency recommendations on the range of reasonable alternatives to analyze in full in the EIS—as well as the list of alternatives that won't be analyzed—and the justifications for each alternative considered.

Cooperating agencies were provided the preliminary Draft EIS to review from January 25, 2016, to February 12, 2016. We held a webinar for the cooperating agencies on the preliminary Draft EIS on February 4, 2016. In total, we received and responded to 177 comments from four participating cooperating agencies in the process of developing the Draft EIS. On June 6, 2016, we held a roundtable meeting with the cooperating agencies, to discuss our responses to agency comments and the contents of the Draft EIS.

Cooperating agencies were also provided an opportunity in October 2016 to review the preliminary Final EIS, and we received and responded to 64 comments from four participating cooperating agencies as we developed this Final EIS.

1.8.6 Tribal Consultation

We have engaged in tribal consultation specific to the issue of eagle take, in accordance with our obligations under NEPA; American Indian Religious Freedom Act of 1978; the Presidential Memorandum of April 29, 1994, Government to Government Relations with Native American Tribal Governments; and EO 13175, Consultation and Coordination with Indian Tribal Governments. We have also considered the principles and obligations of EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, and the Religious Freedom Restoration Act of 1993.

We invited 72 tribes to participate in government-to-government consultation regarding this action, of which 9 have engaged in ongoing consultation. These tribes are the Cheyenne River Sioux Tribe of the Cheyenne River Reservation, Chippewa Cree Indians of the Rocky Boy's Reservation, Comanche Nation, Eastern Shoshone Tribe/Eastern Shoshone Business Council, Northern Arapaho Tribe/Northern Arapaho Business Council, Northern Cheyenne Nation, Pueblo of San Felipe, Santa Clara Pueblo, and Shoshone-Bannock Tribes of the Fort Hall Reservation. Please see Chapter 5.0 of this EIS, Coordination and Consultation, for additional information.

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Chapter 2.0
Description of Alternatives

2.1 Introduction

The Council on Environmental Quality (CEQ) regulations for implementing the National Environmental Policy Act (NEPA) require that federal agencies explore and objectively evaluate reasonable alternatives to the proposed action, and briefly discuss the rationale for eliminating any alternatives that were not considered in detail. Therefore, in Section 2.1, we discuss the factors we considered when developing alternatives. In Section 2.2, we describe a range of reasonable alternatives, including the Proposed Alternative, the No Action Alternative, and two other action alternatives; we also identify our Preferred Alternative in this section. In Section 2.3, we summarize and compare the alternatives considered for detailed analysis, and in Section 2.4, we discuss alternatives that were considered but eliminated from further study.

In developing alternatives, we considered, among other factors, the criteria that we would use to screen alternatives; our management of eagles and other bird species; adherence to Eagle Conservation Plan (ECP) guidance and compliance with the Bald and Golden Eagle Protection Act (BGEPA); and input from the public, agencies, and tribes. These factors are presented below.

2.1.1 Alternatives Screening Criteria

Throughout 2014, we held several internal meetings to discuss alternatives and developed these screening criteria for the alternatives that would be considered in full:

- Meet the purpose and need
    - Be consistent with BGEPA regulatory standards
    - Endeavor to follow Secretarial Order 3285, which encourages development of renewable energy generation projects in the United States while protecting and enhancing the Nation's water, wildlife, and other natural resources
- Pose a clear choice for the decision maker
- Be reasonable
    - Be consistent with laws and regulations
    - Be technically feasible (that is, would use commercially available technology)
    - Be implementable by the project proponent
    - Represent an action for which we could issue Eagle Take Permits (ETPs)

2.1.2 Focus of this Environmental Impact Statement

While developing alternatives, we considered the potential direct and indirect effects on eagles of the proposed project activities that would be covered by the ETPs. This approach is consistent with 40 Code of Federal Regulations (CFR) 1500.1, the purpose of NEPA, which

states that "NEPA documents must concentrate on the issues that are truly significant to the action in question, rather than amassing needless detail."

Our impacts assessment process is based on our Final Environmental Assessment (EA) for the eagle take permit rule (U.S. Fish and Wildlife Service [USFWS] 2009). Before issuing an ETP, we must analyze eagle populations at several levels. First we look at populations in the eagle management unit (EMU) for each species. Then we analyze the local area population (LAP) and further consider the impacts of a project on both bald and golden eagles. The geographic units we use and their relevancy to alternatives development are described in the following sections.

2.1.2.1 Eagle Management Units

We defined EMUs in our Final EA for the eagle take permit rule (USFWS 2009) by using available data for bald and golden eagles to identify regional eagle population management areas for each species. Our goal was to ensure that our permit program does not cause declines in eagle populations at a regional or national scale (USFWS 2009). For bald eagles, EMUs largely follow USFWS regional boundaries. The EMUs for bald eagles potentially affected by the Chokecherry and Sierra Madre (CCSM) Phase I Project are the Northern Rocky Mountains EMU and the Rocky Mountains and Plains EMU. The EMUs for bald eagles are shown in Figure 2-1. For golden eagles, EMUs follow Bird Conservation Regions (BCRs). The EMUs for golden eagles potentially affected by the CCSM Phase I Project are BCRs 10, 16, 17, and 18, as shown in Figure 2-2 and discussed in Section 2.1.2.2 (USFWS 2013b).

ETPs that exceed take thresholds for the affected regional EMU, either singly or in combination with other analyzed forms of take, must require that the eagle take be offset so that there is no net loss to the breeding population. This compensatory mitigation is further described in Section 2.2.1.4.5.

2.1.2.2 Bird Conservation Regions

BCRs are ecologically distinct regions in North America with similar bird communities, habitats, and resource management issues established by the North American Bird Conservation Initiative (U.S. NABCI Committee 2015). We use BCRs as the EMU for golden eagles in accordance with the 2009 eagle take permit rule (74 *Federal Register* [FR] 46836-46879).

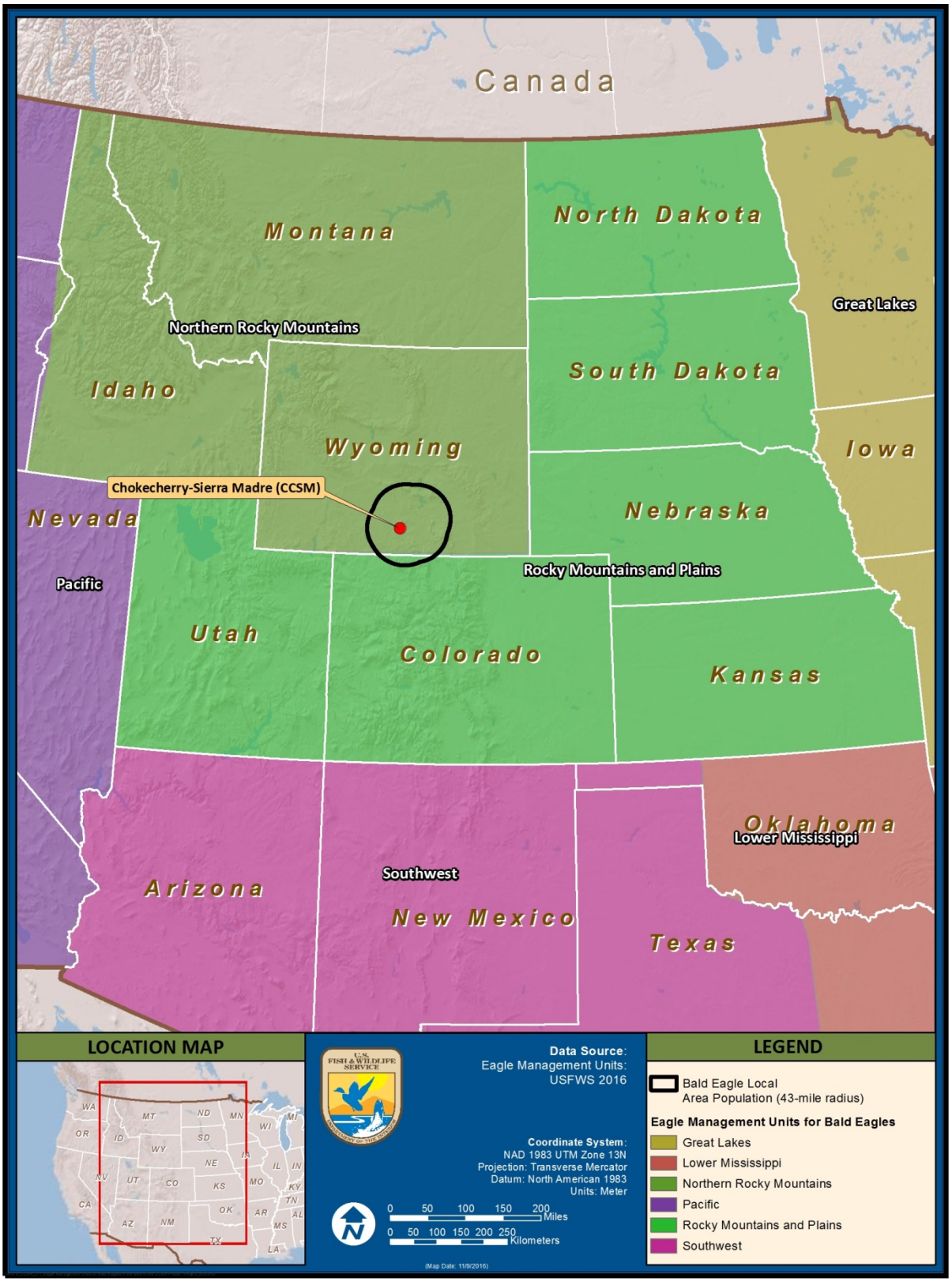

Figure 2-1. Eagle Management Units for Bald Eagles in the area of the CCSM Phase I Project in Wyoming

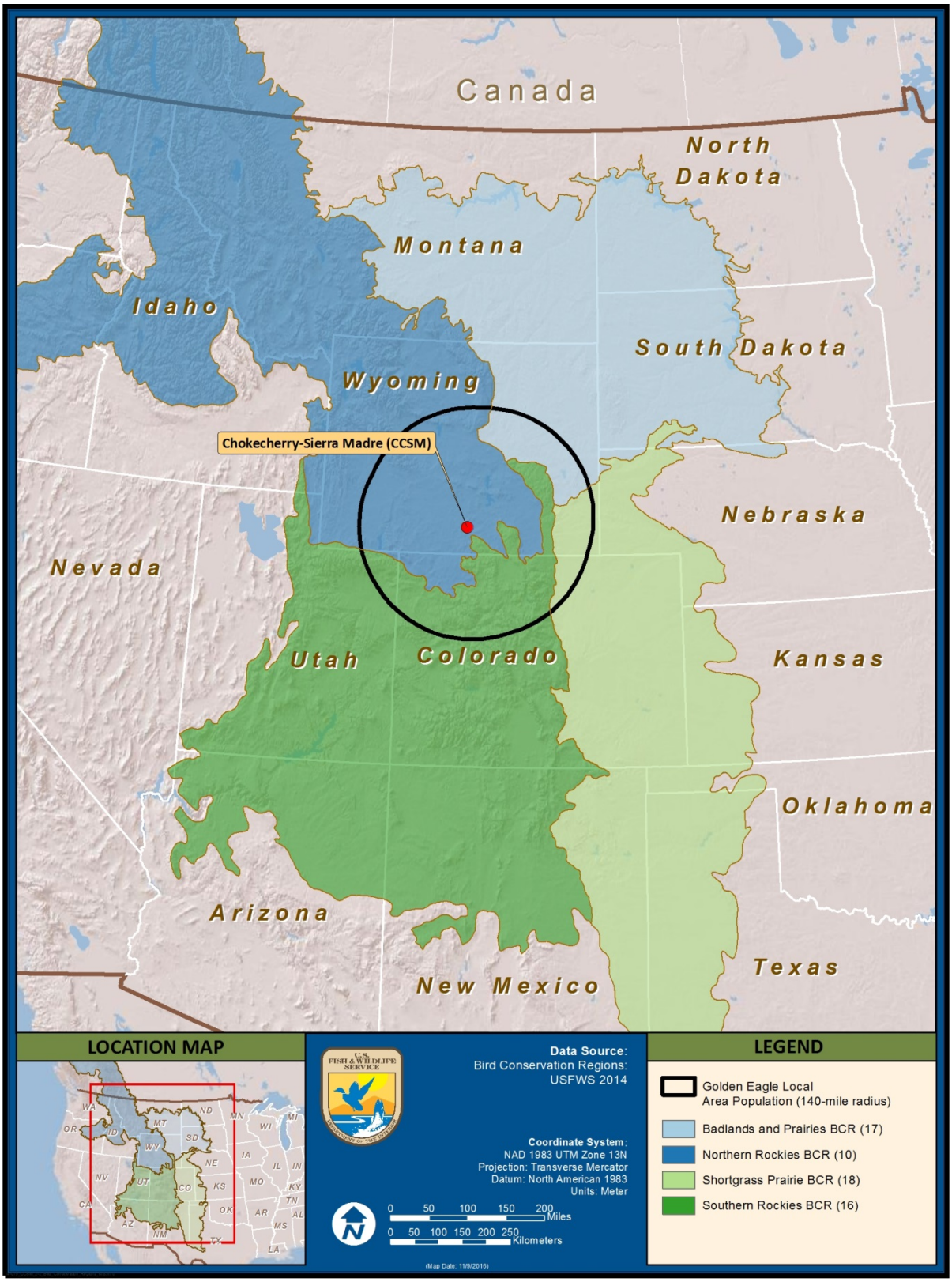

Figure 2-2. Eagle Management Units for Golden Eagles (North American Bird Conservation Regions [BCRs]) Contiguous to the CCSM Phase I Project in Wyoming

Eagles in each of four BCRs may migrate to or from the Phase I development and infrastructure areas. That is, eagles potentially affected by the CCSM Phase I Project can be part of any of the four BCR eagle populations. The four BCRs are described below and are shown in Figure 2-2:

- BCR 10, Northern Rockies: This BCR includes the Northern Rocky Mountains and outlying ranges in both the United States and Canada. Although the mountainous portions of this BCR are dominated by a variety of coniferous forest habitats, the BCR includes the intermontane Wyoming Basin, which is characterized by sagebrush shrubland and shrub-steppe habitat. The CCSM Phase I Project is located in the southern portion of this BCR. Golden eagles present in the northern areas of this BCR may also migrate south to the Phase I development and infrastructure areas during winter months.
- BCR 16, Southern Rockies/Colorado Plateau: This BCR is topographically complex and includes the Wasatch and Uinta Mountains to the west and the Southern Rocky Mountains to the east, separated by the tableland of the Colorado Plateau. A range of habitats is contained in this BCR, including coniferous forest interspersed with aspen at higher elevations, piñon-juniper woodlands on lower plateaus, and shortgrass prairies in the high arid plains. Golden eagles from this BCR may migrate north to the Phase I development and infrastructure areas during summer months.
- BCR 17, Badlands and Prairies: This BCR is a semi-arid rolling plain dominated by a mixed-grass prairie that lies west and south of the glaciated Prairie Pothole region, east of the Rocky Mountains, and north of the true shortgrass prairie. Many large, contiguous grassland tracts persist in this area. Golden eagles from this BCR may migrate to the Phase I development and infrastructure areas, especially during winter months.
- BCR 18, Shortgrass Prairie: This BCR lies in the rainshadow of the Rocky Mountains, where arid conditions greatly limit the stature and diversity of vegetation. Numerous broad, braided rivers drain easterly out of the Rockies and cross through the shortgrass prairie. Golden eagles from this BCR may migrate north to the Phase I development and infrastructure areas during summer months.

2.1.2.3 Local Area Population Scale

For eagles, we define LAPs. The local area is defined for each eagle species using the median natal dispersal distance, or the average distance traveled by an individual eagle from its place of birth to the place where it reproduces. For bald eagles, we conducted our analysis using a 43-mile buffer around the CCSM Phase I Project, and for golden eagles, we did this using a 140-mile buffer around the CCSM Phase I Project. These distances are based on median dispersal distance from nests as presented in the ECP guidance (USFWS 2013b). The LAP is the population of eagles within this radius. For bald eagles, the LAP analysis for the CCSM Phase I Project included the portions of the Northern Rocky Mountains EMU and the Rocky Mountains and Plains EMU that are within 43 miles of the CCSM Phase I Project. For golden eagles, the LAP analysis for the CCSM Phase I Project included the portions of each BCR within 140 miles of the CCSM Phase I Project. For the CCSM Phase I Project, this includes the southern portion of the Northern Rockies BCR (BCR 10), and portions of BCRs 16, 17, and 18. This combined area incorporates portions of three states (Wyoming,

Colorado, and Utah). Our LAP analysis (USFWS 2016e) is provided as Attachment E. The local areas are shown in Figures 2-1 and 2-4.

After we complete the review of the project at the regional or EMU level, we look next at the LAP scale and further consider the predicted level of eagle take for both bald and golden eagles and conduct further analyses.

2.1.2.4 Take Thresholds or Benchmarks

When considering issuing an ETP, we look at our established take thresholds, which are published in our Final EA for the eagle take permit rule (USFWS 2009). To ensure that any authorized take of eagles does not exceed the BGEPA preservation standard, we have set regional take thresholds for each species. Take thresholds establish the maximum cumulative take of eagles that can be allowed under programmatic ETPs each year in each EMU. Under our current management approach, permitted take of bald eagles is capped at 5 percent of the estimated annual productivity for this species (USFWS 2009). However, because we lacked data to show that golden eagle populations could sustain any additional unmitigated mortality at the time the current Eagle Permit Rule was finalized, we set take thresholds for golden eagles at zero for all regional populations (USFWS 2009). This means that any new authorized "take" of golden eagles must be at least equally offset by compensatory mitigation. Thresholds are fixed, and in the context of eagle take permitting, we cannot exceed these thresholds.

We have also developed and applied guidance on upper limits of take at more local scales to manage cumulative impacts on LAP populations for eagles. Under current guidance, we must assess take rates, both for individual projects and for the cumulative effects of other human-caused take of eagles, at the LAP scale. As described in Section 2.1.2.3, the LAP is the population of eagles within the natal dispersal distance. For eagle populations, we identified take rates of between 1 percent and 5 percent of the total estimated LAP as significant, with a 5 percent take rate being at the upper end of what might be appropriate under the BGEPA preservation standard, whether offset by compensatory mitigation or not (USFWS 2013b). The 1 percent and 5 percent levels for the LAP are referred to as benchmarks. These benchmarks represent an eagle harvest rate at the LAP scale that should trigger heightened scrutiny (USFWS 2013b), and they are designed to provide protections for eagle populations at the LAP scale. Unlike thresholds, these benchmarks could be exceeded by us when permitting eagle take, but there should be a specific rationale and a related policy call for doing so.

For the analysis supporting the evaluation of the CCSM Phase I Project, we first compared estimated take from the CCSM Phase I Project to these benchmarks, as described below and in Chapter 3.0. As described in Chapter 4.0, we also analyzed the predicted level of take from this individual project in combination with other past, present, and reasonably foreseeable future actions at the LAP scale to determine the cumulative impacts on eagles. If we issue a programmatic ETP, the level of allowable take would be established for the life of the 5-year permit. If actual take from the project exceeds the allowable take in the permit, the Power Company of Wyoming LLC (PCW) would be legally liable for the additional take. We would build an adaptive management process into the permit within which we would review

the level of actual eagle take on an annual basis. Adaptive management is discussed further in Section 2.2.1.4.4.

2.1.2.4.1 Bald Eagles

For bald eagles, we use the EMU take thresholds in our Final EA for the eagle take permit rule, Table C-3 (USFWS 2009), for the Northern Rocky Mountains EMU and the Rocky Mountains and Plains EMU. These thresholds are set at 5 percent of estimated annual production of bald eagles. As shown in the Final EA for the eagle take permit rule, in Table C-3, the combined take threshold for these two EMUs is 43.75 individual bald eagles. We calculate the predicted level of bald eagle take for the CCSM Phase I Project and determine whether it would fall within the established take threshold (below the 5 percent benchmark) for these two EMUs. Then we analyze the predicted level of take and compare it to the LAP 5 percent benchmark. For bald eagles, we have determined that the predicted level of take due to the CCSM Phase I Project would be below the 5 percent benchmark; therefore, we are considering issuing standard and programmatic ETPs for bald eagles.

2.1.2.4.2 Golden Eagles

For golden eagles, we use the take thresholds in our Final EA for the eagle take permit rule, Table C-4 (USFWS 2009), for the regional level. As shown in the Final EA for the eagle take permit rule, in Table C-4, the take threshold for golden eagles is set at zero for BCRs 10, 16, 17, and 18 (and throughout the range of the species) because data indicate that golden eagle populations are not able to sustain any additional unmitigated mortality (mortality is defined as the death of a large number of individuals) (USFWS 2009). This means that any new authorized take of golden eagles must be at least equally offset by compensatory mitigation. Compensatory mitigation is defined as specific conservation actions to replace or offset project-induced golden eagle fatalities. Therefore, in order for us to issue an ETP, PCW would be required to first perform compensatory mitigation to offset all predicted golden eagle fatalities from the CCSM Phase I Project, resulting in no net loss of golden eagles.

2.1.3 Eagle Take Permits and Eagle Conservation Plan Guidance

We have developed ECP guidance for wind energy developers to follow when they consult with us and apply for ETPs (USFWS 2013b). This guidance outlines the procedures that both we and wind energy developers, such as PCW, should follow during the permitting process to implement and meet the requirements of the regulations at 50 CFR 22. The guidelines were developed based on an EA that evaluated permitting eagle takes and on federal rule making (USFWS 2009; 78 FR 73704-73725).

The alternatives carried forward for detailed analysis in this Environmental Impact Statement (EIS) are consistent with the ETP process, as outlined in the following permit requirements and ECP guidance (50 CFR 22.26; USFWS 2013b). Specific permit stipulations described in more detail under each alternative.

- Under federal rules for ETPs, we can issue permits that authorize individual instances of take of bald and golden eagles (standard take), and programmatic take (that is,

instances of take that may recur over time), when take is associated with, but not the purpose of, an otherwise lawful activity and cannot practicably be avoided. Wind project operators are not legally required to seek or obtain an ETP. However, the take of an eagle without a permit is in violation of BGEPA and could result in a referral by USFWS to the U.S. Department of Justice for prosecution.

- Standard and programmatic ETPs may be issued only in compliance with the preservation standards of BGEPA, which currently means that the take must be consistent with the goal of stable or increasing breeding populations of eagles.
- The USFWS identified take rates of between 1 and 5 percent of the total estimated LAP as a threshold of concern, with 5 percent being the upper end of what might be appropriate under the BGEPA preservation standard, whether offset by compensatory mitigation or not.
- For programmatic ETPs, the regulations require that any authorized take must be unavoidable after the implementation of advanced conservation practices (ACPs). We have not currently approved any ACPs for wind energy projects and are working with the wind industry to develop ACPs as part of an adaptive-management regime and comprehensive research program tied to the programmatic ETP process. Therefore, any ACPs for the CCSM Phase I Project will be referred to as experimental ACPs (EACPs). These EACPs are consistent with the ECP guidance.
- Project developers are expected to implement reasonable avoidance and minimization measures that may reduce take of eagles at a project, and we would work with developers to identify site-specific and possible turbine-specific factors that may pose risks to eagles.
- Where wind energy facilities cannot avoid taking eagles and eagle populations are not healthy enough to sustain additional mortality, applicants must reduce unavoidable mortality to a no-net-loss standard within the affected eagle management unit for the duration of the permitted activity. No-net-loss means that these actions either reduce another existing cause of mortality to a level equal to or greater than the unavoidable mortality, or lead to an increase in carrying capacity that allows the eagle population to grow by an equal or greater amount. Actions to reduce eagle mortality or increase carrying capacity to this no-net-loss standard are known as compensatory mitigation. Examples of compensatory mitigation activities might include retrofitting power lines to reduce eagle electrocutions, removing road-killed animals that eagles scavenge for food to reduce the number of eagles killed by vehicles, or increasing prey availability to increase the number of eagle breeding pairs.
- The issuance of a programmatic ETP and compensatory mitigation requirements are based on the proposed project's risk of eagle take. The risk of eagle take is based on predicted eagle fatalities (that is, deaths of individual eagles) for a project. Fatalities are estimated based on site-specific data collected by the applicant and fatality modeling performed by the USFWS (taking avoidance and minimization measures into account) using our peer-reviewed eagle fatality prediction model (USFWS 2013b, 2013c; New et al. 2015).
- The regulations require that the applicant monitor eagle use and eagle fatalities and provide the USFWS with an annual monitoring report. The results of monitoring required under the standard or programmatic ETP would be publicly available. Post-construction monitoring protocols are included as a condition of programmatic

ETPs, and we work jointly with applicants to determine the design of the protocols. The regulations also require the applicant to allow our personnel, or qualified persons that we designate, to access where eagles are likely to be affected for the purpose of monitoring eagles. This requirement extends through the life of the permit and up to three years after it expires.

- If a standard or programmatic ETP is issued, permit holders are required to contact us immediately upon the discovery of any unanticipated eagle take. For a standard permit, an example of unanticipated eagle take would be a vehicle colliding with an eagle during construction. For a programmatic ETP, an example of unanticipated eagle take would be eagle fatality beyond the number specified in the permit.
- In accordance with the regulations, we may amend, suspend, or revoke a programmatic permit if new information indicates that revised permit conditions are necessary, or that suspension or revocation is necessary to safeguard local or regional eagle populations.

2.1.4 Public, Agency, and Tribal Input

As discussed in Section 1.8, we solicited public, agency, and tribal input through the scoping phase of the EIS and through additional consultations. Scoping meetings were held on December 16, 2013, in Rawlins, Wyoming, and on December 17, 2013, in Saratoga, Wyoming, and the scoping comment period ran from December 4, 2013, to February 3, 2014. Tribal consultation efforts have been ongoing. Through scoping and consultations, we have received comments on a range of topics and have addressed all comments that affect development of the EIS alternatives, as appropriate.

We solicited additional input on the EIS alternatives from cooperating agencies during an alternatives workshop held on September 10, 2014, in Cheyenne, Wyoming. One of the purposes of the workshop was to methodically work through all cooperating agency recommendations on a broad range of alternatives to determine which alternatives would be analyzed in full in the EIS as well as which alternatives would be dismissed from further evaluation. Another purpose of the workshop was to discuss the reason why each alternative would or would not be assessed in full in the EIS.

2.2 Alternatives Carried Forward for Detailed Analysis

After considering the input received from the public, agencies, and tribes regarding the range of alternatives to be considered in this EIS, and comparing the input to the alternatives development criteria (see Section 2.1.1) and ECP guidance (see Section 2.1.2; USFWS 2013b), we determined that four alternatives would be considered in full. These four alternatives are described in the following sections:

- Alternative 1 – Proposed Action: Issue ETPs for Phase I Wind Turbine Development and Infrastructure Components
- Alternative 2 – Proposed Action with Different Mitigation
- Alternative 3 – Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project
- Alternative 4 – No Action: Denial of ETPs

Alternative 1 is our Preferred Alternative; if standard and programmatic ETPs are issued, the permits would reflect any and all additional conditions that we determine are necessary to meet the eagle preservation standards set forth in BGEPA.

2.2.1 Alternative 1 – Proposed Action: Issue ETPs for Phase I Wind Turbine Development and Infrastructure Components

2.2.1.1 Overview

On June 16, 2015, we received an application from PCW for a standard ETP for disturbance take related to the construction of the Phase I wind turbine development and infrastructure components for the CCSM Phase I Project. On June 16, 2015, we also received an application from PCW for a programmatic ETP for the take of bald and golden eagles under BGEPA for operation of the CCSM Phase I Project. Along with the ETP applications, PCW submitted its ECP for the CCSM Phase I Project on June 16, 2015. The ETP applications and ECP are provided in Attachment A. On August 3, 2015, we received a Phase I Bird and Bat Conservation Strategy (BBCS) from PCW in support of its ETP applications. We provided comments on the Phase I BBCS to PCW and received a revised Phase I BBCS on May 20, 2016, and an amendment to the revised BBCS on July 6, 2016. The revised Phase I BBCS and Amendment 1 are provided in Attachment B.

Alternative 1 (Proposed Action) is for the USFWS to issue two ETPs for the CCSM Phase I Project, which includes both infrastructure components and wind turbine development, based on the ETP applications. Because the CCSM Phase I Project could be constructed and put into full operation even if the USFWS declines to issue an ETP, some or all of the effects of the CCSM Phase I Project are therefore neither direct nor indirect effects of the USFWS's decision. We have nevertheless elected in this EIS to analyze the environmental effects of the CCSM Phase I Project. We have also chosen to analyze the construction and operation of the infrastructure components as part of the CCSM Phase I Project because these components would have no independent utility without the wind turbine development. One ETP would be a standard ETP, and the second would be a programmatic ETP.

Standard ETP: The first ETP, a standard ETP, would cover the activities that would result in the unavoidable disturbance of eagles (including nest disturbance) during the construction of the infrastructure components and Phase I wind turbine development for the CCSM Phase I Project. Disturbance take during construction may result from noise and traffic associated with quarry operations, construction and operation of a water extraction facility on the North Platte River, and other construction operations near eagle nests. Disturbance take is further discussed in Section 2.2.1.3.3.

Programmatic ETP: The second ETP, a programmatic ETP, would cover the ongoing take of eagles that is likely to occur during the operation of the CCSM Phase I Project. The primary form of take anticipated during project operations would be lethal take due to turbine blade collisions. However, any disturbance take that could occur during operation of the CCSM Phase I Project also would be covered under the programmatic ETP.

To issue the ETPs, we must determine that the CCSM Phase I Project is consistent with the BGEPA regulatory standards. These standards are currently defined as issuing permits for projects that would maintain stable or increasing breeding populations of bald and golden eagles, resulting in no net loss of eagles. In deciding whether to issue the ETPs, we would endeavor to follow Secretarial Order 3285, issued by the Secretary of the U.S. Department of the Interior (DOI) in 2009, which encourages development of renewable energy generation projects in the United States while protecting and enhancing the Nation's water, wildlife, and other natural resources.

2.2.1.2 Covered Activities (Description of the CCSM Phase I Project)

The CCSM Phase I Project has been analyzed by BLM and BLM will determine whether ROW grants can be issued for construction and operation of the CCSM Phase I Project. Construction and operation activities are described in more detail in BLM's FEIS and its 2013-2016 tiered EAs. BLM's EAs use the same project boundary as the 2012 BLM FEIS, which includes the Phase II wind turbine development. Our EIS does not include the Phase II wind turbine development; therefore, the project boundaries in this EIS are not the same as in the tiered BLM EAs.

This section provides a summary of the CCSM Phase I Project activities that would be covered under the ETPs for Alternative 1. The standard ETP would cover the construction activities for the Phase I wind turbine development and the infrastructure components for the CCSM Phase I Project that may result in disturbance take of eagles. The programmatic ETP would cover the operation of the CCSM Phase I Project that is anticipated to result in eagle fatalities and other types of take, as described in Section 1.7.2.

The CCSM Phase I Project would include 500 wind turbines in the western portions of the Chokecherry and Sierra Madre Wind Development Areas (WDAs), as shown in Figure 2-3. Within the Chokecherry WDA, the Phase I wind turbine development would include 202 turbines, primarily located east of Wyoming State Highway (WYO) 71/County Road (CR) 401. Within the Sierra Madre WDA, the Phase I wind turbine development would include 298 turbines in the areas occurring west of WYO 71/CR 401.

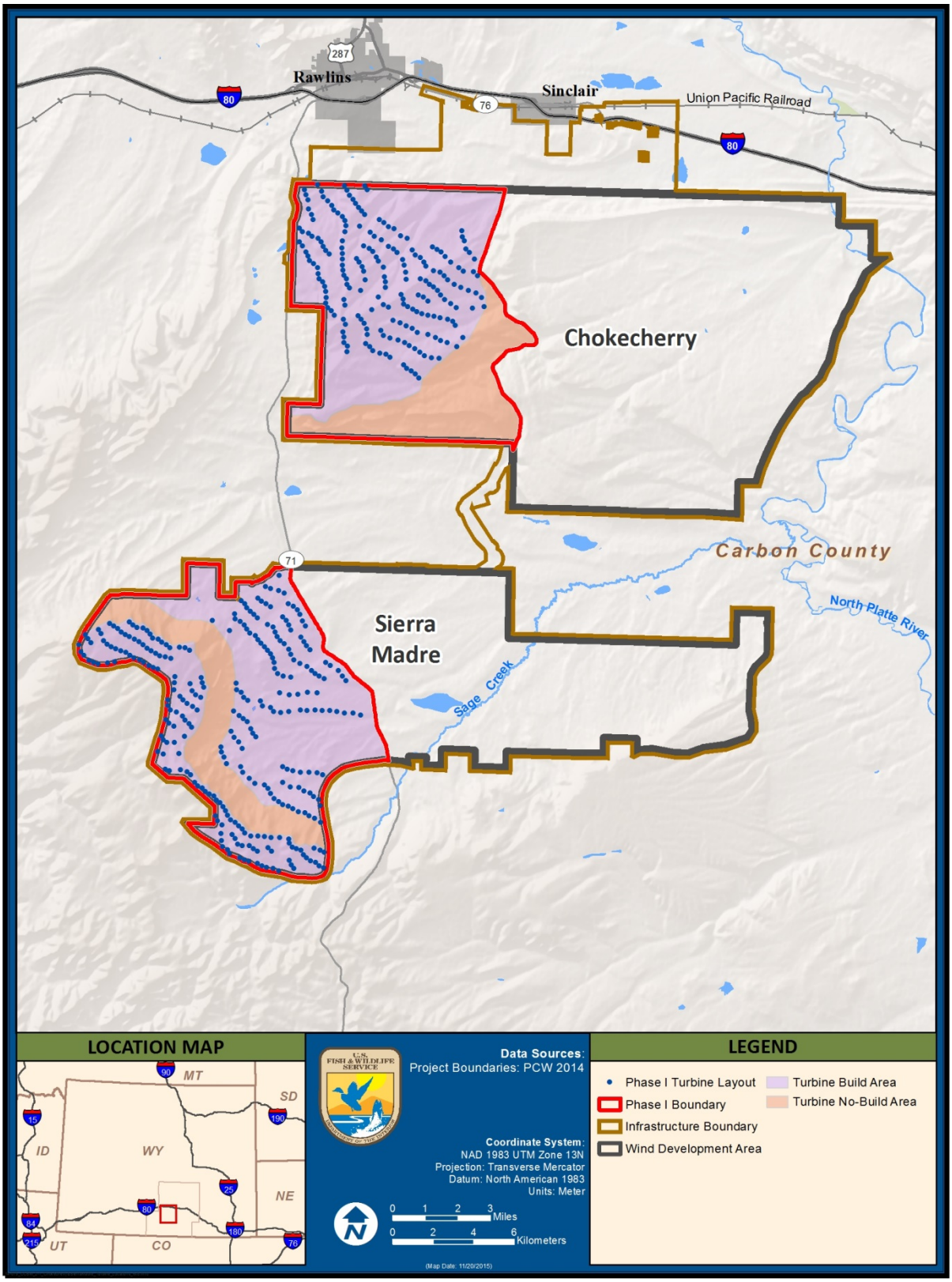

Figure 2-3. Proposed Wind Turbine Layout for the CCSM Phase I Project in Carbon County, Wyoming

Along with the turbines themselves, the Phase I wind turbine development would include roads, laydown yards (including a temporary construction camp and parking areas), electrical systems (including electrical lines and substations), water facilities, operation and maintenance buildings, meteorological towers, utilities, and other temporary features, as shown in Figures 2-4 and 2-5.

As described in the ECP, PCW would also construct infrastructure components as part of the CCSM Phase I Project. The infrastructure components that would be covered by the ETPs are the Phase I Haul Road and Facilities, West Sinclair Rail Facility, and Road Rock Quarry, shown in Figures 2-4 and 2-5.

If granted, the standard ETP would cover activities that would result in disturbance of eagles during construction of the infrastructure components. These infrastructure components would be required for construction of the Phase I wind development and are described below.

Phase I Haul Road and Facilities

The Phase I Haul Road and Facilities would include the Haul Road, arterial and facility access roads, three water stations, one water extraction facility, and five laydown yards (see Figures 2-4 and 2-5). The Haul Road would include the North Entrance, South Entrance, North Road, Chokecherry Road, Miller Hill Road, and Lower Miller Hill Road. The combined road network is referred to as the Phase I Haul Road.

The Phase I Haul Road would provide access to I-80 (exit 221), the West Sinclair Rail Facility, the Road Rock Quarry, and the Chokecherry and Sierra Madre WDAs. The Phase I Haul Road and Facilities would consist of approximately 59.5 miles of road (2.6 miles of existing roads and 56.9 miles of new or improved roads) and 225 acres of long-term modification. Any portions constructed prior to securing a standard ETP for construction activities are still subject to compliance with BGEPA. That is, if construction activities disturb or otherwise take eagles without a permit, it would constitute a violation of BGEPA. However, no violation would occur if the activity does not result in disturbance or other form of take of eagles.

The Phase I Haul Road would have a design speed of 40 mph. Secondary roads would have a slower design speed of 20 mph. The width of the Haul Road would be suitable for two-way traffic. Culverts are anticipated to be used for all crossings by the main Haul Road, as well as all large and moderate drainage crossings (that is, watersheds greater than 10 square miles). For smaller crossings along lower traffic roads, at-grade low water crossings would be used. Ongoing use of the Haul Road would be covered under the programmatic ETP for the CCSM Phase I Project once construction of the road system is complete.

The three water stations and one water extraction facility would provide the infrastructure to obtain and distribute water for both construction and operation of the CCSM Phase I Project. The water stations would include Smith Draw Water Station, McCarthy Water Station, and Pine Grove Water Station, and the water extraction facility would be the North Platte River Water Extraction Facility.

The water stations would be designed to connect a water supply to a water filling station, where water would be loaded onto trucks for use throughout the Phase I development and infrastructure areas. Each water station would consist of a water filling station, a water supply well or connection to surface or municipal supplies, an underground pipeline between the water supply and the water filling station, and associated roads. The Smith Draw Water Station would connect the Tuttle No. 2 well and the North Platte River Water Extraction Facility to the Smith Draw Filling Station; the McCarthy Water Station would connect the McCarthy No. 1 well to the McCarthy Filling Station; and the Pine Grove Water Station would connect the Tuttle No. 1 well to the Pine Grove Filling Station.

The North Platte River Water Extraction Facility would extract surface water from the North Platte River and transmit it to the Smith Draw Water Station. The North Platte River Water Extraction Facility would include the North Platte Pump Station, buried water pipeline, and two booster pump stations. The North Platte Pump Station would consist of a submersible pump (approximately 50 horsepower) mounted in a 72-inch precast concrete wet well adjacent to the North Platte River. The wet well would be connected to the river by a 24-inch intake pipe. A check valve would be placed between the wet well and the river.

The five laydown yards associated with the Phase I Haul Road and Facilities would be the North, Chokecherry, Basin, West Deadman, and Miller Hill laydown areas. Each laydown area would have locations for vehicle and equipment parking, material storage, portable sanitation facilities, waste storage, and an area for vehicle refueling and fuel storage. The North laydown yard would be used as the primary location for temporary construction trailers for the CCSM Phase I Project.

West Sinclair Rail Facility

The West Sinclair Rail Facility would consist of a rail connection to the Union Pacific Railroad (UPRR) main line between Rawlins and Sinclair, and an associated laydown yard to receive, temporarily stage, and deliver components and construction-related materials. The Rail Facility would connect with the CCSM Phase I Project and is designed to minimize impacts on public roadways by bringing construction materials, including wind turbines, to the site by railroad. The West Sinclair Rail Facility would be built southwest of Sinclair, along the northern boundary of the Chokecherry WDA (see Figure 2-4). The Rail Facility would consist of approximately 14 miles of new track, up to 181 acres of laydown area needed for material and component storage, and an access road. Construction of the Rail Facility is anticipated to begin in 2017 and be completed in 2018 to support construction of the Phase I wind turbine development and infrastructure components for the CCSM Phase I Project.

The Rail Facility would be a multi-modal facility, meaning it would be able to receive and store components and material delivered by both rail and truck. The facility would be able to accommodate up to three trains, each up to 6,500 feet in length, onsite at one time, and would process and unload up to four trains per week. Other materials and components may arrive via individual railcars or groups of railcars that are dropped off at an interchange siding. Trains would enter and leave the Rail Facility using two connection points to the UPRR main line, one east of the Rail Facility near mile marker 678 and one west near mile marker 680.

The laydown yards for the Rail Facility would store wind turbine components and stockpiles of aggregate and other construction material. The North laydown yard is designed to store up to 150 complete wind turbines (or about 1,500 large turbine components). The laydown yards would include an office trailer, employee parking, portable toilets, and equipment storage containers.

The Rail Facility would also include a 0.9-mile-long access road connecting the Rail Facility to the CCSM Phase I Project's internal road network. The access road would be routed from the southeast corner of the laydown yards to the Phase I Haul Road. The Rail Facility's access road would be designed to meet the haul road classification with a 40-foot-wide driving surface, a design speed of up to 40 mph, and accommodations for two-way traffic. Vehicle access to the Rail Facility would be from Interstate 80 (I-80), Exit 221, and from the Haul Road.

Road Rock Quarry

The Road Rock Quarry would provide a local source of aggregate and most of the road construction material for the CCSM Phase I Project. The Quarry would be located approximately 2 miles south of Rawlins (see Figure 2-4). The Quarry is an existing quarry that has been operated intermittently over the last 100 years. Commercial quarrying last occurred at the Road Rock Quarry in the 1960s.

Quarry operations for the CCSM Phase I Project would consist of surface rock (open-cut) mining and processing of sandstones and shales of the Mesaverde Group. Material mined from the Quarry would be used for road construction, construction fill, site grading, and other similar uses.

The Quarry would include the excavation area, material processing area, material storage piles, and a 5-mile-long quarry access road (Quarry Road). Quarry Road would run approximately 5 miles from the eastern portion of the Quarry to Chokecherry Road and would be designed with a 40-foot-wide driving surface, a design speed of up to 40 mph, and accommodations for two-way traffic. Quarry Road would also include a one-way arterial loop to facilitate truck loading and turnaround.

For each year of construction of the CCSM Phase I Project, the Quarry would be mobilized at the beginning of the construction season and demobilized at the end of the construction season. No permanent structures would be constructed at the Quarry. Portable office trailers would be used for Quarry construction and operations, and portable crushers would be used to process the material. Material load-out at the Quarry would be accomplished using wheel loaders or portable conveyor belts to load the aggregate and fill into trucks.

The Quarry would decrease the number of train and truck trips required to deliver road based aggregate from off-site quarries to the CCSM Phase I Project.

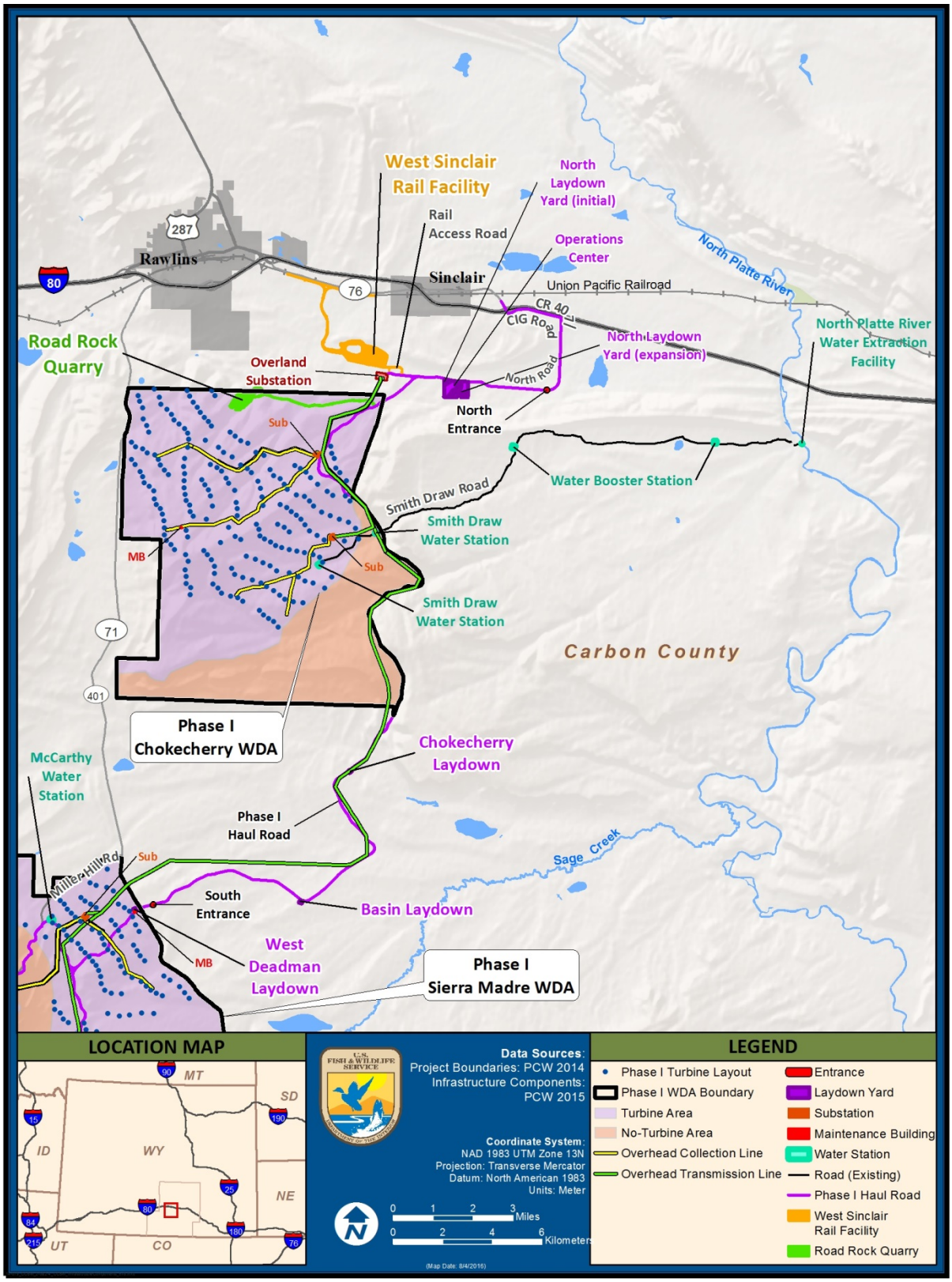

Figure 2-4. Wind Turbine Development and Infrastructure Components in the Chokecherry Portion of the CCSM Phase I Project in Wyoming

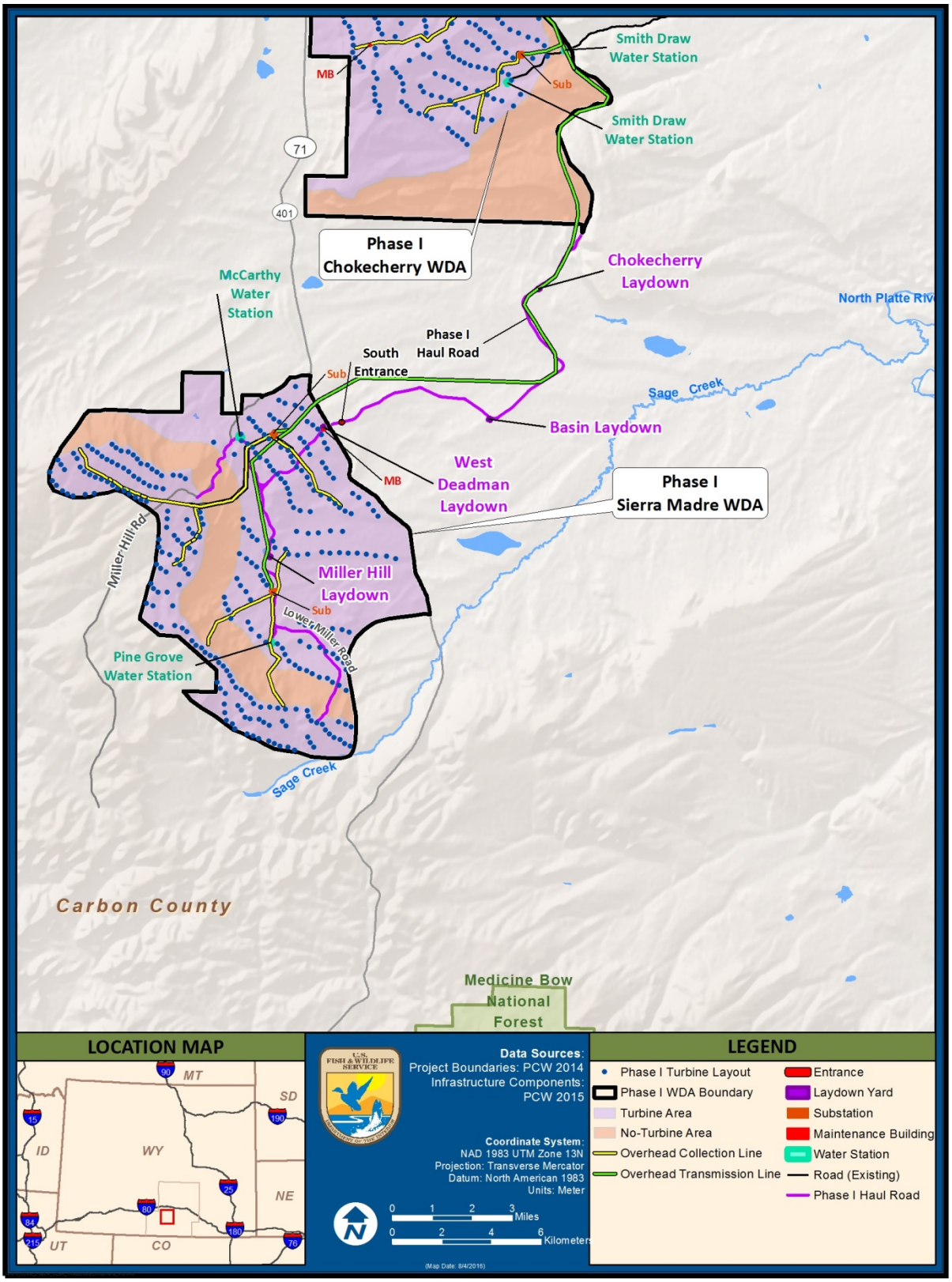

Figure 2-5. Wind Turbine Development and Infrastructure Components in the Sierra Madre Portion of the CCSM Phase I Project in Wyoming

2.2.1.2.1 Surface Modification

The CCSM Phase I Project would include a range of surface modification activities during construction of the wind turbines and the associated turbine infrastructure. For this analysis, we categorized surface modification by the duration of use and level of grading and vegetation cutting into three areas: initial clearing and grading areas, long-term modification areas, and "activity" areas. Initial clearing and grading areas include the total area that would be cleared for construction of the CCSM Phase I Project, including long-term modification areas and areas that would be revegetated and reclaimed following construction. Long-term modification areas include roads and pads that would be maintained throughout project operations and rehabilitated during project decommissioning. Activity areas include locations where grasses may be mowed and shrubs may be cut or partially cut for a short period during construction; no clearing or grading would occur. These areas are discussed in more detail in Section 2.2.1.2.2 under the heading "Wind Turbine Site Activities."

The wind turbine development for the CCSM Phase I Project would consist of 3,035 acres of initial clearing and grading, 485 acres of long-term modification, and 440 acres of activity areas. The infrastructure components would result in an additional 1,430 acres of initial clearing and grading and 365 acres of long-term modification. Table 2-1 shows the estimated acreages of surface modification for the CCSM Phase I Project.

Table 2-1. Surface Modification Areas by Component for the CCSM Phase I Project in Wyoming

Project Component	Initial Clearing and Grading Area (acres) [a]	Long-Term Modification Area (acres)	Activity Area (acres)
Phase I Wind Turbine Development • Roads • Wind Turbines, Pads, Foundations • Collection System • Substations • Internal Transmission System • Buildings • Meteorological Towers • Utilities • Laydown Yards (including construction trailers and workforce accommodations [Construction Camp and RV Park] in North Laydown Yard) • Crane Assembly Areas • Crane Paths • Construction Camp and RV Park for Workforce • Water Stations (North, Nevins	3,035	485	440

Project Component	Initial Clearing and Grading Area (acres) [a]	Long-Term Modification Area (acres)	Activity Area (acres)
Valley, Chokecherry Knob, Upper Miller Hill)			
Phase I Haul Road and Facilities • Haul Road (40.5 miles new; 1.9 miles improved public road) • Laydown Yards (North, Chokecherry, Basin, West Deadman, Miller Hill) • Water Stations (Smith Draw, McCarthy, Pine Grove) • North Platte River Extraction Facility (including North Platte Pump Station, buried water pipeline, and two booster pump stations)	876	226	0
West Sinclair Rail Facility • Rail Access Road • Rail Laydown Yards and Facilities • Union Pacific Main Line Connection and Running Track • Wye Junction and Lead Track • Wind Turbine Unloading Tracks • Manifest Unloading Tracks • Bad Order and Locomotive Storage Tracks	370	121	0
Road Rock Quarry • Quarry Road • Material Extraction Area (or Excavation Area) • Northern Operations Area • Southern Operations Area • Soil Storage and Erosion Control Areas	184	18	0
Total	**4,465**	**850**	**440**

Note:
[a] The initial clearing and grading area includes the long-term modification area.

Long-term modification areas would occur within initial clearing and grading areas and include areas where aggregate fill material would be placed for wind turbine sites, roads, laydown yards, and other sites that would be used during project operation. About 1.5 million cubic yards of aggregate would be required to build the CCSM Phase I Project, with about 674,000 cubic yards of that aggregate used for the Phase I wind turbine development. The aggregate would be obtained both from the proposed Road Rock Quarry onsite and from nearby commercial sources. A small amount of aggregate would also be required to operate and maintain the CCSM Phase I Project. Aggregate would be removed as part of the decommissioning process.

Other construction materials that would be used for the installation of 500 wind turbines include about 495 corrugated metal pipe culverts, 30,000 tons of rebar, 2,610 cable reels, 528 overhead collection structures, and 215 internal electric transmission structures. More information on construction is provided in BLM's FEIS, EA1, and EA2.

2.2.1.2.2 Phase I Wind Turbines

The CCSM Phase I Project would install 500 wind turbines. The Chokecherry WDA would contain 202 turbines, and the Sierra Madre WDA would contain 298 turbines. The proposed placement of wind turbines is shown in Figure 2-3.

PCW determined the preliminary site for each wind turbine based on meteorological, topographical, and geotechnical data, and field review of the preliminary layout. PCW further refined the sites of the individual wind turbines based on conditions outlined in the Bureau of Land Management's (BLM) Record of Decision (ROD), consultation with us and the BLM, and site-specific characteristics (PCW 2014a). Additional information on siting and refining the locations of the wind turbines to avoid and minimize impacts on eagles and other wildlife is provided in Section 2.2.1.3.2, below.

As shown in Figure 2-6, each wind turbine would consist of a nacelle, hub, tower, rotor, and blades. Wind turbines are not specifically designed for each project. Rather, wind turbines are designed according to industry standards to meet a range of wind and site conditions. For utility-scale wind turbines such as those required for the CCSM Phase I Project, vendors would review the site-specific wind data and offer models that meet the requirements of the observed and predicted wind conditions. The wind turbine options for the CCSM Phase I Project are still under consideration. However, all turbine models under consideration have the same general configuration shown in Figure 2-6. This configuration is a single-rotor, three-bladed upwind horizontal-axis design on a tubular tower. The tower would be fixed to a foundation. All turbine models under consideration for the CCSM Phase I Project have a maximum tower height of 328 feet (100 meters) from ground level to the turbine hub, and a maximum rotor diameter of 394 feet (120 meters). Although these dimensions represent the largest turbine under consideration, towers currently being evaluated by PCW range in height from 262 to 279 feet (80 to 85 meters) with rotor diameters of 331 to 367 feet (101 to 112 meters). Any wind turbine model selected by PCW would be painted the standard manufacturer color (approximately 5 percent grey) unless otherwise specified.

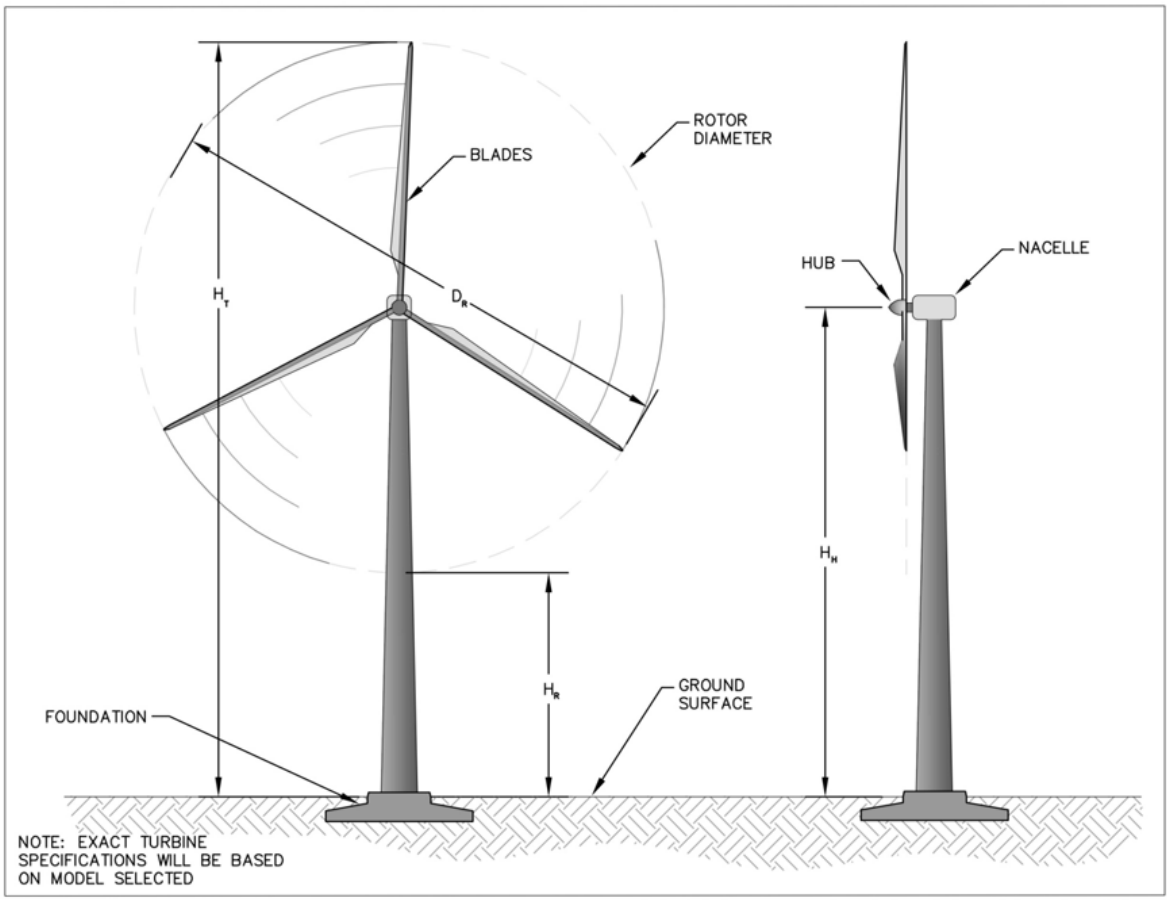

Figure 2-6. Typical Wind Turbine Diagram (PCW 2014a)

Wind Turbine Site Activities

Each wind turbine site includes three overlapping areas, as discussed in Section 2.2.1.2.1: initial clearing and grading areas, long-term modification areas, and activity areas. The initial clearing and grading area is the area around the wind turbine where vegetation would be removed and the ground surface would be leveled to install the turbine, including the turbine's foundation and electrical connections. Following installation of the wind turbine, portions of the initial clearing and grading area would be reclaimed so that a much smaller graveled area would remain at each site. This would be the long-term modification area, which would be a gravel-filled area that provides access to the turbine during operation and maintenance. Activity areas are areas at a wind turbine site that would not be cleared or graded, but where workforce and vehicles may need access to support wind turbine erection. In these areas, vehicles (for example, pickup trucks, all-terrain vehicles, and rough-terrain cranes) and crews on foot would use designated routes to support turbine erection. In activity areas, thick vegetation higher than 1 foot may be cut or partially cut to allow for safe vehicle access and to minimize fire hazard.

The initial clearing and grading area at each wind turbine site would be used for the following:

- Foundation construction, including component staging and concrete placement
- Separated stockpiles of topsoil and subsoil from site grading and foundation excavation
- Soil preparation for backfill, if needed
- Electrical line trenching and pad mount component placement
- Turbine component storage prior to erection
- Turn-around area for delivery vehicles (if needed)
- Pads for main erection crane, and routes in and out for cranes
- Operation areas for rough-terrain and other smaller support cranes used in component offloading, rotor assembly, and turbine erection
- Hub location for turbine rotor assembly

The initial clearing and grading area at wind turbine sites would not have a grade greater than 5 percent and would have sufficient soil depth to support the turbine assembly activities. Where grading is necessary, the site would be graded to tie the access road into the native terrain at a maximum slope of 4:1 unless otherwise specified in site plans. For purposes of planning and permitting, it is assumed that each wind turbine site would be cleared and graded.

The foundations for wind turbines are designed to securely hold the wind turbine in place, account for the local soil and weather conditions, meet applicable codes, be cost effective, and meet load and design requirements based on manufacturer specifications. Loads include extreme loads due to wind or operation, normal operating loads, and fatigue loads. Design requirements include items like required minimum foundation stiffness, maximum allowable differential settlement, and tower connection details.

The primary wind turbine foundation design selected for the CCSM Phase I Project is the mat foundation. Mat foundations are the most widely used design for wind turbine foundations due to their versatility. Mat foundations were chosen for the CCSM Phase I Project because they allow for a wide range of soil conditions and they are simple to construct, requiring only shallow excavations, and are anticipated to be suitable for most wind turbine sites. On average, each wind turbine foundation is anticipated to require less than 600 cubic yards of concrete.

Wind Turbine Operation

Wind turbines would operate autonomously based on sensors that detect the conditions of the wind, the power grid, and the turbine itself. When the power grid is available to accept power and there is sufficient wind, the wind turbines would operate and generate power in an automatic mode. CCSM Phase I Project operators would monitor turbine conditions from the operations center.

The CCSM Phase I Project is designed to extract the maximum potential wind energy from the Chokecherry and Sierra Madre WDAs while minimizing the potential for eagle take

(PCW 2014a, 2015). Based on wind resource mapping provided by the U.S. Department of Energy's National Renewable Energy Laboratory (NREL), only about 2 percent of the continental United States land area has an annual average wind resource above 20 miles per hour (mph), which is considered ideal for wind turbine operation (NREL 2009, as cited in BLM 2012b). Much of the total ideal wind resource exists in mountainous areas that are impractical for wind energy development. However, about 5 percent of the total ideal wind resource is concentrated within the boundaries of the Chokecherry and Sierra Madre WDAs (BLM 2012b). The wind power potential of the Chokecherry and Sierra Madre WDAs was modeled by AWS Truewind Solutions and validated by NREL as Class 5 (excellent; 16.8 to 17.9 mph at 50 meters); Class 6 (outstanding; 17.9 to 19.7 mph at 50 meters); or Class 7 (superb; >19.7 mph at 50 meters). Wind speeds within the Chokecherry and Sierra Madre WDAs are greater than those generally recorded for nearby Rawlins. Average wind speeds in the Chokecherry WDA are approximately 21 mph (9.5 meters per second), and winds are predominantly from the southwest. Average wind speeds in the Sierra Madre WDA are approximately 22 mph (9.9 meters per second) and also are predominantly from the southwest (PCW 2014a).

The majority of the maintenance activities associated with the CCSM Phase I Project would occur during daylight hours. Nighttime activities outside of buildings and substations would be rare. Temporary lighting would be used during instances where nighttime activities are required away from substations and buildings. When safety considerations allow, these lights would be equipped with downward shields to illuminate light in a target area and reduce stray ambient lighting. For nighttime turbine operation and maintenance activities in close proximity to buildings and substations, a combined switch and motion-detection system for exterior lights would be used.

Maintenance activities for wind turbines fall into two categories: scheduled and unscheduled. Scheduled maintenance would be planned by CCSM Phase I Project management and performed by the maintenance teams. If a turbine's sensors detect a problem with the turbine or grid, the turbine would shut down and send a notification to the operations center through the Project's Supervisory Control and Data Acquisition (SCADA) system. Operators would then inform the maintenance teams that an unscheduled maintenance check on the turbine is required.

Following cessation of operation at the end of the lifetime of the CCSM Phase I Project (estimated to be 30 years), the site would be decommissioned. Decommissioning activities are not covered under the scope of the ETPs currently being applied for and are therefore not evaluated further in this EIS. If decommissioning would involve activities that may require a standard ETP due to potential take of eagles, we would evaluate those activities at that time.

2.2.1.2.3 Additional Phase I Wind Turbine Development Features

As described in the ECP, the Phase I wind turbine development would include roads, electrical systems (including electrical lines and substations), operation and maintenance buildings, meteorological towers, utilities, and temporary features associated with the turbines, in addition to the turbines themselves. These features are discussed below, and many of these features are shown in Figures 2-4 and 2-5.

Roads

The roads constructed for the CCSM Phase I Project would provide access between the Phase I Haul Road and the wind turbines, overhead collection and transmission line structures, meteorological towers, and other elements. The proposed road alignments were chosen to minimize the number of drainage crossings to the extent practicable. During site operation and maintenance activities, dust from the roads would be controlled to the maximum extent practicable. Periodic maintenance of the roads would include blading the roads to allow for safe access and to minimize long-term dust generation. If weather and traffic cause long-term road base degradation, PCW would repair roads by recompacting or adding aggregate as needed.

Electrical Systems

Several electrical systems would be built to transfer the electrical energy generated by the Phase I wind turbines to the power grid:

- A collection system from the individual wind turbines to collection substations
- Collection substations
- An internal transmission system connecting the collection substations to the interconnection substation
- An interconnection substation (Overland Substation) that would transmit electricity generated by the CCSM Phase I Project to the power grid

The Avian Power Line Interaction Committee (APLIC) has developed recommended practices designed to reduce operational and avian risks that result from avian interactions with electric facilities (APLIC 2006, 2012). Each of the CCSM Phase I Project electrical systems would be designed to APLIC recommendations by ensuring that vertical and horizontal separation distances between energized components and between energized components and grounded elements meet or exceed APLIC recommendations of the "wrist-to-wrist" measurements of the largest birds that may occur in the vicinity of the CCSM Phase I Project (that is, bald and golden eagles).

Each wind turbine would be connected with fiber optic cable to a central SCADA system, which would allow the turbines to be controlled and monitored remotely. PCW would monitor and control the wind turbines from the operations center.

<u>Collection System:</u> The wind turbines would be connected electrically using a 34.5-kilovolt (kV) collection system to transmit electricity to the power grid. In the collection system, multiple turbines would be grouped together onto a single collection circuit routed to nearby collection substations. The collection circuits would use a combination of underground cables and overhead lines to connect the wind turbines to the collection substation. The underground portions of the collection system would consist of power cables (three single-conductor cables), trench ground conductor, and fiber optic cable buried together in a trench. Underground collection circuits would connect to an overhead line via a riser pole. A given circuit could have multiple riser poles to allow multiple segments to feed into the overhead

line. The overhead collection system lines would primarily use steel poles, with some wood poles used for single-circuit segments of the overhead collection system where feasible.

Collection Substations: The CCSM Phase I Project would connect the collection circuits in each of four turbine regions to a collection substation, where the power would be increased in voltage and placed on the internal transmission system. Two collection substations (Nevins Valley and Smith Draw) would be built in the Chokecherry WDA, and two substations (McCarthy and Pine Grove) would be built in the Sierra Madre WDA. No bulk fuel would be permanently stored at the substations. Each substation would be fenced to keep out livestock, wildlife, and unauthorized personnel.

Internal Transmission System: Two 230-kV internal transmission lines would transfer the electrical generation from the collection substations to the Overland interconnection substation, following the proposed roads as closely as practicable. The internal transmission lines would be constructed using steel monopole structures to reduce impacts on wildlife in accordance with the BLM ROD. Line A would connect the McCarthy and Pine Grove collection substations to the Overland Substation, and Line B would connect the Nevins Valley and Smith Draw collection substations to the Overland Substation.

Overland Substation: The Overland Substation would connect the CCSM Phase I Project to the power grid. This substation would operate entirely at 230 kV and would collect the generation from the internal transmission system onto two main buses. From there, the system would be connected to external transmission lines. No bulk fuel would be permanently stored at the Overland Substation. A fence would surround the perimeter of the Overland Substation to keep out livestock, wildlife, and unauthorized personnel.

During operation of the electrical systems, regular inspections would occur. Maintenance activities would primarily consist of managing vegetation by removing tree branches within about 50 feet of the overhead electrical system structures and conductors.

Operation and Maintenance Buildings

The CCSM Phase I Project includes construction and operation of an operations center and two maintenance buildings. The CCSM Phase I Project operations center would be located north of the Chokecherry WDA as shown in Figure 2-4. The operations center would consist of approximately 5,000 square feet of office space and a 2,500-square-foot high-bay warehouse, as well as associated parking. Two maintenance buildings and associated parking would be constructed for the CCSM Phase I Project, one in the Chokecherry WDA and one in the Sierra Madre WDA. The maintenance buildings would each consist of a 2,500-square-foot office area and a 5,000-square-foot high-bay warehouse.

Meteorological Towers

The CCSM Phase I Project would include 10 meteorological towers to gather wind data for the area: four in Upper Miller Hill, three in Lower Miller Hill, and three in Nevins Ridge. Self-supporting (free standing and non-guyed) lattice meteorological towers would be used based on design requirements and to minimize impacts on wildlife based on the proposed mitigation measures from the BLM ROD. The average height of meteorological towers is

approximately 200 feet, but towers can extend up to a height of 330 feet and each would be equipped with an aviation warning light.

Utilities

Utilities, including water, sewer, and electrical power, would be required for construction and operation of the CCSM Phase I Project. Water would be used for dust control and human use. Water consumption would be highest during construction (reaching a peak of 105 acre-feet per year), and lower during operations (less than 50 acre-feet per year).The CCSM Phase I Project water system would include three groundwater wells, water pipelines, water filling stations, and a potential municipal water connection. Wastewater would be treated by septic systems and potentially by the City of Rawlins through wastewater connections.

Temporary Features

As described in the ECP (see Attachment A), some additional temporary features would be necessary during construction, including 10 laydown yards, crane assembly areas, and temporary crane paths. The footprints of these temporary features are included in the overall surface modification areas provided in Table 2-1.

For construction of the Phase I wind turbine development and infrastructure components for the CCSM Phase I Project, up to 16 temporary construction trailers would be required at the North laydown yard, with no more than 3 additional temporary trailers at any other laydown yard. All temporary on-site accommodations for construction workers would be located in the North laydown yard.

2.2.1.2.4 Project Schedule

PCW provided an updated proposed construction schedule for the CCSM Phase I Project to BLM on April 23, 2015. The infrastructure components (that is, the Phase I Haul Road and Facilities, West Sinclair Rail Facility, and Road Rock Quarry) would be constructed prior to the Phase I wind turbine development in order to open the Chokecherry and Sierra Madre WDAs to road and rail access. Construction of the Phase I Haul Road and Facilities, the access road for the West Sinclair Rail Facility, and the Road Rock Quarry began in 2016 when BLM issued a limited right-of-way grant and notice to proceed for these facilities. We concurred on August 9, 2016, that these activities were not likely to take bald or golden eagles and that no eagle take permit was required for these activities (USFWS 2016a). Construction of the infrastructure components is expected to continue through 2018. Some construction activities would not result in “disturbance take” (see Section 2.2.1.3.3), and because an activity would only constitute a BGEPA violation if take actually results, these activities may proceed without obtaining a standard ETP. Nonetheless, it is incumbent upon PCW to obtain a standard ETP before undertaking any activities that would carry a risk of disturbance or other form of take.

Following construction of the infrastructure components, PCW would install turbines beginning with Phase I of the Sierra Madre WDA, since its wind energy potential is higher, followed by Phase I of the Chokecherry WDA. PCW proposes to begin constructing turbine sites in 2018, and to install 229 turbines in 2019 and another 271 turbines in 2020.

The Phase I construction schedule would comply with the requirements of the BLM ROD, and would also meet the following objectives:

- Comply with applicable wildlife timing stipulations defined in the ECP and Phase I BBCS (see Attachments A and B, respectively)
- Comply with mitigation measure GEN-1 from the BLM ROD; that is, "limit surface disturbance to areas where turbines would be constructed within 12 months with a goal to mitigate impacts from surface disturbances to wildlife, soils, water, and vegetation (e.g., weeds)" (BLM 2012b)
- Construct the Phase I wind turbine development efficiently and cost-effectively by performing similar activities at the same time within a sub-region
- Develop the highest wind energy potential areas first by prioritizing construction in the Sierra Madre WDA.

Based on the typical weather at the Phase I development and infrastructure areas, the practical construction season has been determined to be between June and October of each year. Construction crews would be mobilized in May for work to begin in June, and work would be concluded in October with demobilization in November. In addition to weather restrictions, the schedule reflects wildlife timing restrictions defined in the ECP and Phase I BBCS (see Attachments A and B, respectively). The most restrictive wildlife stipulations prohibit new clearing, grading, or mowing in some areas until as late as July 15 of each year.

Vehicle access for construction of the Phase I wind turbine development and infrastructure components for the CCSM Phase I Project would be through two entrances, the North Entrance and the South Entrance. The North Entrance is off of I-80 at Exit 221 and then south along CR 407/CIG Road. The South Entrance is off of WYO 71/CR 401 (Sage Creek Road) approximately 17 miles south of Rawlins. The peak workforce for the construction of the CCSM Phase I wind turbine development is anticipated to be 761 workers in 2018.

2.2.1.3 Actions Required under the Eagle Take Permit

2.2.1.3.1 Overview of Eagle Fatality Prediction

As described in the ECP guidance (USFWS 2013b), we developed a peer-reviewed Bayesian model to predict the annual fatality rate for bald and golden eagles at a given wind energy facility. Bayesian modeling is a statistical procedure that estimates an unknown distribution based on an observed distribution (also known as prior data). The eagle fatality prediction model defines the relationship between eagle exposure, collision probability, and fatalities, while accounting for uncertainties (USFWS 2013b). It uses pre-construction observation data at a proposed wind facility to predict post-construction collision probability (USFWS 2013b). The general logic behind the model is that the more time an eagle is present in a defined 200-meter cylindrical area around a turbine, the more likely a collision will occur. The model was peer-reviewed in "Summary Report: Peer Review of the Scientific Findings in the U.S. Fish and Wildlife Service Eagle Fatality Model and its Application to Wind Energy Development Projects," prepared by AMEC Environment & Infrastructure, Inc. for USFWS Region 6, Division of Migratory Birds (USFWS 2013c).

The Bayesian model incorporates site-specific values and general information. Site-specific values include eagle observation data collected during pre-construction monitoring efforts, turbine rotor radius, and daylight hours (the number of hours in a year that turbines could be spinning when eagles may be active). Eagle observation data include a compilation of observation effort (amount of time conducting observations for eagles and the total area observed) and the total time eagles (by species) were observed in the proximity of the proposed layout of wind turbines (defined as eagle minutes and used to calculate the exposure rate). General information includes exposure rates and collision probability for eagles based on data collected at existing wind energy facilities in North America (this information is referred to as prior data) (USFWS 2013b).

The model equation reads as follows:

Collision Fatalities = Exposure Rate * Collision Probability * Expansion Term

- Exposure Rate is measured in eagle minutes per hour per square kilometer, which is calculated as the total number of minutes eagles are recorded flying up to 200 meters above ground level within the project footprint during pre-construction surveys.
- Collision Probability is the probability of an eagle colliding with a turbine given exposure and is based on prior data.
- Expansion Term is the product of daylight hours and turbine hazardous area.
    - Daylight hours represent the potential number of hours that eagles may be exposed to collision with wind turbines and can be adjusted to account for non-operational periods if known. Because eagles are rarely active at night, the model uses daylight hours.
    - Turbine hazardous area is calculated as a three-dimensional cylindrical volume around a turbine from ground level to a height of 200 meters (650 feet). An increase in turbine blade diameter results in a greater value for the turbine hazardous area.

We used data collected by PCW, the proposed Phase I wind turbine layout, and our USFWS-published modeling methods (USFWS 2013b; New et al. 2015) to predict eagle fatality for the CCSM Phase I Project. The eagle fatality prediction was used to help evaluate the risk category for the CCSM Phase I Project and to develop compensatory mitigation requirements.

The number of estimated eagle fatalities was calculated by using long-watch data collected at the Phase I development and infrastructure areas from April 2011 to July 2012, and 0.5 mile fixed-point count data collected from August 2012 to August 2013 (see Attachment C, the USFWS eagle fatality prediction analysis executive summary, for additional detail).

2.2.1.3.2 Avoidance and Minimization Measures Incorporated into the Proposed Project to Minimize Eagle Take

The final eagle fatality prediction included in Attachment C and the final Phase I turbine layout incorporate avoidance and minimization measures that were developed over a 7-year period (2007 to 2014) of wind and site evaluation, permitting with the BLM, and cooperation

between PCW and us. During this period, PCW removed several areas of high wind potential as wind turbine sites, and reconfigured the layout of turbines in the CCSM Phase I Project through six major revision stages to avoid and minimize potential impacts on eagles and other wildlife species (PCW 2014a).

The combination of the Phase I turbine layout, the proposed conservation measures, best management practices (BMPs), EACPs, and monitoring and adaptive management measures have been developed and proposed with the intent that they would avoid and minimize impacts on bald and golden eagles such that remaining take is unavoidable.

The major avoidance and minimization measures that PCW has incorporated into project design of the CCSM Phase I Project are summarized below:

- Eliminated wind turbine locations in the southernmost area of the Sierra Madre WDA and the western area of Upper Miller Hill based on raptor nest locations, greater sage-grouse lek and habitat locations, habitat for other avian and wildlife species, and other environmental constraints.
- Established 328-foot (100-meter) wind turbine setbacks from the Miller Hill Rim to reduce impacts on raptors.
- Removed all wind energy development from the greater sage-grouse core areas that were designated in 2010 and are still protected by Wyoming State Executive Order 2015-4 (State of Wyoming 2015).
- Removed wind turbines from north of the hogback and south of Rasmussen Reservoir to reduce potential risks to eagles based on observed eagle use.
- Established turbine no-build areas where PCW documented high eagle and other raptor use, movement corridors, and nesting and foraging habitats. Eagle use within the designated turbine no-build areas represents approximately 80 percent of all eagle use reported by PCW as observed during the 2011 and 2012 long-watch raptor surveys. The no-build areas are shown in Figure 2-3.
- Removed turbines from the Red Rim-Grizzly Wildlife Habitat Management Area, located west and south of the Miller Hill portion of the Sierra Madre WDA. The Red Rim-Grizzly Wildlife Habitat Management Area is managed to benefit big game and other wildlife species that serve as important forage for eagles. Survey data demonstrated that survey points adjacent to and within the Red Rim-Grizzly Wildlife Habitat Management Area had relatively high eagle and other raptor use compared to other areas that are currently proposed for the CCSM Phase I Project.
- Established timing windows for clearing and grading and disruptive activities, as well as exclusion areas for greater sage-grouse and Columbian sharp-tailed grouse leks, nesting areas, early brood-rearing areas, and delineated winter concentration areas. Although Columbian sharp-tailed grouse may not be present, as described in the BLM ROD (see Attachment B), these timing windows would benefit Columbian sharp-tailed grouse if they are present.
- Established timing windows for clearing and grading and disruptive activities for raptor nests, yellow-billed cuckoo nests, mountain plover habitat, big game crucial winter range, and big game parturition, or birthing, areas.

- Agreed to implement employee, contractor, and site visitor requirements to avoid harassment and disruption of wildlife, especially during reproductive seasons; to prohibit or control pets onsite to avoid harassment and disruption of wildlife; and to post speed limits to reduce wildlife collisions, disruption, and airborne dust.
- Moved well locations, roads, ancillary facilities, and other surface structures requiring repeated human presence away from most raptor nests (an 825-foot buffer for most species and a 1,200-foot buffer for ferruginous hawks).
- Agreed to implement procedures for using explosives and conducting blasting activities within specified times and at specified distances from sensitive wildlife, streams, and lakes.
- Adopted our avoidance and minimization recommendations for the Phase I Haul Road, Road Rock Quarry, North Platte River Water Extraction Facility, and wind turbine locations, and operation curtailments relative to eagle nests, areas of concentrated prey resources, and other project-specific eagle activity areas.
- Agreed to curtail operation of any turbines that are located within 1 mile (1,600 meters) of unoccupied golden eagle nests during daylight hours between February 1 and April 30 while determining nest activity. If a nest were to become active during this period, turbines within 2.2 miles (3,500 meters) would be curtailed during the breeding season until the young fledge and are no longer dependent on the nest or until the nest becomes unoccupied. The 2.2-mile distance is used because it is half of the mean inter-nest distance (MIND), which for the CCSM Phase I Project is 4.4 miles (7,000 meters), as described in Section 2.2.1.4.3. To minimize the amount of curtailment, PCW moved most turbines more than 1 mile from all eagle nests and up to 2.2 miles away from recently active nests.

2.2.1.3.3 Predicted Annual Eagle Take and Disturbance (Incorporating Avoidance and Minimization Measures)

The annual eagle fatalities estimated by the Bayesian eagle fatality model were extrapolated to the length of the 5-year permit. We used our eagle fatality model to estimate eagle take for bald and golden eagles separately. Because the wind turbine blade diameter has not been finalized, the fatality modeling for the CCSM Phase I Project used two potential rotor diameters—338 feet (103 meters) and 394 feet (120 meters)—to calculate the cylindrical area, or turbine hazardous area, which is part of the expansion factor. Therefore, the different eagle take predictions do not represent a “range” or an uncertainty factor, but rather are specific take predictions for those two rotor diameters. If the programmatic ETP is granted, PCW would provide us with the exact turbine blade diameter, and the predicted annual eagle take would be recalculated at that time. We chose to predict take for those two rotor diameters because they would be the likely smallest and largest sizes used. If actual rotor diameters are smaller than 338 feet (103 meters) or larger than 394 feet (120 meters), we may need to reassess overall risk to eagles from the CCSM Phase I Project, beyond simply recalculating fatalities using the new turbine size, before issuing a programmatic ETP.

We used the risk-averse 80 percent upper credible limit (80th quantile) of the model output to calculate potential annual take (USFWS 2013b). This can be interpreted as an 80 percent chance, assuming our model is accurate, that the true number of fatalities will be less than or equal to our prediction. Conversely, there is a 20 percent chance that the CCSM Phase I

Project would cause more eagle fatalities than are allowed by the permit (see the ECP guidance, Figure D-4 [USFWS 2013b] for an example of the 80th quantile). The eagle fatality estimate for the CCSM Phase I Project was calculated after applying all of the proposed avoidance and minimization measures. The estimated annual take by eagle species and wind turbine blade diameter is presented in Table 2-2.

Table 2-2. Alternative 1 Estimated Annual Programmatic Eagle Take for the CCSM Phase I Project

Species	394-foot-diameter (120-meter-diameter) Wind Turbine Blade	338-foot-diameter (103-meter-diameter) Wind Turbine Blade
Bald eagle	2	1
Golden eagle	14	10

We make a number of assumptions to account for uncertainty and to incorporate natural variability into the model. A complete description of our model, the assumptions we made, and the data we used in the model are provided in Attachment C.

In addition to the programmatic take predicted for the CCSM Phase I Project, we have determined that disturbance take from construction activities for the Phase I wind turbine development and infrastructure components for the CCSM Phase I Project is likely to occur during construction. As described in Chapter 1.0, BGEPA defines “disturb” as “to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior” (50 CFR 22.3). Disturbance take is a consideration relative to eagle nests, roosts, and concentration areas, such as areas of concentrated prey resources. For the CCSM Phase I Project, the anticipated disturbance would be to eagle nests during construction. Sources of potential disturbance take from construction activities associated with the Phase I wind turbine development and infrastructure components for the CCSM Phase I Project include noise and traffic impacts from road traffic and project construction. Disturbance take under the standard permit does not include lethal or disturbance take from activities associated with operation of wind turbines.

As a result of avoidance and minimization measures discussed in Section 2.2.1.3.2, no eagle nests currently occur within 0.5 mile (800 meters) of a proposed wind turbine. However, five eagle nests lie within 0.5 mile (800 meters) of proposed Phase I infrastructure components. Of the five nests within 0.5 mile (800 meters) of proposed infrastructure components, one golden eagle nest is located approximately 0.1 mile (160 meters) from the access road leading to the Road Rock Quarry, one bald eagle nest is located approximately 0.1 mile (160 meters) from the North Platte River Water Extraction Facility access road, and three golden eagle nests are located along the Phase I Haul Road, approximately 0.06 mile (100 meters), 0.1 mile (160 meters), and 0.4 mile (650 meters) away. Some activities required for construction of the infrastructure components of the CCSM Phase I Project

could potentially disturb the five eagle nests (four golden eagle nests and one bald eagle nest) described above from noise, traffic, and human presence. However, it is important to note that tolerance to disturbance varies greatly between individual eagles and disturbance of all five nests may not actually occur or it could occur at varying levels of impact.

For purposes of estimating disturbance take, we assume two adult eagles are present in each nest. Therefore, take listed in the standard ETP is in terms of adults and nests that could be taken, but the permit would cover potential take of eggs and juvenile eagles or eaglets at these nests. As shown in Table 2-3, the standard permit would thus cover disturbance take at four golden eagle nests and one bald eagle nest on an annual basis until project construction is completed. Disturbance take would include injury to adult eagles and eaglets at these nests, any reduction of productivity at these nests, or abandonment of these nests. The term of the standard ETP would extend from the time it is issued through construction (until the first turbine is operating), but would not exceed 5 years.

Table 2-3. Alternative 1 Estimated Annual Adult Eagle Disturbance from the CCSM Phase I Project

Species	Number of Nests	Number of Eagles
Bald eagle	1	2
Golden eagle	4	8

Note:
The standard ETP would also cover take of eggs and eaglets at these nests but we are not able to quantify this potential take because we cannot predict if it would occur or the number of eggs or eaglets at a given nest.

2.2.1.3.4 Conservation Measures and Best Management Practices from PCW's Eagle Conservation Plan

Before applying for an ETP, applicants must first incorporate measures to avoid and minimize the take of eagles into their project planning. As part of the CCSM Phase I Project, PCW would employ conservation measures and BMPs, as included in the ECP (see Attachment A) and described below, to reduce risk to eagles and decrease eagle fatalities.

Conservation Measures from PCW's Eagle Conservation Plan

As described in the ECP (see Attachment A), conservation measures to avoid and minimize impacts on eagles and other avian species from construction and operation activities associated with the Phase I wind turbine development and infrastructure components for the CCSM Phase I Project would include land management commitments, conservation easements, greater sage-grouse conservation, mesic habitat improvement, relic agricultural field enhancements, suspension of hunting activities, and incorporation of an environmental training program.

Land Management

The Overland Trail Cattle Company LLC (TOTCO) owns the ranch that encompasses the CCSM Phase I Project and has executed cooperative agreements and grazing leases for use of the federal and state lands contained therein. TOTCO currently manages a cow-calf and yearling livestock grazing operation in much of the Phase I development and infrastructure areas and in portions of property adjacent to the Phase I development and infrastructure areas. As part of the CCSM Phase I Project, PCW and TOTCO would commit to continuing with the cow-calf and yearling grazing operation, and would not revert back to sheep, which might be more likely to attract eagles and place them at risk. PCW and TOTCO would also commit to continuing the use of active management to minimize impacts of livestock grazing activities on wildlife and habitat. This would include carcass removal and active herd management. As stated in the ECP (see Attachment A), PCW would coordinate with TOTCO, other committed private landowners, the Wyoming Game and Fish Department (WGFD), and the BLM to conserve or enhance terrestrial and aquatic habitat, as well as to protect important eagle foraging, breeding, and nesting habitat for the life of the CCSM Phase I Project.

Conservation Easements

PCW would coordinate with TOTCO to place approximately 27,500 acres of private land owned by TOTCO east of the WDAs and along either side of the North Platte River into a conservation easement. As described in the ECP, the conservation easement would include important eagle use areas and high-quality eagle foraging habitats adjacent to key nesting locations along the North Platte River and in other areas with documented eagle use. The conservation easement would prohibit wind development activities on the lands subject to the easement in perpetuity.

Greater Sage-Grouse Conservation

PCW would improve habitat and minimize potential threats to greater sage-grouse and other wildlife species as part of its sage-grouse conservation plan (located in the BLM ROD, Attachment B). The measures included in the sage-grouse conservation plan are designed to conserve greater sage-grouse populations and habitat; however, these measures also would have direct benefits to eagles and other raptors by maintaining contiguous habitat patches, conserving and promoting prey base populations, and improving habitat quality throughout the Phase I development and infrastructure areas and the adjacent TOTCO ranch.

As PCW states in its ECP (see Attachment A), bald and golden eagles are known to prey on greater sage-grouse in the vicinity of the CCSM Phase I Project. Greater sage-grouse tags have been recovered from bald and golden eagle nests, and recovered greater sage-grouse carcasses often have evidence of fatality caused by eagles. The conservation measures that would be implemented for the CCSM Phase I Project include the minimization or removal of some existing threats to greater sage-grouse survival and productivity (for example, fence removal and marking, water development projects, and riparian/wetland habitat enhancement).

Mesic Habitat Improvements

As described in the ECP (see Attachment A), the primary objective of mesic (moderately moist) habitat improvement projects is to modify water sources to create and enhance natural free-flowing water and wet meadow habitats that are used by greater sage-grouse and other avian species, including eagles. Habitat improvement projects undertaken by PCW could include installation of upland "bubblers" and water diversions to create and enhance natural free-flowing water, to enhance wet meadow habitat, and to flood bottomland draws. "Bubblers" would be supplied with water from both artesian wells and actively pumped wells. Other water sources to be developed would be supplied through water diversion pipelines from existing reservoirs and stock tank pipeline networks. Water improvement projects would be completed in a manner to minimize standing water and discourage use by mosquitoes, which might carry West Nile virus and could therefore pose a threat to all birds.

Relic Agricultural Field Enhancements

Approximately 2,023 acres of relic agricultural fields are located in the eastern portion of the TOTCO-owned ranch outside of the CCSM Phase I Project that are currently dominated by monocultures of cheatgrass (*Bromus tectorum*), crested wheatgrass (*Agropyron cristatum* sp.), or other introduced plant species. These relic fields currently provide little value to any avian species. The primary objectives of the relic agricultural field enhancements would be to establish conditions suitable for year-round use by wildlife species including eagle prey species. This would include, as appropriate, planting additional sagebrush/shrub cover, establishing high-value forage and cover sources, or both in the relic agricultural fields. Relic agricultural field enhancements, if successful, would improve prey base availability in areas outside of the CCSM Phase I Project, providing new foraging locations for eagles.

Suspension of Hunting

PCW states in the ECP (see Attachment A) that TOTCO has indefinitely suspended access for hunting of greater sage-grouse on all of its private lands and other areas under its control, thereby reducing direct mortality of greater sage-grouse, a prey species for eagles. Suspension of greater sage-grouse hunting access would continue throughout the life of the CCSM Phase I Project or as otherwise agreed to among PCW, TOTCO, and WGFD. Elimination of hunting would eliminate potential carcasses of injured or unrecovered birds shot by hunters. This would remove a potential source of carrion (or dead and decaying flesh of an animal) in the Phase I development and infrastructure areas that might otherwise attract eagles, and could reduce ingestion of lead shot by eagles.

Environmental Training Program

As part of its environmental compliance and monitoring plan for the CCSM Phase I Project, PCW would implement an environmental training program for compliance with environmental permits, including permit requirements and conservation measures associated with the standard and programmatic ETPs. The training program would be designed to consistently communicate requirements for the CCSM Phase I Project to every individual working on the project so that both managers and workers understand PCW's expectations,

the permit requirements, and how to incorporate the permit requirements into their daily work activities. The program would incorporate site-specific training modules to minimize risks to avian species. All personnel working on the CCSM Phase I Project would be required to attend environmental training prior to working onsite. PCW would maintain environmental training attendance records through the end of construction.

Best Management Practices from PCW's Eagle Conservation Plan

As PCW describes in its ECP (see Attachment A), PCW would implement the following BMPs to reduce potential impacts on species of concern, including eagles and other avian species, during construction and operation of the Phase I wind turbine development and infrastructure components for the CCSM Phase I Project:

- Land and habitat impacts during all site development and construction activities would be minimized.
- Native species would be used when seeding or planting during reclamation activities.
- Site infrastructure, including roads, power lines, and fences, would be designed to avoid sensitive natural resources and would be minimized to the maximum extent practicable. Where appropriate, wildlife-compatible design standards for fencing would be used.
- Power lines associated with the collection system for the CCSM Phase I Project would be located underground to the extent practical. All overhead power lines would be designed to meet or exceed APLIC recommendations, as outlined in the *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* and *Reducing Avian Collisions with Power Lines: The State of the Art in 2012* (APLIC 2006, 2012).
- All permanent meteorological and communication towers for the CCSM Phase I Project would be self-supporting and would not be supported by guy wires, which could present a collision risk for eagles and other birds.
- A portion of the Phase I turbines would be lighted; all lights on turbines would meet Federal Aviation Administration requirements and would likely consist of medium intensity synchronized red LED lights.
- Exterior lighting at operation and maintenance facilities and substations for the CCSM Phase I Project would be shielded downward and would be designed to use a combined switch and motion-detection system for exterior lights to minimize the time the lights are on while providing adequate safety for personnel. All internal turbine nacelle and tower lighting would be extinguished when the nacelle and tower are unoccupied.
- Tubular wind turbine towers would be used to reduce the ability of birds to perch and to reduce risk of collision.
- Appropriate speed limits would be posted for all roads in the Phase I development and infrastructure areas.
- All employees, contractors, and site visitors would participate in a site orientation during which they would be instructed to avoid harassment of and interference with wildlife.

- Site plans, including an erosion control plan, stormwater pollution prevention plan, fire safety plan, health and safety plan, hazardous material management plan, weed management plan, and waste management plan, would be developed and adhered to in accordance with applicable regulations and agency recommendations.

2.2.1.4 Permit Stipulations

We would attach stipulations to the standard and programmatic ETPs issued for construction and operation activities, respectively, associated with the Phase I wind turbine development and infrastructure components for the CCSM Phase I Project. These stipulations would include the permit duration; EACPs as well as additional BMPs; monitoring; adaptive management; and compensatory mitigation requirements, as discussed in the following sections.

2.2.1.4.1 Duration

The standard ETP issued for disturbance take during construction of the Phase I wind turbine development and infrastructure components for the CCSM Phase I Project would take effect immediately upon permit issuance and would cover all construction and site development activities until the CCSM Phase I Project is operational. Construction is anticipated to be complete by 2020. The duration of the standard ETP would not exceed 5 years. Any construction occurring prior to securing a standard ETP for disturbance take associated with construction activities is still subject to compliance with BGEPA.

The duration of the programmatic ETP for operation of the CCSM Phase I Project would be 5 years. The permit would take effect once the first turbine is put into operation, which is anticipated to be in 2019, and would cover the operation of all 500 turbines and ongoing operation of site infrastructure. The 5-year permit duration is a requirement of the ETP regulations as defined in 50 CFR Parts 13 and 22.

Going forward, we assume that PCW would reapply for a programmatic ETP at 5-year intervals (or longer intervals if available due to future regulatory revisions). We would review any reapplications we receive and make a decision about whether or not to issue successive programmatic ETPs. During the review process, we would reassess fatality rates, effectiveness of measures implemented to reduce take, eagle population status, and the amount of additional compensatory mitigation that would be required for continued operation. The compensatory mitigation required for each 5-year permit must fully mitigate for the predicted loss of eagles for the permit duration. The compensatory mitigation must persist in the environment for a minimum of 10 years.

The programmatic permit would be reviewed annually over the 5-year permit period as part of the adaptive management framework, discussed further in Section 2.2.1.4.4. The permit would establish thresholds for realized eagle take, as determined through post-construction monitoring, that could trigger a permit review and additional actions such as adjustments to compensatory mitigation or the application of ACPs or EACPs. The results of post-construction monitoring required under the programmatic ETP would be publicly available. Pursuant to 50 CFR 22.26, the USFWS would reserve the right to amend, suspend, or revoke

either the standard or the programmatic ETP if new information indicates that revised permit conditions are necessary, or that suspension or revocation is necessary, to safeguard local or regional eagle populations.

2.2.1.4.2 Advanced Conservation Practices and Best Management Practices

ACPs are defined as "scientifically supportable measures that are approved by the [USFWS] and represent the best available techniques to reduce eagle disturbance and ongoing mortalities to a level where remaining take is unavoidable" (50 CFR 22.3). We have not currently approved any ACPs for wind energy projects; therefore, ACPs are implemented at wind energy facilities on an experimental basis and are referred to as EACPs.

To further our goals to develop and evaluate EACPs for wind energy projects, we would work with PCW to cooperatively review and apply EACPs to the operation of the CCSM Phase I Project as part of the adaptive management process. PCW has agreed to some seasonal curtailment for specific turbines as part of avoidance and minimization measures, discussed in Section 2.2.1.3.2. However, additional seasonal and daily turbine shut-downs (curtailment) would be an example of an EACP that may be considered as part of the permit stipulations. EACPs could also include new techniques or technologies that are not yet available. Additional BMPs may also be incorporated as part of the permit, following our review of the permit application and evaluation of feedback from the public, agencies, and tribes during the Draft EIS review process.

EACPs would be considered during annual reviews of the permit and prior to issuing any successive 5-year permits to reduce eagle take. Future EACPs would be selected based on the results of post-construction monitoring at the CCSM Phase I Project; the effectiveness of compensatory mitigation, BMPs, and any previously applied EACPs; long-term population trends; and the availability and feasibility of the EACPs. EACPs and BMPs for the CCSM Phase I Project would be evaluated for effectiveness based on the results of post-construction eagle fatality and nest monitoring. Potential examples of information that may lead to new EACPs may include data showing evidence of mortality disproportionately occurring during certain seasons or identifiable conditions; or in certain geographic portions of the project; or that ongoing mortality risk is greater than predicted. The results of post-construction monitoring required under the programmatic ETP would be publicly available.

2.2.1.4.3 Monitoring

We would require monitoring of eagle fatalities and eagle nests as part of the stipulations of any standard or programmatic ETPs we may issue for the CCSM Phase I Project and as described in the ECP (see Attachment A). Post-construction monitoring for the CCSM Phase I Project would be required in order for us to estimate the mean annual fatality rate associated with project operations and to ensure that the permitted level of eagle take is not exceeded. Monitoring of eagle nests would be required both during construction of the Phase I wind turbine development and infrastructure components for the CCSM Phase I Project and after the CCSM Phase I Project is operational in order for us to assess the possible disturbance effects of construction activities and project operations on eagles. In accordance with the ETP regulations, the monitoring would be the responsibility of PCW.

However, PCW would also be required to allow us, or parties that we designate, access to the CCSM Phase I Project site for the purposes of monitoring eagles, with reasonable notice (50 CFR 22.26(c)(7)). The results of monitoring required under the standard or programmatic ETP would be publicly available.

Post-Construction Eagle Fatality Monitoring

Post-construction eagle fatality monitoring for the CCSM Phase I Project would involve searching for eagle remains beneath turbines and other facilities to estimate the number of fatalities that occur during operation of the CCSM Phase I Project. The monitoring data would also be used to determine whether any patterns of fatalities are present within the Phase I development and infrastructure areas so that factors associated with those fatalities can be identified and addressed, if possible, through adaptive management and application of additional conservation measures and EACPs.

Post-construction eagle fatality monitoring would be completed for the CCSM Phase I Project using current, scale-modified protocols to document take. Site-specific characteristics of the Phase I development and infrastructure areas would be accounted for in the design of the monitoring protocols to account for differences in vegetation cover and height, snow cover, season, and carcass persistence. The Phase I post-construction eagle fatality monitoring program would be required to achieve a 95 percent level of certainty that permitted take is not exceeded, which would be determined using assessment of carcass scavenging rates and related factors, as discussed below.

The programmatic ETP for the CCSM Phase I Project would require post-construction eagle fatality monitoring during the first 5 years of turbine operation. We would use the monitoring data compiled during the first 2 years to determine the protocol for years 3 through 5. The monitoring data from the first 5 years would then help inform the protocol for subsequent years as part of an adaptive management approach should a permit be reissued after the first 5 years. During the first 2 years of operation, each of the 500 turbines would be searched once per month with a 33-foot (10-meter) transect spacing. The transect width could be adjusted later to 66 feet (20 meter) if the data indicate that the adjustment is valid.

The once-per-month frequency was determined in a non-project-specific study to be appropriate to account for carcass scavenging rates based in northeastern Utah and northwestern Colorado (Lehman et al. 2010). However, the frequency of searches could need to be adjusted based on actual scavenger removal rates for the CCSM Phase I Project. Searches would be conducted within 240- by 240-meter (approximately 787- by 787-foot) square plots oriented such that the largest distance searched (that is, the diagonal of the square) would be aligned in the direction of prevailing winds. Using results of site-specific carcass persistence and searcher efficiency trials during the first 2 years, the number of turbines searched, the interval between searches, transect spacing, and search plot size could be adjusted through the adaptive management process to optimize the sampling design while achieving the goal of 95 percent level of certainty that permitted take is not exceeded.

When an eagle fatality is discovered, the searcher would mark the remains with a flag(s). After completing the search of that turbine, the searcher would immediately return to the

flagged remains to collect data in accordance with the recommendations set forth in the ECP guidance (USFWS 2013b) and Wind Energy Guidelines (USFWS 2012a). All remains, parts, or feathers would be photo-documented, and all potential injuries or lack thereof, signs of scavenging, and identifying characteristics would be documented. Any additional conditions regarding specific project requirements would be included as permit conditions in the ETP.

PCW would notify our Office of Law Enforcement within 24 hours of the discovery of any dead or injured eagle in the Phase I development and infrastructure areas. Eagle remains would not be moved until notification occurs. The handling and removal of eagle remains would occur in accordance with ETP conditions. All remains, parts, and feathers of any bald and golden eagles found onsite would ultimately be sent to the National Eagle Repository. The National Eagle Repository is operated by our Office of Law Enforcement and is located at the Rocky Mountain Arsenal National Wildlife Refuge northeast of Denver, Colorado. The Repository receives, evaluates, stores, and distributes bald and golden eagles, parts, and feathers to Native Americans who are enrolled members of federally recognized tribes throughout the United States.

If an injured eagle is encountered either during a survey or incidentally, the location and time of the observation, as well as the observed behavior and injury, would be recorded and the information given to our Office of Law Enforcement when they are contacted. If we so direct, a qualified biologist, such as a state game biologist, or other certified wildlife handler would be contacted to handle the eagle. The biologist or handler would attempt to capture the injured eagle unless such capture would cause additional injury or harm. Once the injured eagle has been captured, it would be transferred to a federally and state-permitted wildlife rehabilitation center with available capacity. Permitted eagle rehabilitation facilities near the CCSM Phase I Project include the North Park Wildlife Rehabilitation in Walden, Colorado; the Born Free Wildlife Rehabilitation in Steamboat Springs, Colorado; and the Rocky Mountain Raptor Program in Fort Collins, Colorado. The nearest rehabilitation facility in Wyoming is the Teton Raptor Center near Jackson Hole.

During periods of post-construction eagle fatality monitoring, both searcher efficiency trials and carcass persistence trials would be conducted and the results used to adjust final fatality estimates. Searcher efficiency would be calculated as the proportion of trial carcasses found by a searcher relative to the total number of carcasses placed for that searcher's trial. Searcher efficiency trials would be conducted blindly, without the knowledge of the searcher involved, and simultaneously with formal carcass searches at a subset of the searched turbines. Carcasses used for eagle surrogates could include dark colored geese, turkeys, or non-eagle raptors.

Separate searcher efficiency rates would be calculated for each season, for each searcher, and for each variable used in fatality model estimates. These categories would be coded in the observed fatality and carcass persistence data for the adjusted fatality estimate analyses. The appropriate number of carcasses used for searcher efficiency trials would take into account site-specific carcass persistence rates in the Phase I development and infrastructure areas.

Carcass persistence trials would involve revisiting the carcasses used for eagle surrogates in the searcher efficiency trials on days 1 through 7, 14, 21, and 28 in each season. Following

the day 28 visit, carcasses would continue to be visited weekly until they are scavenged or 90 days, whichever is sooner. Seasonal carcass persistence trials would account for the effects of weather, differential carcass decay rates, scavenger densities, and scavenger behavior across seasons.

We would work with PCW to determine the adjusted fatality estimate for eagles during operation of the CCSM Phase I Project. Fatality estimates would be based on observed eagle remains found during formal fatality searches, the probability that a searcher could miss a non-eagle carcass (searcher efficiency correction factor), the probability that a carcass could be removed before a searcher can locate it (carcass persistence correction factor), the date of the last search at a particular search plot prior to finding a carcass (search interval), the proportion of turbines searched to the total number of turbines at the facility, and the proportion of non-eagle carcasses found within searchable areas beneath each turbine (or similar search area correction). Adjusted fatality estimates would be compared to permitted take levels to ensure that the goal of 95 percent certainty that the permit limit has not been exceeded is achieved.

All operations and maintenance personnel working on the CCSM Phase I Project would be trained on how to identify eagle fatalities. Educational information concerning protection of eagles and identification of injured or dead eagles would be posted in the operations center. Instructions and procedures that personnel must follow in the event that an injured or dead eagle is discovered onsite would be included with the educational information, including whom to notify and what actions must be taken. As described above, PCW would notify our Office of Law Enforcement within 24 hours of the discovery of any dead or injured eagle in the Phase I development and infrastructure areas. Eagle remains would not be moved until notification occurs. If necessary permits have been obtained, then following the collection of remains-specific data, the permit holder would remove the remains from the field to a secure location. Any fatality discovered during times other than the formal fatality surveys would be considered an incidental record. Incidental records would be provided to us along with other post-construction monitoring results.

Annual reports detailing the eagle fatality monitoring results and adjusted fatality estimates would be submitted to us and would be available for public review. The annual reports would discuss fatalities in the context of spatial and seasonal distribution and, as warranted, would present recommendations for future monitoring, conservation measures, and adaptive management.

Eagle Nest Monitoring

As a requirement of the standard and programmatic ETPs, PCW would conduct eagle nest surveys throughout the nesting season (January 1 to August 31) to determine if disturbance of eagle nests is occurring from activities associated with the construction or operation of the Phase I wind turbine development and infrastructure components for the CCSM Phase I Project. The eagle nest surveys would be consistent with the ECP guidance (USFWS 2013b) and with recommendations we provided to PCW in 2015 regarding post-construction monitoring for the CCSM Phase I Project. All eagle nests within the mean inter-nest distance (MIND) of eagle nests within the Phase I development and infrastructure areas would be

surveyed throughout the terms of the ETPs. The MIND for the CCSM Phase I Project is 4.4 miles (7,000 meters). The purpose of eagle nest monitoring is to determine whether eagles nests are occupied or unoccupied; when occupied, to determine the productivity and nest success (USFWS 2013b, Appendix H); and to assess whether disturbance take could occur during construction or operation activities. The data collected on eagle nests within the MIND would help inform the operation of certain turbines sited within the MIND.

There are no communal roosts within the MIND based on pre-construction survey data and BLM historical records. Therefore, monitoring of communal eagle roosts would not be required.

We would determine if any disturbance or other take of eagle nests has occurred through interpretation of the occupancy, productivity, and nest success data collected from the eagle nests within the MIND. If we determine that nest disturbance from construction or operation activities has occurred, we would consider additional conservation measures and EACPs that might be effective in reducing the effect under the adaptive management plan. Alternatively, we could require additional compensatory mitigation to offset the estimated decreases in productivity to the extent necessary to meet the statutory requirement to preserve eagles.

Additionally, if eagle behaviors indicative of disturbance are detected within feeding and sheltering areas elsewhere in the Phase I development and infrastructure areas during construction, additional conservation measures and EACPs may be implemented through the adaptive management process.

Annual reports detailing the result of eagle nest monitoring for occupancy, productivity, and nest success would be submitted to us and would be available for public review.

2.2.1.4.4 Adaptive Management

To provide a feedback mechanism that allows for follow-up on the implementation of various EACPs, BMPs, and other risk reduction measures, an adaptive management process would be employed as part of the programmatic ETP. The intent of the adaptive management process is to provide a framework in which the uncertainty related to factors that influence collision risk can be monitored, evaluated, and avoided and minimized to the extent practicable. The adaptive management framework used for the CCSM Phase I Project would be consistent with our strategy used at the national level to inform eagle management, as described in the ECP Guidance (USFWS 2013b). After predictions are generated and the site becomes operational, the results of an approved post-construction monitoring program can be compared to take predictions. At the review points of the programmatic permit, if realized take is greater than predicted, the USFWS will work with the operator to identify and apply EACPs or ACPs.

For an adaptive management process to be successful, the monitoring of eagle populations and the conservation strategies and practices outlined in Section 2.2.1.4.2 should be integrated so that monitoring efforts could be clearly tied back to the goals and objectives of the programmatic ETP. Although the goal of the avoidance and minimization measures is to prevent eagle fatalities, it is anticipated that some level of eagle take would occur from the

CCSM Phase I Project. As a result, an adaptive management process is necessary to adjust EACPs, BMPs, additional avoidance and minimization measures, and conservation efforts to reduce risk to eagles and other species to the extent practicable. It is also expected that over the life of the CCSM Phase I Project, additional BMPs and EACPs would become available. As such, adaptive management would be an essential component of the permit stipulations and would be employed to ensure that risk is minimized to the extent practicable.

2.2.1.4.5 Compensatory Mitigation

Compensatory mitigation is required when the avoidance and minimization measures do not remove the potential for take and the projected take exceeds calculated thresholds for the species-specific EMU in which the project is located. EMUs are described in Section 2.1.2.2. Compensatory mitigation can address pre-existing causes of eagle mortality, such as eagle electrocutions from power poles, or it can address increasing the carrying capacity of the eagle population in the affected EMU.

For bald eagles, we have determined that predicted recurring take during the CCSM Phase I Project would not exceed calculated EMU take thresholds; therefore, no compensatory mitigation is required for bald eagles at this time. During the life of the CCSM Phase I Project, if the recurring take of bald eagles were to exceed the EMU take thresholds, PCW would be required to provide compensatory mitigation for the take of bald eagles. The compensatory mitigation costs and actions would be calibrated to offset the predicted unavoidable take so that the no-net-loss standard is achieved.

For golden eagles, we have determined that species populations throughout the United States might not be able to sustain any additional unmitigated fatalities, and the threshold for take of this species is set at zero for populations at the BCR level (USFWS 2009). This means that any new authorized take of golden eagles for the CCSM Phase I Project must be at least equally offset by compensatory mitigation (that is, specific conservation actions that replace or otherwise make up for the loss of each eagle associated with the CCSM Phase I Project). As part of the programmatic ETP conditions, PCW would be required to provide compensatory mitigation for the predicted take of golden eagles for the predicted number of eagle fatalities for a 5-year period starting with the date that the CCSM Phase I Project becomes operational (USFWS 2013b). The predicted take would be calculated using the USFWS's peer-reviewed eagle fatality model at the 80th quantile (see Section 2.2.1.3.3). The amount of compensatory mitigation required would be adjusted in consultation with us for future years based on the observed fatality rate over the initial 5-year period of post-construction eagle fatality monitoring. The permit would also stipulate thresholds of take, which, if exceeded, would trigger re-evaluation of the permit and, if a revised permit were to authorize additional take, adjustments to required compensatory mitigation.

Approved compensatory mitigation would have to be an action that is not already planned or scheduled to be implemented. For instance, PCW could not include retrofits of power poles that are already scheduled for retrofitting by another entity or as required by a different regulation. Neither, however, would compensatory mitigation be used to relieve another entity from liability if that entity has taken no steps to address its own need to avoid take of eagles. Thus, retrofits of power poles as compensatory mitigation would be approvable in

instances where another entity is taking appropriate steps to reduce risks to eagles, but where compensatory mitigation would accelerate implementation beyond current schedules such that a clearly measurable benefit to eagles can be quantified. For example, a utility company which has developed an Avian Protection Plan in collaboration with the USFWS that identifies both needed power pole retrofits, and a clear schedule and plan to accomplish those retrofits, may be an excellent candidate for mitigation if the eagle take permittee can accomplish the identified power pole retrofits in advance of the Avian Protection Plan work schedule previously reviewed by the USFWS. Before we would issue the programmatic ETP, we would have to review and approve PCW's commitments and binding agreements to perform compensatory mitigation. Sufficient compensatory mitigation for golden eagles would have to be conducted before there is take of a golden eagle; that is, before a given number of eagles is taken, sufficient compensatory mitigation must have been completed to offset that number of take.

As proposed in its programmatic ETP application, PCW would retrofit high-risk power poles to compensate for predicted golden eagle fatalities from operation of the CCSM Phase I Project. A high-risk power pole is one that results in a relatively high probability of avian electrocution. Typically, the areas with higher probability of avian electrocution are located in high-quality habitat or are poles with high numbers of primary conductors or primary and equipment jumpers and presence of grounding wires (EDM 2014). As further explained in Section 2.2.2, retrofitting power poles is the only form of compensatory mitigation for eagle take that the USFWS has previously approved, though other mitigation approaches are considered under Alternative 2.

APLIC has developed guidance documents identifying minimization methods for avian electrocutions and collisions, and has released national Avian Protection Plan Guidelines in conjunction with us in 2005 (APLIC and USFWS 2005). In addition, APLIC provides electric utilities, wildlife agencies, and other stakeholders with guidance for reducing bird electrocutions and collisions with power lines based on the most current information, including its *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* and *Reducing Avian Collisions with Power Lines: The State of the Art in 2012* (APLIC 2006, 2012). Due to the large size of eagles' wingspans, in dry feather conditions the safe distance between energized components on power poles, or the electrocution clearance, for eagles is 60 inches (EDM 2014).

Before we would issue a programmatic ETP, PCW would develop a compensatory mitigation plan that would identify high-risk power poles to be retrofitted and describe specific measures for retrofitting poles. The measures would change the arrangement of the power lines so that eagles' wingspans could not form an electrical connection between charged components, which results in eagle electrocution. We would review this plan before issuing a programmatic ETP to be sure that the proposed measures have been proven effective in reducing electrocutions. The power pole retrofit plan would also include provisions for monitoring and maintaining the proposed measures over the duration of the permit.

We have determined that PCW can work within the four BCRs contiguous with the CCSM Phase I Project to locate and retrofit high-risk power poles according to APLIC guidelines. Eagles in each of these BCRs may migrate to or from the Phase I development and

infrastructure areas. That is, eagles potentially affected by the CCSM Phase I Project can be part of any of the four BCR eagle populations (see Figure 2-2). We note that comments received from the scoping process and coordination with the cooperating agencies have expressed a preference for retrofitting power poles near the CCSM Phase I Project, in particular within Carbon County.

At this time, the only range-wide estimates available for golden eagles are BCR-scale population estimates (USFWS 2013b). The four BCRs within which PCW may retrofit power poles are Northern Rockies (BCR 10), Southern Rockies/Colorado Plateau (BCR 16), Badlands and Prairies (BCR 17), and Shortgrass Prairie (BCR 18), as described in Section 2.1.2.1 and shown in Figure 2-2.

We used the Resource Equivalency Analysis (USFWS 2012b) to quantify the number of power pole retrofits needed to offset the take of golden eagles from the CCSM Phase I Project. Within the context of the ECP guidance (USFWS 2013b), Resource Equivalency Analysis is a methodology used to compare the injury to or loss of eagles caused by wind facilities (debit) to the benefits from projects designed to improve eagle survival or increase productivity (credits). Compensation is evaluated in terms of eagles and their associated services instead of by monetary valuation methods. Compensation that would be required for the CCSM Phase I Project is shown in Table 2-4 based on either 5 or 10 years of avoided loss. The difference between these measures is due to the fact that some methods for retrofitting power poles would last longer than others before requiring additional work to remain effective. By preventing electrocutions for a longer time, those initial compensatory mitigation measures would protect more eagles, and therefore fewer poles would need to be retrofitted to achieve the same mitigation (protect the required number of eagles). The permit would require that a sufficient number of eagles be protected from electrocution, regardless of costs or of the method of retrofits used. Therefore the number of poles required to be retrofitted would be adjusted based on the type of retrofit being implemented, to accomplish the required level of eagle protection.

Table 2-4. Required Compensatory Mitigation for Golden Eagle Take Due to the CCSM Phase I Project

Wind Turbine Blade Diameter and Number of Turbines in Phase I WDA	Annual Permitted Take	Number of Poles to be Retrofitted to Achieve No-Net-Loss of Golden Eagles	
		Assuming 5 Years of Avoided Loss From Retrofitted Poles	Assuming 10 Years of Avoided Loss From Retrofitted Poles
394-foot-diameter (120-meter-diameter) Wind Turbine Blade			
500 turbines	14	3,778	2,029
338-foot-diameter (103-meter-diameter) Wind Turbine Blade			
500 turbines	10	2,778	1,492

The compensation shown in Table 2-4 would offset golden eagle take predicted to occur during the 5-year permit. The actual level of mitigation required would be determined once a final take prediction is calculated based on actual turbine size. Additional compensatory mitigation for subsequent permits would be recalculated during the review process based on predicted fatality at that point in time and the actual fatality as observed through post-construction monitoring. In addition, we would calculate any credits PCW may have earned by conducting compensatory mitigation if eagle take was less than predicted during the previous permit period.

Our ECP guidance states that an ETP holder may either contribute funds to an appropriate independent third-party that is formally obligated to perform approved mitigation work, or execute an approved compensatory mitigation proposal and contract directly with a utility or utilities to complete the required number of retrofits (USFWS 2013b). PCW has indicated that its preference is to contract with utilities directly to complete the retrofits. If the programmatic ETP is approved, PCW would work with electric utilities to identify and retrofit high-risk power poles. Such utilities may include investor-owned utilities, electric cooperatives and their members, and public power districts. The approach to retrofitting power poles would include identifying high-risk power poles, identifying areas and habitat of greater risk to eagles, retrofitting or reframing, and conducting retrofit inspection and maintenance, as well as the associated costs for these activities. PCW may also consider rebuilding electric lines that pose risks to eagles. PCW would be required to conduct sufficient compensatory mitigation before take of a golden eagle occurs.

We would work with PCW to identify landscape areas of greater risk to eagles (that is, electrocutions and collisions) where retrofit efforts should be prioritized, or we would provide criteria for determining such areas where PCW should focus its efforts. PCW would then develop a power pole retrofit plan for our approval as part of the programmatic ETP review process. Finally, PCW would work with utilities to identify high-risk electric power poles that pose potential risks to eagles.

2.2.2 Alternative 2 – Proposed Action with Different Mitigation

2.2.2.1 Overview

Under Alternative 2, we would issue to PCW a standard ETP for disturbance during construction of the Phase I wind turbine development and infrastructure components for the CCSM Phase I Project, and a programmatic ETP for operation of the CCSM Phase I Project, as described under Alternative 1 (Proposed Action). However, under Alternative 2, we would require PCW to implement a different form of compensatory mitigation within the four BCRs contiguous with the CCSM Phase I Project than proposed in its programmatic ETP application. Compensatory mitigation can address pre-existing causes of eagle mortality, such as eagle electrocutions from power poles, or it can address increasing the carrying capacity of the eagle population in the affected EMU. PCW has indicated in its programmatic ETP application that it would perform power pole retrofits, which would reduce the risk of mortality from existing transmission lines.

We are considering the following forms of different mitigation and evaluating their applicability and effectiveness in providing for compensatory mitigation for predicted golden eagle take:

- Mitigation of older wind facilities
- Lead abatement
- Carcass removal
- Carcass avoidance
- Wind conservation easement
- Habitat enhancement, with prey enhancement as an essential component
- Rehabilitation of injured eagles

One or more of the mitigation options could be selected. PCW has stated that it would be willing to consider one or more alternative compensatory mitigation measures, either in place of or in addition to power pole retrofits, if the USFWS quantifies the benefit of the mitigation measure to eagles and approves the use of these measures as mitigation for the CCSM Phase I Project. If additional compensatory mitigation measures are approved in the future, we would evaluate the use of those measures for this Project. However, for us to accept a potential compensatory mitigation option when issuing a programmatic ETP, we would need scientifically supportable evidence as a foundation for the conclusion that implementing the alternative compensatory mitigation action would achieve the desired beneficial offset in mortality or carrying capacity. That means that even if a potential compensatory mitigation option has many qualitative beneficial impacts, we would have to quantify the actual number of eagles saved by each particular mitigation option in order to establish the validity of the particular mitigation.

Some commenters suggested additional forms of mitigation, but for which eagle benefits are unlikely to be quantifiable. These are noted in Section 2.3.6.

2.2.2.2 Covered Activities

The covered activities for Alternative 2 would be the same as described for Alternative 1 (Proposed Action) in Section 2.2.1.2.

2.2.2.3 Eagle Fatality Prediction

The eagle fatality prediction for Alternative 2 would be the same as described for Alternative 1 (Proposed Action) in Section 2.2.1.3. Disturbance of eagle nests would be the same as described for Alternative 1.

2.2.2.4 Permit Stipulations

Permit stipulations for the standard ETP and the programmatic ETP described for Alternative 1 (Proposed Action) in Section 2.2.1.4 would be the same for Alternative 2 with the exception of the type of compensatory mitigation required to offset the predicted number of golden eagle fatalities under the programmatic ETP. Several assessments of the potential benefits of different compensatory mitigation measures for golden eagles are currently taking

place. However, we have not quantified the benefits associated with these mitigation measures, nor have we yet endorsed any of these compensatory mitigation measures. The challenge for other wind projects for using these potential measures for compensatory mitigation in relation to a programmatic ETP is to provide a credible, quantifiable prediction of the benefits of these mitigation measures on eagle survival or productivity, especially when the empirical data needed for making these predictions are limited or not currently available. That said, Alternative 2 considers several different means to potentially achieve the required level of compensatory mitigation for the predicted take of golden eagles from operation of the CCSM Phase I Project.

The different mitigation options we are considering were developed from scoping comment input, cooperating agency discussion, and research into the leading anthropogenic causes (that is, causes resulting from human activity) of golden eagle mortality. When possible, both the benefits and potential measures of mitigation success for the different options are discussed in Chapter 3.0. Studies have found that accidental trauma (that is, collisions with wind turbines, vehicles, or other structures) and electrocution account for a combined 50 to 70 percent of all documented direct anthropogenic causes of golden eagle mortality in the United States. Gunshot and poisoning account for another approximately 20 percent of all documented direct anthropogenic causes of golden eagle mortality (Franson et al. 1995; Kochert et al. 2002; Wayland et al. 2003; Tetra Tech 2011, as cited in Allison 2012). An important cause of indirect mortality for eagles is habitat loss (Scott 1985; Kochert et al. 2002).

2.2.2.4.1 Mitigation of Existing Wind Facilities

Mitigation of existing wind facilities would involve funding the decommissioning of existing wind energy developments or turbines that risk take of eagles, curtailing daytime operations at existing wind facilities where take of eagles is likely to occur, or upgrading equipment at older wind facilities. Golden eagle mortality caused by wind facilities is well documented at projects in North America and Europe (Hunt 2002; Tetra Tech 2011, as cited in Allison 2012). Estimates of eagle fatalities at wind facilities vary depending on several environmental factors, including exposure estimates, avoidance behavior, foraging habitat, prey base, geographic conditions, and habitat availability. The most comprehensive and longest-running studies, such as those being conducted at Altamont Pass Wind Resource Area, also indicate that the highest source of golden eagle fatalities at a facility are associated with a number of factors, most notably tower design, turbine size, and rotation speed (Hunt 2002).

2.2.2.4.2 Lead Abatement

Big game hunting and recreational shooting of prairie dogs, ground squirrels, and other small mammals can result in elevated levels of lead concentrating in these animals, which can then contaminate eagles when eagles ingest the affected carcasses. Studies estimate that between 7 and 15 percent of eagle fatalities are associated with the ingestion of lead from eating carrion with lead fragments present (Wayland et al. 2003; Miller et al. 2000). The American Wind Wildlife Institute (AWWI) is currently assessing golden eagle fatalities associated with

large mammal hunting. The study is intended to quantify the number of fatalities and provide data that can be used by the wind industry to offset eagle take (AWWI 2014a).

Although lead shot was banned from waterfowl hunting in 1991, its use remains common in ammunition for upland hunting and shooting sports, and in fishing tackle. Lead poisoning is a concern for eagles in most parts of their western range. Elevated levels of lead were found in 58 percent of the golden eagles evaluated in west-central Montana (Langner et al. 2015). Similarly, 62 percent of golden eagles tested from 1991 to 2008 in the Raptor Rehabilitation Program in Washington had blood lead levels considered toxic (Stauber et al. 2010).

Voluntary lead bullet and lead shot abatement and hunter education programs could reduce eagle fatalities by decreasing the number of incidents of lead poisoning. This mitigation measure would involve implementing programs designed to reduce the use of lead bullets and shot by targeting some of the resistance to changing ammunition from lead shot to non-toxic shot, or to reduce gut piles left by hunters in areas accessible to eagles. These programs would rely on voluntary participation and would not entail changing existing regulations governing use of lead in ammunition. As an example, to reduce California condors' exposure to lead, the Arizona Game and Fish Department has conducted a program of education and outreach to promote a voluntary switch to non-lead ammunition by Arizona hunters, and has provided free non-lead ammunition to big game hunters in certain areas frequented by condors since 2005. The program also includes incentives for hunters using lead-based ammunition to remove gut piles from the field so that they are not accessible to condors or other raptors. Arizona Game and Fish Department surveys indicate that a high percentage of hunters have voluntarily used non-lead ammunition or have removed gut piles since 2007 (Arizona Game and Fish Department, 2016). Similar programs in other states could reduce the amount of lead in the environment and potentially could lead to quantifiable benefits to eagles.

2.2.2.4.3 Carcass Removal

Eagles can be struck by vehicles while scavenging on roadkill such as deer, coyotes, livestock, or other mammals. Scavenging increases during the winter months when other food sources are less available. One study noted that nearly 100 golden eagle fatalities occurred on highways near Rock Springs, Wyoming, during the winter of 1984–1985 (Phillips 1986). Other regions of the country report that up to 29 percent of all bald eagle fatalities are caused by vehicle collisions along major highways (Michigan Department of Natural Resources and Environment 2010; Wisconsin Department of Natural Resources 2012, 2013). Removing carcasses from roadsides could reduce vehicle-eagle interaction and the number of eagles put at risk by this food source. This could be accomplished by having dedicated road crews remove carcasses from areas with high carcass density and relocate them to areas away from highways where vehicle interactions are eliminated.

Data on big game carcasses found along roadways within a 140-mile radius of the Phase I development and infrastructure areas were collected from State Departments of Transportation to determine what high-density carcass areas could be identified and potentially targeted as a part of this mitigation strategy. (As discussed in Section 2.1.2.3, we used a 140-mile buffer around the CCSM Phase I Project to evaluate effects on golden eagles

at the LAP level). For purposes of analysis in this EIS, high-density carcass areas were identified as those stretches of highway where over 50 carcasses within a 2-square-mile area were found over the past 7 to 8 years, for Colorado and Wyoming, respectively (Colorado Department of Transportation 2015a; Wyoming Department of Transportation 2015). We acknowledge that the data is inherently biased by data collection frequency and methodology. Data for Utah were not available. The high-density carcass areas identified within a 140-mile radius of the Phase I development and infrastructure areas are shown in red in Figure 2-7.

According to our ECP guidance (USFWS 2013b), as a compensatory mitigation strategy, a project developer or operator may collect data (or use existing data if it is available) on the annual number of eagle fatalities that result from vehicle collisions in a specified geographic area or along a specific stretch of roadway. These data could then be used to generate an estimate of the number of eagle fatalities that could be prevented in the same area by removing carcasses from roadsides. If there were sufficient evidence that carcass removal would result in quantifiable and verifiable benefits to eagles, the project developer or operator could contract to have these roadsides “cleaned” of carcasses during the time of year that large mammals concentrate and eagles are known to be struck. The credible estimate of eagle fatalities that would be avoided through carcass removal would be the value of the compensatory mitigation achieved.

The AWWI is currently developing a model that seeks to establish quantifiable positive effects on golden eagles through carcass removal along sections of highway systems (AWWI 2014a). This compensatory mitigation measure is currently being evaluated in relation to the Mohave County Wind Farm in Arizona. If appropriate and approved for use for the CCSM Phase I Project, PCW would work with us and with state and local highway departments to identify appropriate carcass removal protocols, including the frequency of carcass removal. Removal of carcasses would be focused in areas of high carcass density, such as those shown in Figure 2-7. PCW could perform carcass removal anywhere in the four BCRs; however, we would encourage PCW to focus carcass removal efforts within a 140-mile radius of the Phase I development and infrastructure areas. The Carbon County Planning and Development Department, a cooperating agency, has expressed support for carcass removal from highways in Carbon County.

Removal of carcasses along railroads could also benefit eagles. Eagles can be struck by trains while scavenging on the carcasses of animals killed by trains. The Saratoga-Encampment-Rawlins Conservation District, a cooperating agency, recommended that we consider this mitigation option in addition to removal of carcasses from roadways. Less information on railway-wildlife collisions is available than for carcasses found along roads (Wells et al. 1999; Dorsey et al. 2015). Unlike highways, railroad rights-of-way are typically private, with restricted access to the public; therefore, fewer records are collected on train-wildlife collisions. Additional data collection and coordination with railway operators would be required before we could estimate the number of eagle fatalities that would be avoided through carcass removal on railways.

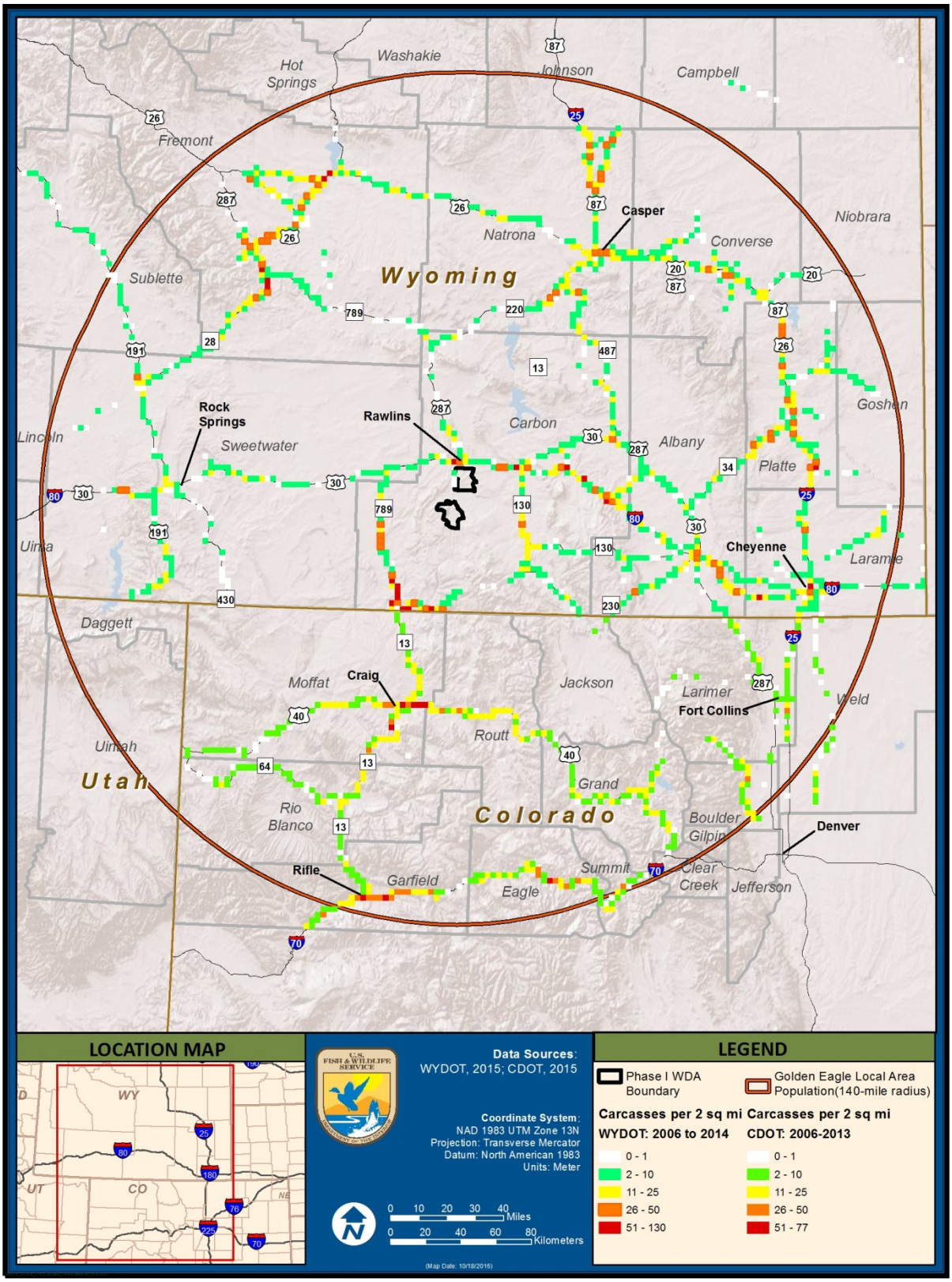

Figure 2-7. High-Density Carcass Areas Within 140 Miles of the CCSM Phase I Project in Wyoming

2.2.2.4.4 Carcass Avoidance

As discussed in Section 2.2.2.4.3 for the carcass removal mitigation option, eagles can be struck by vehicles while scavenging on roadkill such as deer, coyotes, livestock, or other mammals. Carcass avoidance refers to avoiding or decreasing the amount of carcasses that are generated on roads, which reduces vehicle-eagle interaction and the number of eagles put at risk by this potential food source. Carcass avoidance would be accomplished by constructing wildlife crossings across highway sections where vehicle-wildlife collisions are well documented. Generally, vehicle-wildlife collisions occur most frequently in areas where big game cross busy highways. Reducing the amount of big game crossing busy highways could be effective in reducing wildlife collisions with automobiles if the crossings are properly located on stretches of highways that have high densities of documented collisions.

Wildlife crossing structures are in use throughout the United States and are used by a variety of wildlife, including bears, mountain lions, elk, moose, deer, coyote, bobcat, ground squirrels, rabbits, and jackrabbits (Cramer 2012). Wildlife crossing structures have appeared to effectively reduce the number of wildlife on highways in Utah, Montana, and Colorado (Cramer 2012). Wildlife crossing types under consideration as part of Alternative 2 could include underpass tunnels and overpasses in areas where high densities of carcasses are recorded within 140 miles of the CCSM Phase I Project (see Figure 2-7).

As with any compensatory mitigation option, the mitigation would have to be completed before take of a golden eagle would occur under the terms of the programmatic ETP. Under this option, that means that the wildlife crossing(s) would have to be built and operating before any golden eagle take would occur from the CCSM Phase I Project.

2.2.2.4.5 Wind Conservation Easement

A conservation easement is a tool used to conserve private land. A conservation easement (also known as a conservation restriction) is a legal agreement between a landowner and a land trust or government agency that permanently limits uses of the land to protect its conservation values. It allows landowners to continue to own and use their land, and they can also sell it or pass it on to heirs as long as they comply with any use restrictions.

As a compensatory mitigation option, a wind conservation easement would be an easement to protect land used by golden eagles from future wind energy development. Under this mitigation option, PCW would establish easements on undeveloped tracts of privately owned land that have high wind power potential (classified by NREL as Wind Power Class 5, 6, or 7). To calculate the benefits of this mitigation option, we would need to consider the likelihood of wind development occurring on the lands included in the easements and the likely potential number of turbines. We also would need to generate an estimate of the eagle fatalities that could result, but which would be avoided by establishing the easements.

We used datasets from NREL (2010, 2012) to identify lands within 140 miles of the CCSM Phase I Project that have high wind power potential (classified as Wind Power Class 5, 6, or 7). We then used data from BLM and the National Land Cover Database to identify undeveloped tracts of privately owned land within 140 miles of the CCSM Phase I Project.

The areas that are privately owned, currently undeveloped, and within Wind Power Classes 5, 6, and 7 were classified as areas with a high potential for wind power development that could be placed into wind conservation easements. These potential wind conservation areas are shown in Figure 2-8.

2.2.2.4.6 Habitat Enhancement

Golden eagles inhabit shrub-steppe and grasslands in a wide variety of landscapes. They tend to avoid areas with high human use. The loss of any portion of their breeding, foraging, roosting, or wintering habitats can have a detrimental effect on golden eagles (Kochert et al. 2002). Habitat loss that affects golden eagle populations can come in many forms. In the western United States, the most significant indirect threats to stable populations of golden eagles are the loss of breeding habitat; encroachment of residential, commercial, and industrial development; and other anthropogenic activities that fragment or destroy foraging and nesting areas (Phillips 1986; Kochert et al. 2002).

Encroachment through urbanization and agricultural conversion has altered areas historically used by eagles (Kochert et al. 1999). When rangelands are converted to agricultural land, habitats that eagle prey relies on for survival are lost. Consequently golden eagle populations are affected even if suitable nesting habitat is relatively abundant (Kochert et al. 1999, 2002). Extensive agricultural development reduces jackrabbit and snowshoe hare populations and makes areas less suitable for nesting and wintering eagles (Beecham and Kochert 1975; DOI 1979; Craig et al. 1986).

Fires have also caused large-scale losses of shrubs and prey habitat, which reduces golden eagle nest success (Kochert et al. 1999). Mining and various types of energy development can affect eagle breeding, foraging, and wintering habitat (Kochert et al. 1999). Recreation and other human activity near nests can also cause breeding failures (Steidl et al. 1993).

Destruction or adverse modification of eagle habitat or their prey base reduces eagle populations (Kochert et al. 2002); therefore, modification or improvement of eagle habitat or their prey base could be a potential compensatory mitigation option. For instance, if an artificial or natural habitat type is identified as attracting prey items for eagles or other large raptors, then recreating that habitat type could establish new or improved important eagle use areas. Artificial perch and nesting structures could also be constructed in areas with low levels of current or possible future development, creating “safe” zones for eagles. However, at this time, we lack good data on how useful such artificial structures are for eagles.

Habitat enhancement could occur within conservation banks that protect or enhance golden eagle nesting, foraging, or congregation sites. These land areas could be restored from a degraded condition and then conserved and permanently managed for eagles and other wildlife. Conservation banks could provide an opportunity to reverse declines in breeding, floating, or juvenile eagles and to improve conservation for these birds. Conservation banks could also be created to protect species and habitats that are at risk of becoming endangered or threatened. These protections could offset fatalities from a given project by ensuring continued use and protection of high-use golden eagle sites.

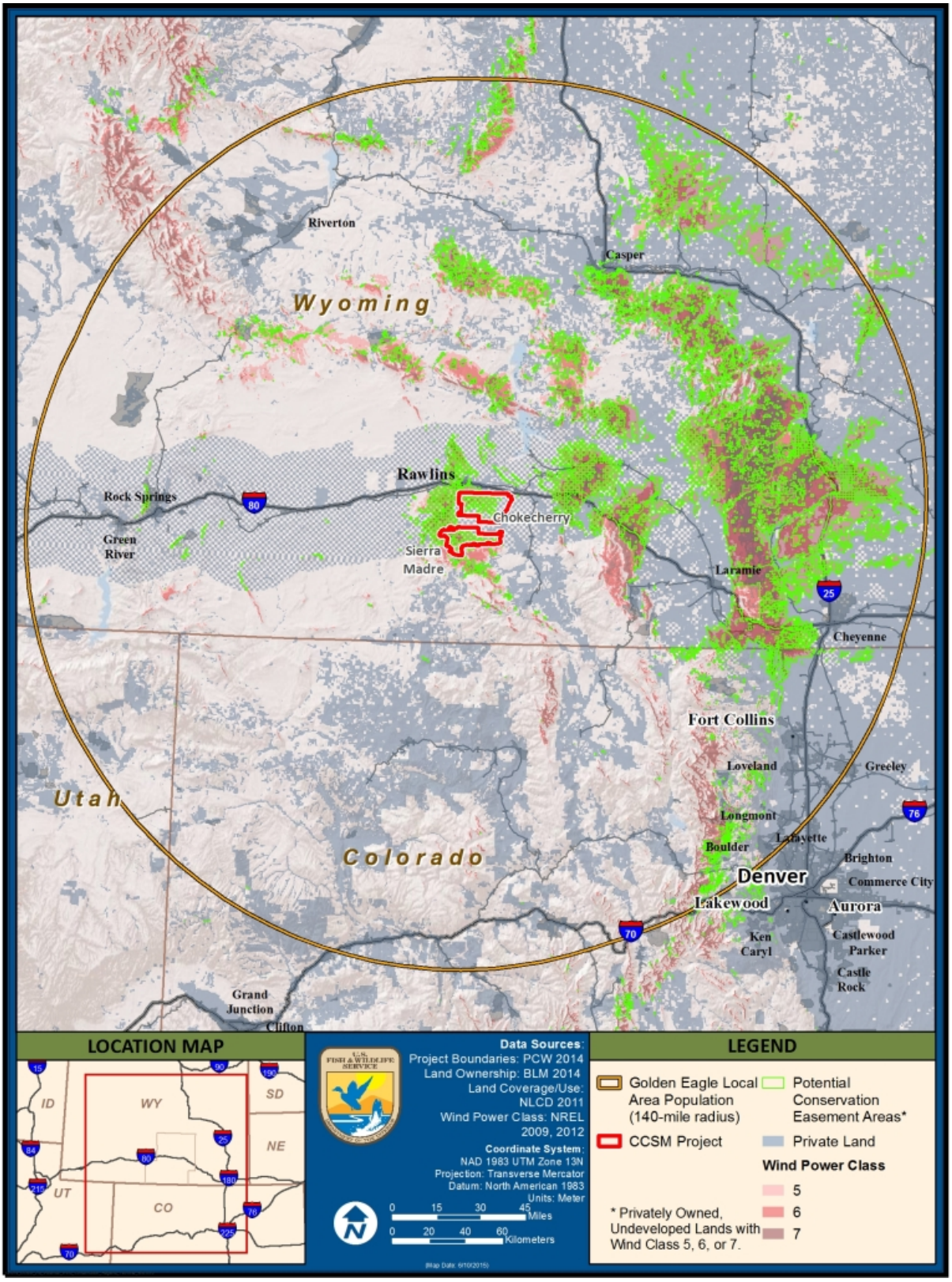

Figure 2-8. Potential Wind Conservation Areas Within 140 Miles of the Chokecherry and Sierra Madre Wind Development Areas for the CCSM Phase I Project in Wyoming

Increasing prey availability would be a component of habitat enhancement. Increasing prey availability is an indirect method of providing benefits to eagles. Because prey availability contributes to fledgling success and survivability (Kochert et al. 2002), it stands to reason that increasing the numbers of prey species would benefit eagle health and success in raising young. Protection of known foraging sites, such as prairie dog colonies, or habitats restored to provide prey habitat used by known prey species could benefit the survival of adult birds and enhance their ability to provide sustenance to young eagles. The benefits to golden eagles resulting from habitat enhancement could potentially be quantified through a resource equivalency analysis model.

2.2.2.4.7 Rehabilitation of Injured Eagles

Wildlife and raptor rehabilitation centers are intended to provide for the medical care of wildlife by licensed rehabilitators. These centers acquire sick, injured, debilitated, and orphaned wildlife to provide necessary treatment so that in general the wildlife may be returned to the wild. When the rescued wildlife is not releasable, wildlife rehabilitators may transfer the animal to a zoo or other educational institution. There are currently about 150 federally and state-permitted wildlife rehabilitators within the four BCRs, including two raptor rehabilitation centers in Wyoming.

Some rehabilitation centers in Wyoming and Colorado report rehabilitating and releasing 20 to 40 percent of the eagles brought to them (USFWS 2015a). Organizations associated with these centers often sponsor research evaluating the effectiveness of rehabilitation. This form of augmentation to wild populations has demonstrable success for peregrine falcon (Minnesota), whooping crane (Wisconsin), bison (from a captive-bred population in Minnesota), California condors (Arizona, California), and wolves (Michigan). Additionally, many injured eagles are rehabilitated and reintroduced every year (Primack 2014). Rehabilitation of injured birds requires significant effort for reintroductions to be successful. In some cases, rehabilitated birds need to be taught how to conduct activities they need to survive and require effort to develop their fitness so that they can survive in the wild.

Statistics concerning the success of raptor reintroduction into the wild are difficult to find. We examined 15 rehabilitation programs and interviewed four facilities and did not obtain information on long-term survival success rates. Sweeney et al. (1997) evaluated morbidity and survival in rehabilitated and wild peregrine falcons and found survival rates of 20 percent for rehabilitated peregrines up to 3 months after release, 14 percent survival up to 1 year, and survival rates similar to wild falcons beyond 1 year. Fijardo et al. (2000) had similar results when comparing local wild populations of barn owls to rehabilitated and released individuals. They found that released individuals showed greater numbers of fatalities due to starvation and lower life expectancy. They also found a higher number of fatalities for about the first 4 weeks after release, but then survival resembled fatality patterns of wild populations.

Most injured eagles that we are aware of are rehabilitated at federally and state-permitted facilities. However, existing facilities might not be able to keep up with the need, and some evidence suggests that not all injured eagles are getting access to rehabilitation and subsequent opportunity for rerelease into the wild. This mitigation option would involve

providing funding for expansion of existing wildlife rehabilitation services. Expansion of services could include expanding the network of federally and state-permitted rehabilitation centers and eagle rehabilitators in the four BCRs, or expanding the transportation network so that injured eagles could be transported to wildlife rehabilitation centers more quickly and safely. Satellite transmitters could be attached to reintroduced eagles to provide data on survival rates, assess the success of a rehabilitation program, and provide a means for calculating credit for compensatory mitigation.

This mitigation option would be unlikely to offset the total anticipated annual take of golden eagles from the CCSM Phase I Project due to the limited potential to expand existing rehabilitation programs in the four BCRs. However, supporting the rehabilitation of injured eagles could supplement other compensatory mitigation measures. The Carbon County Planning and Development Department has expressed support for the expansion of existing wildlife rehabilitation services in Wyoming. The Northern Arapaho Tribe has expressed an interest in developing a tribal rehabilitation program in concert with existing rehabilitation services near the Wind River Reservation. PCW has also expressed interest in supporting the rehabilitation of injured eagles to supplement other compensatory mitigation strategies.

2.2.3 Alternative 3 – Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project

2.2.3.1 Overview

We received numerous comments during the EIS scoping process requesting that we examine a different development scenario from the one proposed by PCW as part of Alternative 1 (Proposed Action) (that is, the CCSM Phase I Project, which consists of 500 turbines). To issue any ETP, we must analyze a specific project and determine whether the ETP application meets our criteria for issuing a permit based on analysis of that project. Only after required avoidance, minimization, mitigation, and other criteria are met can a specific project permit be issued authorizing take for the number of predicted eagle fatalities. In other words, we must analyze a project with specific wind turbines and layout rather than issuing a permit allowing a level of take and then devising a project layout to meet that permit.

We will not determine whether to issue ETPs for the CCSM Phase I Project as proposed by PCW until completion of the ETP application review and the associated NEPA processes. At this time, it is possible that we would issue ETPs for the CCSM Phase I Project under Alternative 1 (Proposed Action) or that we would deny the ETPs under Alternative 4 (No Action: Denial of ETPs). However, it is also possible that we would determine that the applications would meet the criteria for issuing ETPs, but not at the scale of the proposed project, and the applicant would need to present an alternative project scenario. Therefore, we are considering Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) as an example of a different development scenario and the potential federal action if, through the ETP application review process, it is determined that Alternative 1 (Proposed Action) does not meet criteria for a programmatic ETP. During development and preliminary assessment of PCW's ECP, the impacts and consequent avoidance and minimization measures for the Sierra Madre WDA were developed and analyzed independently of that for the Chokecherry WDA. Therefore, issuing ETPs for only

the Sierra Madre portion of the CCSM Phase I Project could be evaluated in this EIS as an independent potential project that could be submitted by PCW for our review in the future. We chose to analyze the Sierra Madre WDA as an example of a smaller project rather than the Chokecherry WDA because the Sierra Madre WDA has a higher potential for wind energy production. We acknowledge that PCW has stated that its market research and economic modeling indicate that a project of less than 500 turbines or 1,500 MW would not be economically viable due to the increased cost-per-megawatt of transmission of the wind energy.

Alternative 3 would be eligible for selection only if we were to determine that Alternative 1 (Proposed Action) does not meet regulatory criteria for a programmatic ETP, but that this smaller project did meet ETP criteria. Alternative 3 would also be eligible for selection only if the applicant submitted a revised programmatic ETP application for only the Sierra Madre portion of the CCSM Phase I Project, or some other smaller project area for which actual impacts can be determined. If our review determines that PCW's applications for ETPs for Alternative 1 (Proposed Action) meet the ETP criteria, Alternative 3 would not be selected. We will not reach a decision regarding the ETP applications until the NEPA process is concluded.

2.2.3.2 Covered Activities

Activities covered under the standard and programmatic ETPs for Alternative 3 would include the Phase I activities related to only the Sierra Madre WDA and all infrastructure components of the CCSM Phase I Project. Phase I of the Sierra Madre WDA would include 298 turbines in the areas occurring west of WYO 71/CR 401 (see Figure 2-3 and Table 2-5). Along with the turbines themselves, Phase I development of the Sierra Madre WDA would include roads, electrical systems (including electrical lines and substations), operation and maintenance buildings, meteorological towers, utilities, and temporary features within the Sierra Madre portion of the Phase I boundary (see Attachment A, Figure 3.2). All additional infrastructure components associated with the CCSM Phase I Project (the Phase I Haul Road and Facilities, West Sinclair Rail Facility, and Road Rock Quarry, as discussed in Section 2.2.1.2.4) would be covered under the standard and programmatic ETPs for Alternative 3.

Alternative 3 would include 3,262 acres of initial clearing and grading areas (27 percent less than under Alternative 1), 658 acres of long-term modification areas (22 percent less than under Alternative 1), and 288 acres of activity areas (35 percent less than under Alternative 1).

Table 2-5. Wind Turbines in the Sierra Madre Wind Development Area of the CCSM Phase I Project in Wyoming

Region	Number of Turbines
McCarthy[a]	69
Pine Grove[a]	72
Upper Miller Hill	157
Sierra Madre WDA/Total	**298**

Note:

[a] Collectively referred to as Lower Miller Hill

2.2.3.3 Eagle Fatality Prediction

We used data collected by PCW and the proposed Phase I wind turbine layout to predict eagle fatality for Phase I of only the Sierra Madre WDA. As described in Section 2.2.1.3, the number of estimated eagle fatalities was calculated by using long-watch data collected at the Phase I development and infrastructure areas from April 2011 to July 2012, and 0.5 mile fixed-point count data collected from August 2012 to August 2013 (see Attachment C, the USFWS eagle fatality prediction analysis executive summary, for additional detail).

The predicted take from Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) is 1 bald eagle and 7 or 10 golden eagles annually, depending on turbine blade size, as shown in Table 2-6. As described in Alternative 1, if Alternative 3 is selected, the actual predicted take would be determined by the actual turbine blade size used.

Table 2-6. Alternative 3 Estimated Annual Programmatic Eagle Take for the CCSM Phase I Project in Wyoming

Species	394-foot-diameter (120-meter-diameter) Wind Turbine Blade	338-foot-diameter (103-meter-diameter) Wind Turbine Blade
Bald Eagle	1	1
Golden Eagle	10	7

In addition to the programmatic take predicted for Phase I of only the Sierra Madre WDA, the same level of disturbance take from construction of the Phase I wind turbine development and infrastructure components for the CCSM Phase I Project and the infrastructure components, as described under Alternative 1 (Proposed Action) in Section 2.2.1.3, would likely occur under Alternative 3 as well.

Construction associated with Alternative 3 would include construction of only the Sierra Madre portion of the Phase I wind turbine development for the CCSM Phase I Project and all the infrastructure components of the CCSM Phase I Project. As a result, construction would be predicted to disturb the five eagle nests described in Section 2.2.1.3. As under

Alternative 1 (Proposed Action), the standard ETP for Alternative 3 would thus cover disturbance take of 2 bald eagles at one nest and 8 golden eagles at four nests on an annual basis during construction of the Phase I wind turbine development and infrastructure components.

2.2.3.4 Permit Stipulations

We would attach stipulations to the standard and programmatic ETPs issued for construction and operation activities, respectively, associated with only the Sierra Madre portion of the CCSM Phase I Project.

The standard ETP issued for disturbance take during construction of the Sierra Madre portion of the CCSM Phase I Project and construction of the infrastructure components would take effect immediately upon permit issuance and would cover all construction and site development activities until the Sierra Madre portion of the CCSM Phase I Project is operational. Limited construction of infrastructure components in areas not requiring an eagle take permit began in 2016 and construction of the CCSM Phase I Project is anticipated to be complete by 2020. Any construction occurring prior to securing an ETP for disturbance take associated with construction activities would still be subject to compliance with BGEPA. The duration of the standard ETP would not exceed 5 years. Stipulations for the standard ETP would include monitoring requirements, as discussed in Section 2.2.1.4.

The duration of the programmatic ETP for only the Sierra Madre portion of the CCSM Phase I Project would be 5 years. The permit would take effect once the first turbine is put into operation, which is anticipated to be in 2018, and would cover operation of all 298 turbines and ongoing operation of site infrastructure. Going forward, we assume that PCW would reapply for a programmatic ETP at 5-year intervals. We would review any reapplications we receive and make a decision about whether or not to issue successive programmatic ETPs. During the review process, we would reassess fatality rates, effectiveness of measures implemented to reduce take, the appropriate level of compensatory mitigation, eagle population status, and other factors.

The stipulations for the programmatic ETP would include the EACPs, additional BMPs, monitoring, adaptive management, and compensatory mitigation requirements, discussed in Section 2.2.1.4. The protocols for post-construction eagle fatality monitoring and disturbance monitoring would be the same as described under Alternative 1 (Proposed Action); the post-construction eagle fatality monitoring program would be required to achieve a 95 percent level of certainty that permitted take is not exceeded.

For Phase I of the Sierra Madre WDA, the predicted recurring bald eagle take would not exceed calculated EMU take thresholds; therefore, no compensatory mitigation is required for bald eagles at this time.

Compensatory mitigation for golden eagles would be required under Alternative 3. We assume that mitigation under Alternative 3 would be similar to mitigation under Alternative 1 (Proposed Action) and would consist of retrofits to high-risk power poles to compensate for predicted golden eagle fatalities. Compensation would be based on Table 2-7. As discussed

in Alternative 1, the actual level of mitigation required would be based on the actual predicted take, based on turbine size selected, and the actual number of poles would be determined by the duration the retrofit would provide benefit to eagles by electrocution avoidance.

Table 2-7. Required Compensatory Mitigation for Golden Eagle Take Under Alternative 3 of the CCSM Phase I Project in Wyoming

Wind Turbine Blade Diameter and Number of Turbines in Sierra Madre WDA of Phase I	Annual Permitted Take	Number of Poles to be Retrofitted to Achieve No-Net-Loss of Golden Eagles	
		Assuming 5 Years of Avoided Loss From Retrofitted Poles	Assuming 10 Years of Avoided Loss From Retrofitted Poles
394-foot-diameter (120-meter-diameter) Wind Turbine Blade			
298 turbines	10	2,556	1,373
338-foot-diameter (103-meter-diameter) Wind Turbine Blade			
298 turbines	7	1,889	1,015

2.2.4 Alternative 4 – No Action: Denial of ETPs

Under Alternative 4 (No Action), we would deny PCW standard and programmatic ETPs for construction and operation of the CCSM Phase I Project. We could deny the ETPs because the permit applications failed to meet one or more of several issuing criteria under 50 CFR 22.26 or because we have determined that the risk to eagles is so low that ETPs are unnecessary.

In addition to Alternative 4 (No Action) being a potential outcome of the permit review process, analysis of the No Action alternative is required by CEQ regulation (40 CFR 1502.14) and provides a baseline against which to compare the environmental impacts of the Proposed Action and other reasonable alternatives. ETPs are not required in order for PCW to construct and operate a wind energy facility. However, any unpermitted eagle take, if it occurs, would constitute a violation of BGEPA.

For purposes of impact analysis, we assume that if we deny or do not issue ETPs to PCW for the proposed project, PCW may take one of two actions:

- PCW may decide not to construct the proposed project, which we refer to as the No Build scenario under Alternative 4.
- PCW may construct the proposed project, as approved by the BLM and other permitting agencies, without ETPs and without adhering to an ECP, which we refer to as the Build Without ETPs scenario under Alternative 4.

We note that PCW may also choose to construct the project and voluntarily adhere to the proposed ECP, even without an ETP. In this case, impacts would be sufficiently similar to

Alternative 1 that we are not analyzing that scenario separately in this document. Each of the two possible actions above, however, is further described below.

2.2.4.1 No Build

If the CCSM Phase I Project were not constructed, existing land uses would be maintained. No wind turbines or infrastructure components would be constructed, and the ECP would not be implemented.

PCW's purpose of generating 1,500 megawatts (MW) of electricity from wind from the CCSM Phase I Project to serve 790,000 households in California, Nevada, and Arizona to help meet the renewable energy mandates of these states would not be met.

The goal of Secretarial Order 3285, which encourages development of renewable energy generation projects in the United States, would not be met by the CCSM Phase I Project if it were not constructed.

2.2.4.2 Build Without ETPs

If the CCSM Phase I Project were constructed without ETPs, the Phase I wind turbine development and infrastructure components would be built as described in the BLM-approved site-specific plans of development (SPODs) for the project and as described above in Sections 2.2.1.2 and 2.2.1.3. However, for purposes of this evaluation, we assume that many of our permit stipulations as described in the ECP and as outlined in Section 2.2.1.4 would likely not be implemented, including monitoring, adaptive management, compensatory mitigation, and EACPs. As a worst-case scenario of baseline impacts, we assume that none of our ETP stipulations would be implemented.

PCW would still be required to comply with BGEPA, and we could make a referral to the U.S. Department of Justice that PCW be prosecuted for any bald and golden eagles taken without a permit.

2.3 Alternatives Considered but Eliminated from Consideration

Alternatives to the Proposed Action that were assessed and dismissed from further consideration are discussed below. Alternatives were eliminated from consideration if they did not meet the alternatives screening criteria described in Section 2.1.1.

2.3.1 Full Site Build-Out (1,000 Turbines)

The BLM Final Environmental Impact Statement (FEIS) analyzed the full build-out of the CCSM Project, which would consist of 1,000 turbines. During the development of BLM's NEPA documents, BLM and PCW incorporated a phased construction sequence. By limiting the construction to a shorter time period, impacts on wildlife, soils, water, and vegetation (including weeds) would be reduced. The phased construction sequence would also allow BLM to use an adaptive management approach, monitoring impacts and modifying the required mitigation measures to best protect wildlife and habitat as construction proceeds.

The BLM ROD described the process for subsequent NEPA analysis to occur. The BLM ROD did not authorize site-specific construction, but stated that PCW was expected to request separate authorizations before construction would be approved. The separate authorizations consist of right-of-way (ROW) grants to implement SPODs. BLM would conduct subsequent NEPA analysis, tiered to the analysis conducted in the BLM FEIS, prior to issuance of any ROW grants.

In its ETP applications, PCW proposes to construct 500 turbines in the western portions of the Chokecherry and Sierra Madre parcels, in the areas known as Miller Hill and West Chokecherry, which comprise the highest-quality wind resources of the CCSM area. The Phase I turbines in the Sierra Madre WDA would be constructed first, followed by the Phase I turbines in the Chokecherry WDA. If PCW were to pursue a full build-out of 1,000 turbines, the company would need to submit a new programmatic ETP application covering the full build-out.

CEQ guidance from 2014 states that the requirement of alternatives development is “meant to ensure that agencies consider approaches with no, or less, adverse environmental effects as compared to the Proposed Action” (79 FR 77801, December 24, 2014). The full build-out of 1,000 turbines would result in greater adverse environmental effects than the Proposed Action. Additionally, this alternative is not consistent with the programmatic ETP application we have received. Consequently, we eliminated this alternative from further consideration.

2.3.2 Eagle Take Permit Duration

During scoping, we received several comments that expressed general concern over the length of 30-year permits. Some commenters suggested that permit tenure should not exceed 5 years until critical uncertainties regarding risk prediction are addressed and effectiveness of both conservation practices and mitigation measures are proven.

PCW originally requested a programmatic 30-year ETP in its application. However, as a result of a recent court decision (*Shearwater v. Ashe*, Case No. 14-cv-02830-LHK, N.D. Cal. Aug. 11, 2015), which set aside the permit duration part of the rule authorizing 30-year permits, the maximum duration for ETPs is 5 years. In consultation with PCW, we decided to process PCW’s original 30-year application as a 5-year application and did not require PCW to submit a new application. The duration of the standard ETP would be the period of construction, not to exceed 5 years (currently anticipated to be about 4 years).

If a programmatic ETP is issued for the proposed project, it will be for a duration of no more than 5 years. After the first 5 years, PCW may elect to reapply for another programmatic ETP for continued operation of the CCSM Phase I Project. We will review any reapplication submitted to us, and at the time of review, we will reassess fatality rates, effectiveness of measures to reduce take, the appropriate levels of compensatory mitigation, and eagle population status. Depending on our findings during permit review, we may make changes to any future permit issued for the CCSM Phase I Project, including any of the following:

1. Update the fatality predictions for the facility.
2. Require implementation of additional conservation measures.

3. Update monitoring requirements.
4. Revise compensatory mitigation requirements.
5. Revise the advanced conservation practices.
6. Deny the permit.

Because we cannot issue standard or programmatic ETPs with a duration of more than 5 years under current regulations, we have eliminated from consideration an alternative that would assess variable ETP durations.

2.3.3 Macrositing (Consideration of Development Outside of CCSM Boundaries)

An alternative evaluating wind power development at a site outside of the CCSM boundaries, macrositing, was eliminated from consideration because it is not reasonable to request that PCW acquire a different site, and because PCW is seeking permits from other federal and state agencies (that is, BLM and the State of Wyoming) for a project at the proposed location. Our consideration of a different project would be counter to the BLM ROD for the CCSM Project (BLM 2012b) and BLM's site-specific environmental assessments (EA1 and EA2) evaluating the CCSM Phase I Project and infrastructure components. Additionally, this alternative is not within our authority as an action agency reviewing the ETP applications. While the USFWS is developing tools that may help influence developers concerning site selection earlier in their planning processes, at the time of receipt of an ETP application, our authority is to determine whether the application meets permit criteria, not to direct the applicant to develop a different project. Consequently, we have eliminated a macrositing alternative from further consideration.

2.3.4 Micrositing (Adjustments to Turbine Numbers and Layouts within CCSM Boundaries)

During the scoping process, several commenters noted that development associated with the CCSM Phase I Project should occur in previously modified areas and areas with the fewest environmental impacts, and that turbines should not be located in areas with high avian use, near known raptor nests, near breeding areas, near abundant prey areas, within core habitat for greater sage-grouse, or near greater sage-grouse leks. Additional specific comments received on siting included the following:

- Move the CCSM Project to Bolten Flats.
- Avoid Miller Hill.
- Avoid the Atlantic Rim located to the west of the CCSM Project.
- Use WYO 71 as the haul road.
- Avoid turbines along the southern border of the Chokecherry WDA and the southwestern boundary of the Sierra Madre WDA.
- Avoid development of 0.5 mile on either side of the Continental Divide National Scenic Trail (CDNST).
- Avoid all greater sage-grouse core areas and use a buffer of 0.6 mile to protect habitat integrity near any lek.
- Consider an alternative that shields the viewsheds of the CDNST and the Overland Historic Trail from the CCSM Project.

Micrositing of the wind turbine layout and configuration within the CCSM boundary was eliminated from further consideration as an independent Alternative for analysis because PCW worked with us during pre-application coordination to develop eagle and other wildlife avoidance and minimization measures, which are documented in the ECP (see Section 2.2.1.3.2 and Attachment A).

PCW's originally proposed project would not have placed turbines on Sage Creek Rim or in Lower Miller Hill or the Sage Creek Basin. Turbines would have been placed throughout the full extent of Upper Miller Hill, including within the Red Rim-Grizzly Wildlife Habitat Management Area. As PCW developed avoidance and mitigation measures in cooperation with BLM and us, turbines were removed or relocated as described in detail in the ECP, Chapter 6 (see Attachment A). Hundreds of proposed turbines were relocated or removed during six project redesign efforts. Major avoidance and mitigation measures for the Proposed Action included:

- Considering alternative sites for turbines to reduce risk to eagles and other birds.
- Removing or relocating specific potential wind turbine sites using site-specific eagle and avian use data.
- Modifying, removing, or relocating infrastructure components using site-specific eagle and avian use data.

Greater sage-grouse core areas have been avoided, and the proposed turbine sites have been arranged into rows to be consistent with our ECP guidance. Turbine no-build areas have been defined, which have eliminated turbine sites in the areas where about 80 percent of eagle use in the area of the CCSM Project has been observed. The turbine layout has been refined to avoid some documented avian use areas, movement corridors, and nesting and foraging habitats. Turbine sites have also been removed from the Red Rim-Grizzly Wildlife Habitat Management Area located west and south of the Miller Hill portion of the Sierra Madre WDA.

Micrositing of the wind turbine layout as it relates to minimizing impacts on eagles and other wildlife is incorporated into the CCSM Phase I wind turbine development SPOD (PCW 2014a). PCW has determined that additional micrositing is not feasible. Our permit review is considering whether the current project layout avoids impacts on eagles sufficient to meet ETP criteria. Additional micrositing is therefore eliminated from further consideration as an independent alternative.

2.3.5 Additional Avoidance and Minimization Measures

Additional avoidance and minimization measures include site avoidance measures (placing buffers around resources used by eagles), turbine avoidance measures (altering the size, speed, or color of turbines), and operational mitigation (removing or curtailing the operation of turbines where a high number of fatalities have occurred).

Several commenters noted that priority should be given to additional strategies for avoiding and minimizing eagle take during operations and to measures for excluding specific areas from development. Suggested avoidance strategies included configuring wind turbines to

avoid high avian use areas and buffers around known eagle nests and breeding areas, and removing especially hazardous turbines that cause repeated fatalities or overlap with high avian use areas. Avoidance and minimization measures that avoid development in or near site resources are discussed in detail as part of Alternative 1 (Proposed Action) in Section 2.2.1.3.2 and under micrositing in Section 2.4.4. We have worked with PCW to site turbines and other project features to reduce effects on eagles. The proposed configuration of wind turbines and the buffers around known eagle nests are based on our discussions with PCW. Our review of the permit application will determine whether the current turbine layout avoids impacts on eagles to the maximum extent possible.

Some commenters suggested technological avoidance measures such as mechanically triggered, temporary turbine curtailment in response to detected eagle presence. We are aware of ongoing efforts to develop such technological avoidance systems. At this time, however, we are aware of no such systems that have been demonstrated to be effective.

We may consider suggested minimization strategies such as operational curtailment and an increased “cut-in” speed to minimize impacts on bats and migratory birds as part of the adaptive management process of a programmatic ETP, should one be issued. For example, post-construction monitoring results may inform us that certain locations, times, or seasons stand out as highest risk to birds, and could be efficiently addressed through adaptive management using targeted curtailment strategies. Changes to cut-in speeds have been demonstrated to reduce risk to bats in some instances. However, given that cut-in speed changes have not been clearly shown to reduce migratory bird risk (unlike bats, bird activity does not reliably diminish as wind increases), and that bats in the vicinity of the CCSM Phase I Project are not under federal jurisdiction, we have determined that changes to cut-in speeds would not be a relevant BMP or adaptive management strategy of ETPs considered for the CCSM Phase I Project. Therefore, we have eliminated consideration of additional avoidance and minimization measures as a stand-alone alternative in this EIS.

2.3.6 Mitigation

Many scoping comments urged us to develop a full suite of mitigation options to avoid eagle take before it occurs. Avoidance and minimization measures that reduce take before it occurs are not considered compensatory mitigation measures under BGEPA because avoidance and minimization measures must already be implemented to the maximum degree practicable before take would be authorized through a programmatic ETP. Avoidance and minimization measures under consideration as part of Alternative 1 (Proposed Action) are discussed in Section 2.2.1.3.2. Avoidance and minimization measures dismissed from further consideration are discussed in Section 2.3.5.

Compensatory mitigation measures that are intended to be implemented as a result of unavoidable take are discussed in the subsections below. During the scoping process, several commenters suggested compensatory mitigation measures that we are considering as part of Alternative 2, as discussed in Section 2.2.2. Additional compensatory mitigation suggestions that are eliminated from further consideration, and the rationale for their elimination, are discussed below.

2.3.6.1 Expand Captive Eagle Breeding Programs

Captive breeding programs have been used successfully to create experimental flocks of endangered whooping cranes in Wisconsin and to keep the California condor from becoming extinct (Primack 2014). In some cases, active rearing programs are a tool used to augment wild populations of bird species (Steenberg 1981; Tennessee's Watchable Wildlife 2014). Successful programs use methods that are very time-intensive and costly, and require trained individuals who institute methods designed to keep birds from imprinting on or becoming attached to humans (American Eagle Foundation 2011).

At this time, we have issued a permit to only one facility in the United States for captive breeding of eagles; this permit is held by an individual of the Comanche Nation in Oklahoma. Captive propagation is otherwise prohibited currently. Moreover, if there is a wild breeding population of a species, then captive breeding is typically considered a last resort option. Therefore, this alternative was eliminated from further review.

2.3.6.2 Increase Public Education

Public education campaigns are initiated to heighten awareness of the current plight of a targeted resource. In this case, golden eagles would be the focus of a campaign to describe the species and the protection it is afforded, current sources of mortality, and identification of measures to prevent mortality, such as accidental shootings or trappings. Although no literature exists to further evaluate this option with regard to golden eagles, past public education campaigns have been credited with the elimination of dichlorodiphenyltrichloroethane (DDT) from ecosystems, have resulted in an increase in the North America population of bald eagles, and have increased populations of other predatory raptors (USFWS 2007a). This type of campaign could be initiated to advance the conservation of golden eagles in the four BCRs that are considered to comprise the CCSM golden eagle population. However, because there would be no way to calculate the benefits of a specific public education effort and correlate those benefits with reducing eagle mortality in a quantifiable manner, this alternative was dismissed from further evaluation.

2.3.6.3 Research

Targeted research concerning new methods to mitigate the take of golden eagles could both identify new options, and develop metrics to quantify options currently discarded due to an inability to reasonably determine how many eagles would benefit. As such, targeted research would certainly provide a benefit both for eagles and for implementation of the permitting program. However, because the research itself would not be able to determine in advance whether, much less how many, golden eagles would be protected by conducting the research, funding the research would not itself serve as a means to mitigate for predicted take of eagles by a specific project.

2.3.6.4 Mitigation Banks

Mitigation banks are frequently used in many contexts, to allow conservation activities offsite to be implemented and applied as mitigation to a separate project's impacts. The use of a mitigation bank to compensate for eagle take by the recipient of a programmatic ETP

may be feasible. Under current guidelines, however, the methods employed by the mitigation bank itself would need to provide quantifiable benefits to golden eagles. Consequently, the pressing question would remain whether a particular form of eagle conservation activity is feasible and demonstrably quantifiable to serve as compensatory mitigation for the take of a golden eagle, regardless of whether the conservation activity is performed as part of a mitigation bank. Therefore, the option of using mitigation banks to deliver compensatory mitigation for a programmatic ETP is not analyzed as an independent form of mitigation.

2.3.7 Monitoring (Other than that in the Eagle Conservation Plan)

Comments received during scoping regarding monitoring included the following:

- Incorporate detailed monitoring prescriptions and protocols in the ETP and the ECP, including stringent reporting requirements.
- Use avian radar technology for monitoring during and after construction.
- Monitor nesting success.
- Have monitoring be conducted by an independent third party of qualified observers.
- Require pre-construction monitoring to extend 10 miles outside the CCSM Project boundary and include a sufficient number of observation points to ensure that the entire area of the CCSM Project is evaluated.
- Require 3 years of post-construction fatality monitoring for 50 percent of turbines.
- Make monitoring and analysis data publicly available in real time.
- Develop a publicly available wildlife incidental reporting system that would include incidental reporting of eagle fatalities in the vicinity of the CCSM Project.

Regulations for issuing standard or programmatic ETP under BGEPA require the applicant (PCW) to prepare and agree to comply with an ECP (78 FR 73704, December 9, 2013). The ECP prepared by PCW for the CCSM Phase I Project (see Attachment A) includes a comprehensive eagle monitoring plan, which we will review as part of the ETP applications to ensure that it meets our requirements. In addition, PCW has prepared a Phase I BBCS (see Attachment B) that includes monitoring for bats and birds other than eagles. In addition to the monitoring plans that are being made publicly available through inclusion of the ECP and the BBCS in this EIS, the reports that would be required to be submitted as a stipulation of an issued permit would also be available to the public.

Because comprehensive monitoring would be a requirement of the standard and programmatic ETPs, we have eliminated from consideration an alternative to monitoring other than what would be required as part of the ETPs.

2.3.8 Adaptive Management Strategies

Several commenters encouraged that we require, as part of a programmatic ETP, a robust adaptive management plan that incorporates the most recent and best techniques available for

reducing eagle fatalities during the lifetime of the CCSM Project. Specific comments received on adaptive management strategies included the following:

- A Technical Advisory Committee should be established to oversee the adaptive management framework and implementation of ACPs.
- Specific thresholds for fatalities that would trigger additional adaptive management should be defined. The additional adaptive management measures also should be defined.
- Measures should include observer- or radar-triggered temporary turbine shutdown, seasonal curtailment, operational curtailment, and decommissioning of specific turbines.
- In the event that turbine designs that have significantly lower impacts on birds and bats or other minimization measures become available, the CCSM Project proponents should be required to change out old turbine designs or otherwise incorporate new lower-impact technologies.

If we issue ETPs for the CCSM Phase I Project, the ETPs will incorporate the ECP developed for the project (see Attachment A), which includes measures to avoid and minimize impacts on eagles, including removing and relocating wind turbines from areas with high potential for eagle take and seasonal curtailment of specific wind turbines in proximity to eagle nests (see the permit stipulations discussed in Section 2.2.1.4). In addition, as part of its 5-year reviews of the programmatic ETP, we would evaluate the need to require implementation of additional conservation measures and revisions to advanced conservation practices and mitigation measures (78 FR 73704, December 9, 2013). These measures could include additional seasonal restrictions and curtailments.

Adaptive management strategies would be considered as part of Alternative 1 (Proposed Action) on an as-needed basis. However, these strategies do not constitute a stand-alone alternative and were eliminated from further consideration as a separate alternative.

2.3.9 Different Technologies

During scoping, several commenters suggested that we consider other renewable energy development, such as solar panels, thermal energy, and installation of small wind turbines on existing buildings, as an alternative to the CCSM Phase I Project. Additionally, several comments requested that we consider different “bird-friendly” wind energy technologies, such as alternative turbine designs that may present a lower risk to eagles and other birds and additional bird deterrents, as part of the CCSM Phase I Project.

Assessing a renewable energy source other than wind power is beyond the scope of the ETP applications and counter to other federal permitting actions for the CCSM Project (BLM 2012a, 2014, 2016a).

Alternatives that evaluate technologies other than the wind turbines proposed by the applicant, including alternative “bird-friendly” wind turbine designs, were eliminated from further consideration because they are not technically feasible or commercially available. We are not aware of any published studies that demonstrate that commercially available

alternative wind turbine designs result in fewer fatalities to birds or bats. Alternative wind turbines are not proven technology at this time and therefore are not a practicable alternative to the Proposed Action.

2.3.10 Issue Either Standard Eagle Take Permit or Programmatic Eagle Take Permit

We evaluated the feasibility of issuing only one ETP, either the standard ETP or programmatic ETP, without the other. The standard ETP would authorize unavoidable individual eagle take (including nest disturbance) during construction while the programmatic ETP would authorize unavoidable eagle take that may recur through the life of CCSM Phase I Project after implementation of EACPs. The two permits do not overlap. This alternative was considered but eliminated for the reasons presented in the subsections below.

2.3.10.1 Issue Standard Eagle Take Permit Only

The issuance of only a standard ETP would authorize individual eagle take during construction of the Phase I wind turbine development and infrastructure components for the CCSM Phase I Project, but not during the operation of the CCSM Phase I Project. Because a programmatic ETP would not be authorized, eagles taken during operation of the CCSM Phase I Project would result in violations of BGEPA, and the lack of EACPs and compensatory mitigation for eagle take could result in unacceptable reductions in eagle populations. This alternative would not be consistent with BGEPA or ECP guidance; therefore, we did not consider this alternative further.

2.3.10.2 Issue Programmatic Eagle Take Permit Only

The issuance of only a programmatic ETP would authorize eagle take during operation of the CCSM Phase I Project, including implementation of EACPs and compensatory mitigation, but would not authorize individual eagle take during construction. Activities associated with the construction of the Phase I wind turbine development and infrastructure components for the CCSM Phase I Project would occur within disturbance zones of bald and golden eagle nests. Eagle take, including nest disturbance, during construction would result in violations of BGEPA. Therefore, we did not consider this alternative further.

Chapter 3.0
Affected Environment and Environmental Consequences

3.1 Introduction

We, the U.S. Fish and Wildlife Service (USFWS), have combined the discussion of affected environment and environmental consequences into a single chapter, Chapter 3.0, to improve the readability of this Environmental Impact Statement (EIS). For each resource that is evaluated, the affected environment is described and then the potential environmental consequences are analyzed, thereby eliminating the need for duplicate text.

Following this introduction, Chapter 3.0 is organized as follows:

- **Section 3.2** includes resources commonly described and assessed for potential impacts in many EISs but that are not evaluated in detail in this EIS.
- **Sections 3.3 through 3.9** include the resources fully evaluated in this EIS.

As noted in Chapter 1.0, the Bureau of Land Management (BLM) conducted National Environmental Policy Act (NEPA) analyses by preparing a Final Environmental Impact Statement (FEIS) and Record of Decision (ROD) for the Chokecherry and Sierra Madre (CCSM) Wind Energy Project. In addition, the BLM prepared two subsequent Environmental Assessments (EAs), tiered to the FEIS, to evaluate site-specific improvements. The first EA, called EA1, addresses infrastructure components of the CCSM Project, including the Phase I Haul Road and Facilities, West Sinclair Rail Facility, and Road Rock Quarry. The second EA, called EA2, addresses the CCSM Phase I Project for the 500 turbines and pads, access roads, and associated components.

As part of our independent obligation to comply with NEPA to consider issuing standard and programmatic Eagle Take Permits (ETPs) for the CCSM Phase I Project, we have reviewed the BLM's NEPA analyses for the CCSM Project and have determined that the BLM has adequately evaluated impacts on many human and natural resource areas. Consequently, to avoid redundancy and to focus our EIS on issues relevant to our decision to be made, we have incorporated by reference many portions of the BLM's documents that we determined to be adequate for our analysis in accordance with 40 Code of Federal Regulations (CFR) 1502.21.

Resources not evaluated in detail in this EIS are discussed in **Section 3.2**. Each resource summary includes context for the resource; the BLM's conclusions of impacts on the resource; clarification or updated information on the conclusions of impacts (based on feedback received during the scoping process and applicable new project information, site data, or regulations); and an explanation of why no further evaluation of the resource is needed in this EIS.

For each resource evaluated in full in **Sections 3.3 through 3.9**, three subsections are presented. These describe the approach to characterizing and evaluating the resource, describe the potentially affected resource (affected environment), and finally, discuss the

assessment methodologies and potential impacts on that resource (environmental consequences).

Emphasis in our EIS is on biological resources, with other resources described and evaluated in detail with regard to their potential for being affected by the take of bald and golden eagles and other special status species. Special status species include threatened and endangered species protected under the Endangered Species Act (ESA), species that have been proposed for protection under the ESA, birds of conservation concern, and species protected by or of concern to other agencies such as the Wyoming Game and Fish Department (WGFD). This focused analysis will provide the basis for our decision to issue or not issue standard and programmatic ETPs.

Specifically, the resources evaluated in full in this EIS are water resources (Section 3.3); vegetation and wetlands (Section 3.4); fish, amphibians, and reptiles (Section 3.5); mammals (Section 3.6); birds (other than eagles) (Section 3.7); eagles (Section 3.8); and cultural resources (Section 3.9). Each of these topics was evaluated in the BLM FEIS and ROD, EA1, and EA2, and we have addressed each of these resources in greater detail in our EIS for one or more of the following reasons:

- The resource is the subject of our decision to be made regarding potentially issuing standard and programmatic ETPs (that is, eagles).
- The resource falls under our trust as a result of another federal regulation (for example, the Migratory Bird Treaty Act [MBTA] or ESA).
- The topic requires discussion to provide background for resources under our jurisdiction (for example, resources that serve as habitat or prey for eagles).

Because each of the topics discussed in the sections below was presented in the BLM's NEPA analyses (that is, BLM's FEIS, ROD, EA1, EA2) and we have determined those analyses adequate, we incorporate information from these documents into our EIS by reference in accordance with 40 CFR 1502.21. Sections vary in level of detail based on a number of factors, including the amount of information we incorporated by reference and the amount of new information available since publication of the BLM's FEIS, ROD, EA1, and EA2.

In the description of the affected environment and analysis of environmental consequences, we have relied on peer-reviewed literature to the maximum extent practicable. In some cases, we have cited references that are not peer-reviewed, meaning that the reports have not undergone a thorough review process by experts in the field. We have cited non-peer-reviewed literature, such as the site-specific studies performed by the Power Company of Wyoming LLC (PCW), only when it includes the best data available and peer-reviewed literature is not available. Non-peer-reviewed literature used in this EIS is noted in the body of the document and is denoted with an asterisk (*) in Chapter 8.0, References.

3.2 Resources Not Evaluated Further in this EIS

3.2.1 Geology, Geological Hazards, and Minerals

3.2.1.1 Context of Resource

Geology pertains to the earth's composition and includes components such as rocks and minerals, and physical features such as mountains and valleys. Minerals are naturally occurring substances of a definite chemical composition, including inorganic elements (such as calcium and gold) and organic derivatives (such as coal and petroleum derived from plants or animals). Geological hazards considered in the BLM FEIS consisted of seismic hazards, landslides, sinkholes, and swelling clay.

As described in the BLM FEIS, the Phase I development and infrastructure areas (that is, the footprint, or the areas of initial grading and clearing as well as long-term modification) are in a small geological sub-basin called the Kindt Basin. Oil and natural gas are the primary leasable mineral resources in the vicinity of the Phase I development and infrastructure areas. The Kindt Basin was assigned a low potential for hydrocarbon development. Some small-scale salable mineral resources are present in the area, including sand and gravel and crushed stone. Potential access limitations to development of mineral resources from the CCSM Phase I Project are expected to be minor, given the low potential for development within the area.

Of the geological hazards studied, landslides and swelling clay were identified as potential risks to the CCSM Phase I Project in some areas. These risks would be mitigated by avoiding potential landslide areas, if possible, and implementing site-specific geotechnical design and engineering practices.

3.2.1.2 Conclusion of Impacts

We are incorporating by reference the BLM FEIS, Section 3.3, found on pages 3.3-1 through 3.3-11, and Section 4.3, found on pages 4.3-1 through 4.3-6, because we have found this information adequate for our analysis. The BLM ROD, Appendix D, includes applicable applicant-committed measures (ACMs), but no mitigation measures are proposed for these resources. Additionally, EA1, Appendix B; and EA2, Appendix B identify the topic of geology, geological hazards, and minerals as "not impacted" by the CCSM Phase I Project.

3.2.1.3 Justification for Not Evaluating Further in this EIS

We have reviewed all applicable documentation regarding the CCSM Phase I Project and this resource. The description and assessment of geology, geological hazards, and minerals in the BLM NEPA documents have not changed since publication of these documents. No additional information regarding geology, geological hazards, and minerals is necessary for us to consider issuing standard and programmatic ETPs. The Proposed Action and alternatives would not change the potential of geologic hazards or mineral composition of the site and do not justify additional evaluation of impacts on said resources. Geology, geological hazards, and minerals are thus dismissed from further analysis in this EIS.

3.2.2 Soils

3.2.2.1 Context of Resource

Soils in the CCSM Phase I Project area are composed of a mixture of organic remains, clay, and rock particles at the surface of the Earth. To characterize soils in the Chokecherry and Sierra Madre Wind Development Areas (WDAs), the BLM FEIS presented information from a soil survey for the BLM land in Carbon County, reconnaissance-level surveys, and data from the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS). Subsequently, PCW conducted additional soil surveys to provide site-specific data on the physical and chemical properties of soils in the Phase I development and infrastructure areas. The results of these additional surveys are summarized in EA1 and EA2. The site-specific plans of development (SPODs) also provide summary analyses on soils.

We have found to be adequate for our analysis and are incorporating by reference the BLM FEIS, Section 3.9, found on pages 3.9-1 through 3.9-9; EA1, Section 3.8, found on pages 3-22 through 3-27; and EA2, Section 3.5.

3.2.2.2 Conclusion of Impacts

The BLM FEIS, Section 4.9; BLM ROD; EA1, Section 4.2.8; EA2, Section 4.2.5; and the SPODs for Phase I development and infrastructure areas, Appendices H, I, and L, all of which have been found to be adequate for our analysis and are incorporated by reference, determined that significant impacts on soil resources would be anticipated because it is not feasible to completely avoid areas of severe and poor soil limitation. Anticipated soil erosion would exceed background levels, and some topsoil would be lost or degraded. Additionally, EA2 determined that about 2,345 acres of sensitive soils within the Phase I development and infrastructure areas would be impacted by initial site modification from the CCSM Phase I Project.

To avoid, minimize, and mitigate effects from the CCSM Phase I Project on soil resources, PCW would implement numerous measures that are described in the BLM FEIS and ROD and the SPODs; documents that we determined to be adequate for our analysis and incorporated by reference include:

- BLM ROD, Appendix D, Table D-1
- ACMs A-3-40 to A-3-42, A-3-65, and A-3-66 to A-3-74
- BLM ROD, Appendix D, Table D-4

3.2.2.3 Justification for Not Evaluating Further in this EIS

The description and assessment of soils in the BLM NEPA documents have not changed since publication of these documents. No additional information regarding soils is necessary for us to consider issuing standard and programmatic ETPs. Soil characteristics and site modification pertaining to habitat for special status species, migratory birds, and eagle prey species are addressed, as applicable, in other resource sections that are fully evaluated in this EIS. Soils are thus dismissed from further analysis in this EIS.

3.2.3 Paleontological Resources

3.2.3.1 Context of Resource

Paleontological resources (that is, fossil evidence of plants and animals) were reviewed in the BLM FEIS through a fossil potential classification of geologic formations within the Phase I development and infrastructure areas. Based on the review of geologic formations, the BLM FEIS concluded that some areas with many fossils would likely be altered by the CCSM Phase I Project. The possibility of discovering new fossil localities on public lands was acknowledged.

3.2.3.2 Conclusion of Impacts

The BLM FEIS concluded that construction could cause adverse impacts on some fossil resources, but could also result in a beneficial impact of discovering new fossil localities. Operation of the wind facilities should not affect paleontological resources unless maintenance activities would be needed outside previously modified areas. Geotechnical investigations and on-the-ground surveys were conducted in selected areas of the infrastructure components addressed in EA1, and Phase I wind turbine development was addressed in EA2. The surveys confirmed the presence of high potential fossil areas within the Phase I development and infrastructure areas. The SPODs for the infrastructure components and the Phase I wind turbine development considered impacts on paleontological resources in specific areas of modification.

EA1 and EA2 confirmed that there would be a few areas of high potential for significant fossil resources that would likely be altered. Mitigation measures and a best management practice (BMP) were identified as commitments to help minimize impacts on paleontological resources. The documents that we determined to be adequate for our analysis and are incorporated by reference are the BLM FEIS, Section 3.5 (found on pages 3.5-1 through 3.5-4) and Section 4.5 (found on pages 4.5-1 to 4.5-4); EA1, Section 3.4 (found on pages 3-14 to 3-16) and Section 4.2.4 (found on pages 4-14 to 4-15); and EA2, Section 3.3 and Section 4.2.3. The BLM ROD, Appendix D, includes the committed mitigation measures and BMP for paleontological resources and is also incorporated by reference because it is adequate for our analysis.

3.2.3.3 Justification for Not Evaluating Further in this EIS

We have reviewed all applicable documentation regarding the CCSM Phase I Project and this resource. The description and assessment of paleontological resources in the BLM NEPA documents have not changed since publication of these documents. No additional information regarding paleontology is necessary for us to consider issuing standard and programmatic ETPs. Paleontological resources are thus dismissed from further analysis in this EIS.

3.2.4 Historic Properties

3.2.4.1 Context of Resource

Historic resources are physical elements of the cultural environment considered important by local or regional communities, or that are considered important to the study of prehistory or history, or both. Historic resources include prehistoric or historic archaeological sites, buildings, structures, districts, or other places or objects. If these resources meet defined significance criteria, they are protected under federal laws and executive orders. The federal laws include the National Historic Preservation Act of 1966, the American Indian Religious Freedom Act of 1978, the Archaeological Resources Protection Act of 1979, and the Native American Graves Protection and Reparation Act of 1990.

We reviewed the SPODs and the BLM's analysis of impacts on historic resources (referred to as cultural resources) in the BLM FEIS and ROD, EA1, and EA2. We have found adequate for our analysis and are incorporating by reference the BLM FEIS, Section 3.2, found on pages 3.2-1 through 3.2-9. This section discusses the affected environment for historic resources, including the regulatory environment, a prehistoric and historic narrative of the region, a Class I file search of the CCSM Project area, and a Class II sample inventory and we determined this information to be adequate for our analysis. We are also incorporating by reference EA1, Section 3.2, found on pages 3-4 through 3-6, and EA2, Section 3.1. These sections discuss the results of Class III intensive cultural resource inventories undertaken for the Phase I development and infrastructure areas and this information is adequate for our analysis. The BLM also developed a Programmatic Agreement for the CCSM Project in consultation with the Wyoming State Historic Preservation Office, the Advisory Council on Historic Preservation, PCW, and other interested parties; the Programmatic Agreement is part of the BLM ROD, Appendix E. The Programmatic Agreement formalizes the BLM's obligations for identifying and evaluating historic resources, addressing inadvertent discoveries, and mitigating impacts in accordance with Section 106 of the National Historic Preservation Act.

3.2.4.2 Conclusion of Impacts

We reviewed the BLM's conclusion of impacts, ACMs, BMPs, and mitigation measures presented in the BLM FEIS and ROD, EA1, and EA2. We are incorporating by reference the following discussions on these subjects, which are adequate for our analysis:

- BLM FEIS – Section 4.2, found on pages 4.2-1 through 4.2-8
- BLM ROD – Appendices D and E
- EA1 – Section 4.2.2, found on pages 4-7 through 4-9
- EA2 – Section 4.2.1

The BLM FEIS analyzed potential direct and indirect impacts on historic resources. Direct impacts include physical impacts from ground-altering activities associated with construction of project components and future maintenance. Indirect impacts include soil erosion from changes to drainage patterns, looting and vandalism from increased access, and inadvertent damage. The BLM FEIS determined that significant adverse impacts would occur to historic

properties such as the Overland Trail, where setting is an important aspect of site integrity. The Overland Trail is discussed further in Section 3.2.5 in this EIS.

As documented in the SPODs, EA1, and EA2, Class III surveys for the CCSM Phase I Project identified 21 sites eligible for inclusion on the National Register of Historic Places in the Phase I development and infrastructure areas. Avoidance and minimization measures were employed to prevent direct impacts on 15 sites, leaving 6 eligible sites where adverse impacts are unavoidable. Indirect impacts have potential to adversely affect 20 eligible sites identified outside the Phase I development and infrastructure areas. Adverse effects on eligible sites and mitigation of impacts will be resolved in accordance with the Programmatic Agreement and through implementation of ACMs, BMPs, and BLM-required mitigation measures as described in the BLM FEIS and ROD, and in the SPODs.

3.2.4.3 Justification for Not Evaluating Further in this EIS

We have reviewed all applicable documentation regarding the CCSM Phase I Project and this resource. The description and assessment of historic resources in the BLM NEPA documents have not changed since publication of these documents. No additional information regarding historic resources is necessary for us to consider issuing standard and programmatic ETPs. Historic resources are thus dismissed from further analysis in this EIS.

3.2.5 Historic and Scenic Trails

3.2.5.1 Context of Resource

National Scenic and Historic Trails are components of the National Trails System, a network of Congressionally designated trails created to fulfill outdoor recreation needs and "promote the preservation of, public access to, travel within, and enjoyment and appreciation of the open-air, outdoor areas and historic resources of the Nation" (16 United States Code [U.S.C.] 1241). The BLM is responsible for managing national trails on BLM-administered lands. This management is guided by BLM Manual 6280, *Management of National Scenic and Historic Trails and Trails Under Study or Recommended as Suitable for Congressional Designation.*

One National Scenic Trail is in the Phase I development and infrastructure areas: the Continental Divide National Scenic Trail (CDNST). Two historic trails in the vicinity of the CCSM Phase I Project, the Overland Trail and Cherokee Trail, are undergoing feasibility studies for congressional designation as parts of the California National Historic Trail. These three trails were described and reviewed in the BLM FEIS and ROD, EA1, and EA2. National trails are not discussed substantively in the SPODs for the West Sinclair Rail Facility, Road Rock Quarry, and Phase I wind turbine development. The SPOD for the Phase I Haul Road and Facilities briefly addresses the CDNST in a discussion on the BLM ROD's selected alternative locating the Phase I Haul Road internal to the CCSM Phase I Project, increasing the distance from the CDNST.

The BLM manages a 0.25-mile-wide corridor centered along the CDNST as a Special Recreation Management Area (SRMA) on BLM-administered lands for this portion of the trail. No trail segments pass through the Phase I development area; however, the Phase I

development area lies within the trail's viewshed. We are incorporating by reference EA1, Section 3.3, found on pages 3-7 through 3-12, and EA 2, Section 3.2, found on pages 3-5 through 3-11, which describe this inventory and characteristics of the CDNST and are adequate for our analysis.

The Overland Trail, a stage and emigrant route between Kansas and Utah used between 1862 and 1869, crosses east-west through the CCSM Project between the Phase I Chokecherry and Phase I Sierra Madre WDAs, with a 1-mile segment crossing through the Phase I development area in the Sierra Madre WDA. The BLM defined a 0.5-mile-wide corridor centered on the trail as the Historic Trail Management Area for the Overland Trail (BLM FEIS, p. 3.4-6). We determined the information to be adequate for our analysis and are incorporating by reference EA1, Section 3.3.3, found on page 3-13, which describes the trail's historic background and limited recreation opportunities, and a 2008 field assessment that evaluated the trail's historical integrity in the vicinity of the CCSM Phase I Project.

The Cherokee Trail is a 900-mile-long trail from Oklahoma to Wyoming used from the late 1840s to the 1890s. Portions of Phase I development and infrastructure areas are within the trail's viewshed. We are incorporating by reference EA1, Section 3.3.4, found on pages 3-13 through 3-14, which discusses the Cherokee Trail's history and ongoing feasibility studies and is adequate for our analysis.

The three scenic and historic trails in and around the Phase I development and infrastructure areas are sensitive to changes in the visual environment. Such changes can impact the nature of scenic trails and the resources for which they are designated. Changes to the visual environment can also affect historic trails where historic setting is an important component of site integrity. We have found the information to be adequate for our analysis and are incorporating by reference the BLM FEIS, Section 3.12, found on pages 3.12-1 through 3.12-13, which describes the BLM's visual resource analysis for the CCSM Project, including Visual Resource Inventory findings and Key Observation Points for the CDNST, Overland Trail, and Cherokee Trail.

3.2.5.2 Conclusion of Impacts

Impacts on National Scenic and Historic Trails were evaluated in the BLM FEIS and ROD, EA1, and EA2. Construction would not directly impact trail alignments or take place within the 0.25-mile SRMA for the CDNST. However, the BLM FEIS concluded that construction and operation of the CCSM Project would result in substantial, adverse, temporary and long-term visual impacts due to the project's scale and visibility from sensitive viewpoints, including historic and scenic trails (BLM FEIS, p. 4.12-8). The BLM FEIS anticipated strong visual contrast within 5 miles of the CDNST in the western portion of the Chokecherry WDA and the southwest and northwest portions of the Sierra Madre WDA, but concluded that the CCSM Project would not substantially interfere with the nature and purposes of the CDNST. The BLM FEIS also anticipated moderate visual impacts on the Overland Trail, which would adversely affect the trail's integrity of setting.

We are incorporating by reference the following sections of the BLM FEIS, which are adequate for our analysis and which detail the type, extent, and magnitude of impacts on the

land management, recreation, visual, and cultural aspects of National Scenic and Historic Trails:

- Section 4.2.2, found on pages 4.2-3 through 4.2-5 (Cultural Resources)
- Section 4.4.2.8, found on page 4.4-11 (Lands and Realty)
- Section 4.7, found on pages 4.7-5 through 4.7-9 (Recreation)
- Section 4.12, found on pages 4.12-6 through 4.12-42 (Visual Resources)

Additionally, we have determined the information adequate for our analysis and are incorporating by reference EA1, Section 4.2.3, found on pages 4-9 through 4-14, and EA2, Section 4.2.2. EA1 and EA2 provided site-specific detailed analysis of visual impacts for the Phase I development and infrastructure areas. These specific impacts were analyzed per guidance outlined in BLM Manual 6280, National Register of Historic Places criteria, and the BLM's Visual Resource Management system, and it was concluded that impacts on trails were consistent with and did not exceed those described in the BLM FEIS.

Mitigation of impacts on the CDNST, Overland Trail, and Cherokee Trail would be implemented through design features, ACMs, BMPs, BLM-required mitigation measures, the site-specific reclamation plan, and the Cultural Resources Programmatic Agreement. We are incorporating by reference the following discussions, which are adequate for our analysis, on these measures:

- BLM FEIS – Section 4.12, found on pages 4.12-42 through 4.12-43
- BLM ROD – Appendix D, page D-1
- BLM ROD – Appendix E
- EA2 – Section 4.2.2.3

Mitigation measures presented in the BLM ROD, Appendix D, are also referenced in each SPOD in Appendix A alongside PCW's actions implementing the measures.

3.2.5.3 Justification for Not Evaluating Further in this EIS

We have reviewed all applicable documentation regarding the CCSM Phase I Project and this resource. The description and assessment of National Scenic and Historic Trails in the BLM NEPA documents have not changed since publication of the documents. No additional information regarding these trails is necessary for us to consider issuing standard and programmatic ETPs. National Scenic and Historic Trails are thus dismissed from further analysis in this EIS.

3.2.6 Air Quality and Climate

3.2.6.1 Context of Resource

The federal Clean Air Act requires all states to control air pollution emission sources so that the National Ambient Air Quality Standards (NAAQS) are met and maintained. The regulatory framework of the Clean Air Act also includes consideration of greenhouse gases and their contribution to climate change. Air quality within the vicinity of the CCSM Phase I

Project area has the potential to be affected by activities such as emissions from the construction of facilities, access roads, operation of facilities including the West Sinclair Rail Facility and Road Rock Quarry, and maintenance of installed equipment.

Carbon County is designated by the U.S. Environmental Protection Agency (USEPA) to be in attainment of (meets or is better than) the NAAQS. The NAAQS and the county's specific criteria pollutant measurements were described in detail in the BLM FEIS, Section 3.1, and EA1, Section 3.1.1. EA1 also provided an update to the primary NAAQS for particulate matter with a diameter of 2.5 microns or less ($PM_{2.5}$), which had been updated since the BLM FEIS was published. We are incorporating by reference the BLM FEIS, Section 3.1, found on pages 3.1-1 through 3.1-9, and EA1, Section 3.1.1, found on pages 3-2 through 3-3, as we have found this information is adequate for our analysis.

In EA2, Appendix B, Table B-1 notes that the CCSM Phase I development area is a feature of or is essentially similar to the preferred alternative in the FEIS (Alternative 1R) because the CCSM Phase I development area is located within the same analysis area. In addition, greenhouse gas emissions are considered a cumulative impact, consistent with the BLM FEIS (BLM 2012a), and no changes to the anticipated greenhouse gas emissions analysis provided in the BLM FEIS are anticipated for the CCSM Phase I Project. Therefore, additional analysis of air quality from the CCSM Phase I Project is not warranted.

A long-term reduction in greenhouse gas emissions would occur as a result of use of wind power versus fossil fuels, such as coal- or oil-generated power. The long-term reduction in in greenhouse gas emissions from operation of the CCSM Phase I Project would contribute less to the effects of climate change than would fossil-burning energy sources on various resources, including wildlife. The CCSM Phase I Project's production of renewable energy is estimated by PCW to reduce greenhouse gas emissions by approximately 4.6 million tons per year for a 20-year operations period compared to the burning of fossil fuels (PCW 2016).

3.2.6.2 Conclusion of Impacts

The BLM FEIS concluded that the CCSM Project would not cause a violation of ambient air quality standards or degradation of regional air quality.

EA1 concluded that the emissions associated with operations in the Road Rock Quarry would lead to slight increases in pollutant concentrations in the Phase I development and infrastructure areas; however, these increases would be unlikely to cause any violation of the NAAQS or the Wyoming Ambient Air Quality Standards. Although the CCSM Phase I Project would emit low levels of pollutants, principally from mobile sources associated with maintenance activities during operation, the net impact of the project would be to improve atmospheric conditions since the generation of electricity from wind turbines would reduce the need for electricity generated in fossil fuel-fired power plants.

We have determined that the impacts on air quality and climate for the Phase I Haul Road and Facilities and the West Sinclair Rail Facility were adequately analyzed in the BLM FEIS Section 4.1, and that the impacts on air quality for the Road Rock Quarry were adequately analyzed in EA1, Section 4.2.1. We have determined that the information is adequate for our

analysis and are incorporating by reference the BLM FEIS, Section 4.1, found on pages 4.1-1 through 4.1-6; and EA1, Section 4.2.1, found on pages 4-2 through 4-7.

3.2.6.3 Justification for Not Evaluating Further in this EIS

We have reviewed all applicable documentation regarding the CCSM Phase I Project and this resource. The description and assessment of air quality and climate in the BLM NEPA documents have not changed appreciably since publication of the documents. No additional information regarding air quality and climate is necessary us to consider issuing standard and programmatic ETPs. Air quality and climate are thus dismissed from further analysis in this EIS.

Please note that potential impacts of climate change on several resources discussed in full in this EIS are addressed under those respective resource areas.

3.2.7 Visual Resources

3.2.7.1 Context of Resource

Visual resources address the scenic value of views from viewsheds by users of various sensitivities. Visual resources were described and reviewed in the BLM FEIS. The Phase I development and infrastructure areas and surrounding regions have high to very high visibility with mostly moderate scenic quality, with several high quality scenic areas that were reviewed from key observation points. The analysis determined that structures above the horizon can be viewed from beyond 5 miles, but those below the horizon typically are not discernable beyond 3 miles because they blend in with background features.

3.2.7.2 Conclusion of Impacts

Construction activities would adversely affect visual resources during the short term, through the introduction of construction equipment, ground modification and other construction activities, and the transport of wind turbines and other supplies and equipment into the Phase I development and infrastructure areas. Long-term effects were attributed to the addition of permanent structures and operation of facilities (primarily wind turbines) for the life of the CCSM Phase I Project. Adverse impacts on visual resources would be unavoidable, but the Visual Resource Management Class IV objectives (which provide for management activities that may result in major modifications to the existing character of the landscape with a high level of change) on BLM land in the Phase I development and infrastructure areas were considered to be achieved for each of the alternatives evaluated.

EA1 indicated that there were no changes to the visual resources affected environment section of the BLM FEIS. Additional site-specific analysis was done for reviewing impacts under EA1 to account for minor changes and additional engineering details after completion of the BLM FEIS; no visual impacts were anticipated beyond those identified in the BLM FEIS. In EA2, visual resources were not evaluated further because the resource was considered to be analyzed sufficiently in the BLM FEIS. SPODs for the infrastructure components considered impacts on visual resources in specific areas of alteration. The SPOD for Phase I wind turbine development noted that impacts for 500 turbines would be less that

for 1,000 turbines for the entire CCSM Project, which was evaluated in the BLM FEIS. SPODs for the infrastructure components considered visual resource impacts and indicated that those views would be partially screened and are near areas of current alteration of viewsheds. Mitigation measures and BMPs were identified as commitments to help minimize impacts on visual resources. We have determined the information about visual resources from the following documents is adequate for our analysis and we are incorporating by reference:

- BLM FEIS – Section 3.12, found on pages 3.12-1 through 3.12-16; Section 4.12, found on pages 4.12-1 through 4.12-43; and Section 5.12, found on pages 5-28 through 5-30
- BLM ROD – Appendix D, which includes the committed mitigation measures and BMPs for visual resources
- EA1 – Section 3.11, found on pages 3-38 through 3-39; and Section 4.2.11, found on pages 4-28 through 4-39
- EA2, Appendix B

3.2.7.3 Justification for Not Evaluating Further in this EIS

We have reviewed all applicable documentation regarding the CCSM Phase I Project and this resource. The description and assessment of visual resources in the BLM NEPA documents have not changed appreciably since publication of these documents. No additional information regarding visual resources is necessary for us to consider issuing standard and programmatic ETPs. Visual resources are thus dismissed from further analysis in this EIS.

3.2.8 Noise

3.2.8.1 Context of Resource

Noise is defined as any sound that is undesirable because it interferes with communication, is intense enough to damage hearing, or is otherwise annoying. It can be intermittent or continuous, steady or impulsive, and can involve any number of sources and frequencies. Human response to increased sound levels varies according to the source type, characteristics of the sound source, distance between source and receptor, receptor sensitivity, and time of day. In addition to noise produced by construction, operation of the wind turbines would produce noise. The noise affected environment is analyzed from a human perspective for this resource and not from an avian impact perspective. Noise is considered for impacts on avian and other wildlife species in the resources evaluated in detail in this EIS.

The noise and human health affected environment section of the BLM FEIS included a discussion of the following topics: fundamentals of acoustics, characterization of background noise levels, noise propagation, noise standards and guidelines, and human health associated with noise impacts. Sensitive noise receptors (residences) within the Chokecherry and Sierra Madre WDAs were identified. EA1 updated the noise affected environment section to include additional noise receptors within 1,600 feet of the West Sinclair Rail Facility. We have determined the information is adequate for our analysis and we are incorporating by reference the BLM FEIS, Section 3.16, found on pages 3.16-1 through 3.16-4, and EA1,

Section 3.15, found on page 3-64. In EA2, Appendix B, Table B-1 notes that significant impacts from construction noise to residences were disclosed in the BLM FEIS.

3.2.8.2 Conclusion of Impacts

The BLM FEIS concludes that impacts from noise under the construction phase of the CCSM Project would include temporary noise from heavy construction equipment and construction activities, as well as light vehicle construction traffic. Impacts during the operations phase would include wind turbine noise and noise from maintenance vehicles, power lines (that is, transmission lines and collection lines), and the substation. The BLM FEIS concluded that there would be significant noise impacts on two residences located within 1,600 feet of project construction activities and proposed mitigation measures for these impacts. The impacts on the two affected residences would be temporary in nature. The BLM ROD (Appendix D, Table D-4) identified proposed mitigation measures N-1 and N-2 to reduce construction noise impacts on nearby residences.

The BLM FEIS also evaluated operational noise impacts (including noise from wind turbines, maintenance vehicles, power lines, and vehicular traffic) and determined them to be negligible.

EA1 concluded that no noise impacts are expected from either the Phase I Haul Road and Facilities or the Road Rock Quarry because no residences are located within 1,600 feet of these facilities. Approximately seven residences are located within 1,600 feet of the West Sinclair Rail Facility, and the noise impacts on these residences would be considered significant in accordance with USEPA guidance. However, EA1 points out that these residences are also located within 1,600 feet of the existing Union Pacific Railroad (UPRR) main line and are in proximity to Interstate 80 (I-80). The CCSM Project would result in an increase of approximately two trains per day, or roughly 2 percent of the total rail traffic along the UPRR main line in this area. In addition, the location of the West Sinclair Rail Facility on the south side of a ridge would help attenuate sound from operations on the southern portion of the West Sinclair Rail Facility. The SPOD for the West Sinclair Rail Facility includes proposed mitigation measures N-1 and N-2 from the BLM ROD, Appendix D, Table D-4.

EA2 for Phase I wind turbine development considered updated information and concluded that no additional analysis was warranted. We are incorporating by reference the BLM FEIS, Section 4.16, found on pages 4.16-1 through 4.16-7; and EA1, Section 4.2.15, found on pages 4-56 through 4-58, because this information is adequate for our analysis.

3.2.8.3 Justification for Not Evaluating Further in this EIS

We have reviewed all applicable documentation regarding the CCSM Phase I Project and this resource. The description and assessment of noise in the BLM NEPA documents have not changed appreciably since publication of these documents. No new residences have been identified in or within 1,600 feet of the Phase I development and infrastructure areas since completion of the BLM FEIS, and it can be reasonably concluded that no additional significant impacts beyond those already disclosed are anticipated for the CCSM Phase I

Project. No additional information regarding noise is necessary for us to consider issuing standard and programmatic ETPs.

The potential impacts of noise on various biological resources from each alternative evaluated in this EIS are discussed under those respective sections. Noise as a stand-alone topic is thus dismissed from further analysis in this EIS.

3.2.9 Land Use

3.2.9.1 Context of Resource

The area in the vicinity of the CCSM Project consists of alternating tracts of public and private ownership, often referred to as the checkerboard ownership, across southern Wyoming. Most of the private land is owned by The Overland Trail Cattle Company LLC (TOTCO). Livestock grazing (mostly cattle, with some sheep) is the primary land use on the public lands and on lands owned by TOTCO. The BLM FEIS also assesses rural residences in the southern portion of the Sierra Madre WDA, authorized and pending right-of-way (ROW) grants within the CCSM Project area, BLM land consolidations, wild and scenic rivers, BLM natural areas, Areas of Critical Environmental Concern, Wilderness Areas, Wilderness Study Areas in the CCSM Project area, specially designated lands in the CCSM Project area, SRMAs, and Wildlife Habitat Management Areas.

The Wildlife Habitat Management Areas are considered wind energy avoidance areas by the BLM, but the Rawlins Resource Management Plan allows ROW to be issued in these areas with special stipulations. The Phase I development and infrastructure areas also cross school trust lands under the jurisdiction of the State Board of Land Commissioners. Local land use and zoning are addressed by the Carbon County Comprehensive Land Use Plan and Chapter V of the Carbon County Zoning Resolution of 2015 where Wind Energy Facilities – Overlay District Regulations are specified.

We have determined the information to be adequate for our analysis and are incorporating by reference the following sections of the BLM FEIS, which detail the type, extent, and magnitude of impacts on land use:

- Section 1.6.1, found on pages 1-12 through 1-13 (Conformance with the 2008 Rawlins [Resource Management Plan] RMP EIS and Record of Decision)
- Section 1.10, found on pages 1-19 through 1-21 (Issues and Concerns)
- Section 1.11, found on page 1-21 (Resources Not Addressed in this EIS)
- Section 2.4, found on page 2-31 (Comparison of Alternatives – Land Use/Recreation)
- Section 3.4, found on pages 3.4-1 through 3.4-11 (Land Ownership and Use)
- Section 4.4, found on pages 4.4-1 through 4.4-15 (Impacts to Lands and Realty)

Because it is adequate for our analysis, we are also incorporating by reference the following sections of EA1, EA2, and the SPODs:

- EA1 – Sections 1.3 through 1.5, found on pages 1-6 through 1-7; Section 1.7, found on pages 1-9 through 1-11; Section 3.6, found on page 3-19; Section 4.2.6, found on pages 4-17 through 4-18; and Appendix B
- EA2 – Section 1.5 and Appendix B
- SPOD for Phase I Haul Road and Facilities – Section 8.1, found on pages 8-1 through 8-3
- SPOD for West Sinclair Rail Facility – Section 8.1, found on pages 8-1 through 8-2
- SPOD for Road Rock Quarry – Section 8.1, found on page 8-1

EA1, EA2, and the SPODs provided detailed site analysis of land impacts for infrastructure and turbine development for the CCSM Phase I Project.

3.2.9.2 Conclusion of Impacts

The BLM FEIS found that none of the land use impacts were significant, as they do not conflict with existing land uses, including current land use authorizations; do not result in changes to land use designations; do not substantially reduce the opportunity for ROW authorizations and development activities; and do not substantially reduce the opportunity for land tenure adjustments or public access due to the existing public-private checkerboard landownership.

The BLM FEIS concluded that the North Platte SRMA would be avoided; however, as identified in EA1, a portion of the Phase I Haul Road and Facilities improvements and underground water main would be located in the North Platte SRMA. The North Platte River Recreation Area Management Plan has been revised since the BLM FEIS was published to allow this infrastructure to be placed in the SRMA. The easements held by WGFD for fishing along the North Platte River would not be impacted directly; therefore, public access would not be restricted. No wind turbines would be placed in the wind energy exclusion and avoidance areas of the CDNST SRMA, Historic Trails Management Area, or the Red Rim-Grizzly Wildlife Habitat Management Area, consistent with the BLM FEIS, but there would be indirect visual impacts, which are addressed in Section 3.2.7 of this EIS. Compliance with the state goals and objectives in the Upper Muddy Creek watershed/Red Rim-Grizzly Wildlife Habitat Management Area are addressed in the BLM FEIS, Section 4.14.

There would be no conflicts with Carbon County land use designations or zoning with the changes to the Phase I Haul Road and Facilities, West Sinclair Rail Facility, or Road Rock Quarry described in EA1.

Mitigation of impacts on land use would be implemented through design features, ACMs, BMPs, and the site-specific reclamation plan. No additional BLM-required mitigation measures are required. We have found the information to be adequate for our analysis and are incorporating by reference the following discussions on these measures:

- BLM FEIS – Section 4.4.6, found on page 4.4-15

- BLM ROD – Appendix D, pages D-8 through D-10, and D-15 through D-16

Additionally, as discussed in Section 2.2.1.4.2 (Conservation Measures, Advanced Conservation Practices and Best Management Practices) of this EIS, PCW would coordinate with TOTCO to put approximately 27,500 acres of private land into conservation easements.

3.2.9.3 Justification for Not Evaluating Further in this EIS

We have reviewed all applicable documentation regarding the CCSM Phase I Project and this resource. The description and assessment of land use in the BLM NEPA documents have not changed since publication of these documents. No additional information regarding land use is necessary for us to consider issuing standard and programmatic ETPs. Land use is thus dismissed from further analysis in this EIS.

3.2.10 Recreation

3.2.10.1 Context of Resource

Recreation resources include a variety of activities, as well as the lands and facilities that support those activities. Recreation in the vicinity of the CCSM Phase I Project consists primarily of dispersed activities on public lands. Activities include hunting, fishing, hiking, camping, off-highway vehicle (OHV) use, mountain biking, wildlife viewing, and scenic driving. Rim Lake Recreation Site, Teton Reservoir Recreation Site, the CDNST, the North Platte River SRMA, and multiple informal, dispersed recreation sites and campgrounds are located within or adjacent to the Phase I development and infrastructure areas. The CDNST is addressed separately in Section 3.2.5, Scenic and Historic Trails, of this EIS. There are four public access areas along the North Platte River managed by WGFD. Many private outfitters offer guided trips for hunting, fishing, floating, and wildlife viewing on public lands and waters in the vicinity of the CCSM Phase I Project.

We have determined the information to be adequate for our analysis and are incorporating by reference the following sections of the BLM FEIS, which detail the type, extent, and magnitude of impacts on recreation resources:

- Section 2.4, found on pages 2-30 through 2-31 (Comparison of Alternatives – Land Use/Recreation)
- Section 3.4, found on pages 3.4-1 through 3.4-11 (Land Ownership and Use)
- Section 3.7, found on pages 3.7-1 through 3.7-8 (Recreation)
- Section 4.4, found on pages 4.4-1 through 4.4-15 (Impacts to Lands and Realty)
- Section 4.7, found on pages 4.7-1 through 4.7-12 (Impacts to Recreation)

We have also found the information in the following sections of EA1, EA2, and the SPODs to be adequate for our analysis and are incorporating by reference:

- EA1 – Section 1.7, found on page 1-10; Section 3.3, found on pages 3-6 through 3-14; Section 3.6, found on page 3-19; Section 4.2.3, found on pages 4-9 through 4-14; Section 4.2.6, found on pages 4-17 through 4-18; and Appendix B

- EA2 – Section 3.2 and Appendix B

EA1 and EA2 provided site-specific detailed analysis of land impacts for the infrastructure components and wind turbine development for the CCSM Phase I Project.

3.2.10.2 Conclusion of Impacts

The findings of the BLM FEIS are confirmed with the additional analysis in EA1 and the SPODs. Recreation areas are managed per the direction of the 2008 Rawlins Resource Management Plan, as amended. The CCSM Phase I Project is in conformance with this plan. The project would not compromise public health or safety because access would be restricted during construction in areas where safety could be comprised. However, long-term access, especially near developed recreation areas such as the easements along the North Platte River, would not be restricted. The CCSM Phase I Project is compatible with the stated objectives of the CDNST and North Platte River SRMAs.

However, as identified in EA1 and a change from the analysis in the BLM FEIS, a portion of the Phase I Haul Road and Facilities improvements and underground water main would be in the North Platte SRMA. The total surface modification is approximately 550 linear feet and 1.5 acres. The North Platte River Recreation Area Management Plan has been revised since the BLM FEIS was published to allow this infrastructure to be placed in the SRMA. The easements held by WGFD for fishing along the North Platte River would not be impacted directly; therefore, public access would not be restricted. However, access may be temporarily limited in the North Platte River SRMA for construction of the Haul Road and water main to protect the safety of recreation users.

As noted in Section 2.2.1.4.2 of this EIS, TOTCO has indefinitely suspended access for hunting of greater sage-grouse on all of its private lands and other areas under its control. It is unlikely to affect many public recreation users, but has been implemented per applicant-committed mitigation addressed in the BLM ROD.

Mitigation of impacts on recreation resources would be implemented through design features, ACMs, BMPs, BLM-required mitigation measures, and the site-specific reclamation plan. We have determined the information adequate for our analysis and we are incorporating by reference the following discussions on these measures:

- BLM FEIS – Section 4.7.6, found on page 4.7-11
- BLM ROD – Appendix D

3.2.10.3 Justification for Not Evaluating Further in this EIS

We have reviewed all applicable documentation regarding the CCSM Phase I Project and this resource. The description and assessment of recreation resources in the BLM NEPA documents have not changed since publication of these documents. No additional information regarding recreation resources is necessary for us to consider issuing standard and programmatic ETPs. Recreation resources are thus dismissed from further analysis in this EIS.

3.2.11 Traffic and Transportation

3.2.11.1 Context of Resource

Transportation resources evaluated in this EIS include railroads and paved and unpaved roadways, and the traffic upon them. I-80, Wyoming State Highway (WYO) 76, and WYO 71 provide access to the CCSM Phase I Project area as well as several county roads and BLM roads. Undesignated BLM roads and two-tracks, which are used for grazing, recreation, and oil and gas activities in the vicinity of the CCSM Phase I Project, also provide access. The UPRR transcontinental main line runs north of the proposed West Sinclair Rail Facility, and includes a switching yard facility in Rawlins and a major freight siding in Sinclair.

We have determined the information to be adequate for our analysis and are incorporating by reference the following sections of the BLM FEIS, which detail the type, extent, and magnitude of impacts on transportation resources:

- Section 2.3.13, found on page 2-26 (WYO 71/Carbon County Road 401 for Haul Road)
- Section 2.4, found on pages 2-28 and 2-34 (Comparison of Alternatives – Transportation)
- Section 3.4.5, found on page 3.4-5 (Transportation and Utility ROW Corridors)
- Section 3.10, found on pages 3.10-1 through 3.10-7 (Transportation)
- Section 4.4.2.6, found on page 4.4-11 (Transportation and Utility ROW Corridors)
- Section 4.10, found on pages 4.10-1 through 4.10-21 (Impacts to Transportation)

We have determined the information to be adequate for our analysis and are also incorporating by reference the following sections of EA1, EA2, and the SPODs:

- EA1 – Section 1.2, found on pages 1-3 through 1-5; Section 1.7, found on pages 1-9 through 1-10; Section 2.2, found on pages 2-1 to 2-18; Section 3.9, found on pages 3-27 through 3-29; Section 4.2.9, found on pages 4-23 through 4-25; and Appendix B
- EA2 – Section 2.2.2.1, Section 2.2.25, and Appendix B
- SPOD for Phase I Haul Road and Facilities – Section 4.1, found on pages 4-1 through 4-2; Section 4.3.1, found on pages 4-7 through 4-9; Section 5.1, found on pages 5-1 through 5-3; Section 5.8.3, found on pages 5-9 through 5-13; Section 6.4, found on page 6-2; Section 7.6.3, found on page 7-3; and Appendices D, E, and L
- SPOD for West Sinclair Rail Facility – Section 2.1, found on pages 2-2 through 2-5; Section 2.2, found on pages 2-5 through 2-6; and Section 4.1, found on pages 4-1 through 4-2
- SPOD for Road Rock Quarry – Section 3.2, found on pages 3-3 and 3-4; Section 5.3.1, found on pages 5-23 and 5-24; Section 6.3, found on pages 6-2 through 6-4; Section 6.9.3, found on page 6-8; Section 7.6.5, found on page 7-3; and Appendices C, D, E, and L

EA1, EA2, and the SPODs provided site-specific detailed analysis of transportation impacts for infrastructure and turbine development for the CCSM Phase I Project.

3.2.11.2 Conclusion of Impacts

The BLM FEIS concluded that increased traffic levels on state and county roads from laborers traveling to the CCSM Project area and deliveries that cannot be delivered via rail would be the greatest transportation impacts of the CCSM Project. The addition of the onsite Road Rock Quarry described in EA1 would reduce the number of deliveries during construction and would improve transportation operations; the SPOD for the Road Rock Quarry noted that some off-site deliveries would still be needed. The revised traffic study and transportation management plan still identified construction impacts resulting in unacceptable temporary traffic levels at some intersections. These impacts would be mitigated by managing construction labor shifts so they do not coincide with normal peak traffic levels. Also, flaggers would be used during large deliveries to improve traffic flow and allow the local traffic to take precedence over deliveries. Long-term operations for roads and intersections within and near the CCSM Phase I Project area would be acceptable as defined by operation standards of the responsible government agency (Wyoming Department of Transportation, Carbon County, and the BLM), measured by level of service as reported in the BLM FEIS.

Impacts on air travel are addressed in Section 3.2.12 (Airspace and Aviation) of this EIS. Transportation-related impacts on air quality are addressed in Section 3.2.6 (Air Quality and Climate) of this EIS. Wildlife-related transportation impacts are addressed in Sections 3.6 (Mammals), 3.7 (Birds Other than Eagles), and 3.8 (Eagles) of this EIS.

Mitigation of impacts on traffic and transportation would be implemented through design features, ACMs, BMPs, and the site-specific reclamation plan. No additional BLM-required mitigation measures are required. The information is adequate for our analysis and we are incorporating by reference the following discussions on these measures:

- BLM FEIS – Section 4.10.9, found on pages 4.10-19 through 4.10-20
- BLM ROD – Appendix D

3.2.11.3 Justification for Not Evaluating Further in this EIS

We have reviewed all applicable documentation regarding the CCSM Phase I Project and this resource. The description and assessment of traffic and transportation facilities in the BLM NEPA documents have not changed since publication of these documents. No additional information regarding traffic and transportation is necessary for us to consider issuing standard and programmatic ETPs. Traffic and transportation are thus dismissed from further analysis in this EIS.

3.2.12 Airspace and Aviation

3.2.12.1 Context of Resource

Airspace and aviation address aircraft flight resources, including airports and the airspace through which aircraft fly, throughout the CCSM Phase I Project area. The BLM FEIS identified nearby airports and stated that the Federal Aviation Administration (FAA) would require an aeronautical study once a ROD had been issued for the project. EA1 and EA2 did not discuss airspace and aviation.

3.2.12.2 Conclusion of Impacts

Because the CCSM Phase I Project would include construction of wind turbines over 200 feet tall, the applicant is required to complete a Notice of Intent to Construct with FAA per the Federal Aviation Regulation Part 77. FAA also requires an aeronautical study to determine what lighting and additional measures may be required for the project to promote air safety and the efficient use of the navigable airspace. This aeronautical study would be completed following the release of the BLM FEIS and EA2 because the study requires project-specific details including turbine locations, size, and a lighting and marking plan that would not be available until those documents had been completed.

The BLM ROD identified the use of an Audio Visual Warning System for aircraft detection and warning as a potential mitigation measure. Following submittal of the Notice of Intent to Construct to FAA and completion and approval of the aeronautical study and lighting plans, the turbine locations would be added to aeronautical charts. The applicant would also be required to keep FAA apprised of construction progress and any changes in turbine locations, and would be required to install aeronautical lighting on turbines in accordance with the FAA-approved lighting plan.

According to a publicly available report to Congress (U.S. Department of Defense 2012) and a non-public aviation dataset (National Geospatial-Intelligence Agency 2015), there are no military operation areas or low-level military training routes within or in proximity to the CCSM Phase I Project. Aside from an aerial refueling route located north of Rawlins, there are no designated military flight-related areas within a 30-mile radius of Rawlins (National Geospatial-Intelligence Agency 2015). An FAA-designated holding pattern associated with Saratoga's Shively Field intersects the Sierra Madre WDA. Project-related impacts on this holding pattern would need to be coordinated with FAA.

3.2.12.3 Justification for Not Evaluating Further in this EIS

We have reviewed all applicable documentation regarding the CCSM Phase I Project and this resource. The description and assessment of airspace and aviation in the BLM NEPA documents have not changed since publication of these documents. We have determined that no further evaluation of impacts is warranted for our decision of whether or not to issue standard and programmatic ETPs. Airspace and aviation are thus dismissed from further analysis in this EIS.

3.2.13 Socioeconomics and Environmental Justice

3.2.13.1 Context of Resource

Socioeconomic resources (that is, human settlement, employment and labor market conditions, key economic trends, population and demographics, housing, community infrastructure and services, local government fiscal conditions, public education, non-market benefits and values, and social conditions and trends) were reviewed in the BLM NEPA documents for the CCSM Project. Environmental justice (a determination of whether a project would cause disproportionately high and adverse effects on minority and low-income populations) was also reviewed in these documents. For the purposes of our analysis, the potential for environmental justice effects as they specifically apply to tribal communities (due to the integral nature of eagles in tribal belief systems and practices) is addressed in Section 3.9, Cultural Resources.

Ranching, the railroads, and the interstate flow of commerce associated with I-80 have been long-term and stable elements of the area's economic base and social fabric. The mining, oil, and natural gas industries also have been important but volatile contributors to the regional economic base through employment, spending, and their fiscal support for local government and education.

The BLM FEIS evaluated the numbers of minority and low-income persons in Carbon County, Rawlins, Sinclair, Census Block 2 of Census Tract 9676 (the location of the Application Area), and the Application Area, but did not evaluate whether these populations are substantially larger than surrounding communities. EA1 and EA2 did not evaluate environmental justice.

3.2.13.2 Conclusion of Impacts

Based on the review of the socioeconomic data, the BLM FEIS concluded that constructing 1,000 wind turbines would generate approximately $4.6 to $6.2 billion in capital investment and would create up to 1,150 seasonal jobs in the third and fourth years of project construction. Up to 590 additional jobs could be induced through CCSM Phase I Project workers spending money in the local economy for goods and services and from additional demand for governments providing community services. Employment from maintenance and operation of the wind turbines would create approximately 150 jobs and induce an additional 120 jobs for approximately 25 years. The BLM FEIS estimated that 1,320 seasonal jobs would be filled by workers temporarily or permanently migrating into the area. Most of the housing demand would be supplied by temporary housing, including hotel or motel rooms, recreational vehicle (RV) pads, rental housing, and mobile homes. The BLM FEIS concluded that existing temporary housing would likely meet demand for the first 2 years of the CCSM Project, but a shortage of approximately 670 units would occur during the third and fourth years of the CCSM Project. A shortage of 430 units was projected for the fifth year of the CCSM Project. The shortage would be exacerbated by competition from other construction and I-80 travelers, especially tourists.

The BLM FEIS concluded that because demand would not likely be met from other, more distant communities, temporary housing would need to be constructed by the CCSM Project

owners. The demand for long-term housing for maintenance and operation workers was projected to be filled by existing conventional housing. The BLM FEIS also concluded that community infrastructure and services would be adversely affected by the influx of workers; with increased demand for infrastructure and services, public expenditures could exceed revenues in the short-term, but a beneficial impact is anticipated over the long-term. The BLM FEIS concluded that impacts on social conditions would be temporary, and that there would not be any disproportionately high and adverse impacts on minority or low-income populations. EA1, EA2, and SPODs concluded that minor changes in unemployment would not change the impacts analysis of the BLM FEIS, and that economic conditions would be substantively similar to those described in the BLM FEIS.

The BLM FEIS referenced 2009 employment data, population data from 2008 population estimates and Census 2000, and housing data from Census 2000. We assessed current Census data to evaluate any potential changes in projected impacts on socioeconomic resources. The population of Carbon County has increased since 2008. The number of housing units in Carbon County grew by 3.2 percent from 2000 to 2010 (U.S. Census Bureau 2011); however, the number of vacant houses and available temporary housing (motels, recreation vehicle pads, and campgrounds) has not significantly changed from 2010 (Wyoming Housing Database Partnership 2015). Community infrastructure and services, local government fiscal conditions, public education, non-market benefits and values, and social conditions and trends have not changed meaningfully from conditions described in the BLM FEIS.

The number of unemployed people and the number of workers in the mining, utilities, and construction industries in Carbon and Sweetwater counties have decreased from the numbers referenced in the BLM FEIS and EA1. The BLM FEIS and EA1 based employment projections and impacts on 1,500 unemployed people and a higher mining, utilities, and construction labor force; currently the number of unemployed in both counties totals approximately 1,300. Consequently, less local labor would be available for temporary and long-term employment to construct and operate the CCSM Phase I Project. Thus, the estimated workforce from outside of Carbon and Sweetwater counties would be at least 200 more workers than what was projected in EA1 and EA2 to construct the Phase I wind turbine development (500 turbines) and the infrastructure components. The projected shortage of temporary housing would also be approximately 200 more than the 564 projected in EA1. The same potential options to address housing shortages discussed in the BLM FEIS (commitments to use motel rooms, campgrounds, and RV pads, and construction of a temporary housing facility by the CCSM Project) are discussed in EA1. It is likely that 200 more temporary housing units would be needed to meet the projected demand. Based on current conditions and past trends, existing and future housing would be adequate to house long-term maintenance and operations workers plus the increase in population that would result from employment induced by increased spending in the local economy for goods and services by construction workers.

Impacts on community infrastructure and services and social conditions would be similar to impacts identified in the BLM FEIS and EA1. As discussed in the BLM FEIS and EA1, the supply of long-term housing units would be adequate to meet demand, and housing availability and pricing are not anticipated to change substantially. Any impact on housing supply and pricing is not anticipated to be disproportionately high and adverse on minority

and low-income populations. No other disproportionately high and adverse impacts on minority and low-income populations are anticipated. Minority and low-income populations are anticipated to benefit from increased employment and economic activity from construction and operation of the CCSM Phase I Project. The BLM FEIS indicated GEN-1 and GEN-2 mitigation measures could apply to socioeconomics as applicable. The BLM ROD, Appendix D, does not include any additional mitigation measures for socioeconomic resources; the BLM ROD is adequate for our analysis and is incorporated by reference.

We have determined that the impacts on socioeconomics for the Phase I Haul Road and Facilities and the West Sinclair Rail Facility were adequately analyzed in the BLM FEIS, Section 4.8, and in EA1, Section 4.2.7. Therefore, we are incorporating by reference the BLM FEIS, Section 4.8, found on pages 4.8-1 through 4.8-29; EA1, Section 4.2.7, found on pages 4-18 through 4-20; and EA2, Section 2.2.4.

The BLM FEIS evaluated the numbers of minority and low-income persons in Carbon County, Rawlins, Sinclair, Census Block 2 of Census Tract 9676 (the location of the Application Area), and the Application Area, but did not evaluate whether there would be disproportionately high and adverse human health and environmental impacts on these populations. EA1 and EA2 did not evaluate environmental justice. We assessed current Census data to evaluate any potential changes in minority and low-income populations. The percentage of minorities in Carbon County, Rawlins, Sinclair, Wamsutter, and in Block Group 2, Census Tract 9676 (the tract that includes the Phase I infrastructure components) has increased from 2000 to 2010 (U.S. Census Bureau 2011). The percentage of the total population that identified as minority in Carbon County was estimated to be 19.0 percent in 2010, while the percentage of the total population that identified as minority in Sweetwater County was estimated to be 17.8 percent in 2010. Rawlins had a total estimated minority population of 27.4 percent in 2010. The percentage of low-income population has increased from 2000 to 2010 in Carbon County, Rawlins, Sinclair, and Block Group 2, Census Tract 9676, but has decreased in Wamsutter (U.S. Census Bureau 2001, 2014). The overall percentage of the low-income population in Block Group 2, Census Tract 9676 was 22.1 percent in 2010 (U.S. Census Bureau 2014). The percentage of minorities in Carbon County is substantially greater than in the State of Wyoming, and the percentage of minorities in Rawlins is substantially greater than in Carbon County. However, no adverse human health and environmental impacts on minority populations are anticipated. The percentage of low-income population is only slightly greater in these communities than in the respective surrounding areas.

3.2.13.3 Justification for Not Evaluating Further in this EIS

We have reviewed the information from the BLM's evaluation of potential impacts on socioeconomics and environmental justice populations (except for tribal communities' relationship to eagles) and have determined that no further evaluation of impacts is warranted for our decision of whether or not to issue standard and programmatic ETPs. Socioeconomics and environmental justice are thus dismissed from further analysis in this EIS except for the consideration of tribal communities in relation to the cultural resource aspects of eagles (see Section 3.9).

3.2.14 Human Health and Safety

3.2.14.1 Context of Resource

Human health and safety is addressed for Carbon County, including the Application Area, Rawlins, Saratoga, Baggs, and Wamsutter throughout documentation for the CCSM Project, including the BLM FEIS and the SPODs. Construction and operation activities associated with the project could affect several aspects of human health and safety. The BLM FEIS does not have a specific health and safety section, but human health as it applies to noise and turbine operations is addressed in a human health subsection. The BLM FEIS also addresses public health, welfare, and safety as part of evaluations of socioeconomics, geology and minerals, land use, recreation, and transportation resources. We have determined that the information presented in the following sections of the BLM FEIS is adequate for our analysis and we incorporate by reference Section 3.3, Geology, Geologic Hazards, and Minerals; Section 3.4, Land Use; Section 3.7, Recreation; Section 3.8.6, Community Infrastructure and Services; and Section 3.10, Transportation.

The BLM FEIS evaluated potential impacts on human health from operating wind turbines, including wind turbine syndrome, shadow flicker, and the looming effect , both for the CCSM Project and cumulatively. Section 3.15 of EA1 (found adequate and incorporated by reference) addressed potential noise and human health impacts beyond those addressed in the BLM FEIS. Additional site-specific analysis was completed in EA1 to account for potential blasting at the Road Rock Quarry and operational noise at the West Sinclair Rail Facility. EA2 included no additional analysis on noise and human health. Other resources with health and safety components were analyzed in EA1 and EA2, but the analysis did not identify any new health or safety concerns.

The SPODs completed for the CCSM Phase I Project and associated infrastructure components (determined adequate and incorporated by reference) included nearly identical health and safety sections, as well as a PCW-specific health and safety plan appendix. The health and safety plan included requirements on communication, vehicles, personal protective equipment, fire prevention, security, hazardous materials, and incident response. The health and safety section also referenced a spill prevention, control, and countermeasures plan, which addressed potential health and safety impacts of possible fuel and oil spills. The health and safety section indicated that the general contractor or operating entity would be required to develop a site safety policy and site health and safety plan, applicable to all work on the CCSM Phase I Project.

3.2.14.2 Conclusion of Impacts

The BLM FEIS determined that, with the set-back distances planned for wind turbines from residences and other sensitive receptors, no significant health impacts would occur. Construction activities would adversely affect public health from construction noise, but the impacts would be temporary. Locations of wind turbines compared to residences are sufficiently distant to not result in adverse health impacts. Public safety was addressed through consideration of exclusion areas from construction zones, thus minimizing impacts on human health and safety during construction. Also, the public health and safety plan

prepared for PCW employees and the future health and safety plans required by the general contractor or operating entity would help minimize health and safety impacts of the CCSM Phase I Project. Additional traffic during construction would increase the risk of vehicular accidents, but BMPs and mitigation measures would reduce transportation impacts.

We have determined the information to be adequate for our analysis and are incorporating by reference information about health and safety from the following documents:

- BLM FEIS – Section 3.16.5, found on page 3.16-4; Section 4.16, found on pages 4.16-1 through 4.16-7; and Section 5.16, found on pages 5-59 through 5-60
- BLM ROD – Appendix D, which includes the committed mitigation measures and BMPs for health and safety
- EA1 – Section 3.15, found on page 3-63; Section 4.2.15, found on pages 4-53 through 4-55; and Appendix B, page B-17
- EA2 – Appendix B

3.2.14.3 Justification for Not Evaluating Further in this EIS

We have reviewed all applicable documentation regarding the CCSM Phase I Project and this resource. The description and assessment of health and safety as they apply to various resources in the BLM NEPA documents have not changed appreciably since publication of these documents. No additional information regarding health and safety issues is necessary for us to consider issuing standard and programmatic ETPs. Health and safety are thus dismissed from further analysis in this EIS.

3.3 Water Resources

3.3.1 Approach

Water resources in the Phase I development and infrastructure areas are discussed because they provide habitat for special status species, migratory birds, and eagle prey species. The study area for water resources, shown in Figure 3-1, includes all 12-digit hydrologic unit code (HUC), also referred to as HUC-12, sub-watersheds that include a portion of the Phase I development and infrastructure areas. The U.S. Geological Survey (USGS) hydrologic unit maps divide and sub-divide the United States into successively smaller hydrologic units from the largest geographic area (regions) to the smallest geographic area (watersheds and sub-watersheds). Each hydrologic unit is identified by a unique HUC. Watershed boundaries are delineated at 8-digit, 10-digit, and 12-digit HUCs. The 12-digit HUC boundaries map the smallest geographic areas (sub-watersheds). Sub-watersheds typically have a drainage area of about 2 to 15 square miles, with boundaries that include the land area draining to a point at or below where a stream drains into another waterbody, such as another stream, river, or lake (USGS 2015).

For our analysis of water resources, we reviewed the BLM FEIS and ROD, EA1, and EA2. We also reviewed the SPODs for the Phase I development and infrastructure areas, public, agency, and tribal comments regarding water resources that were received during the scoping process and tribal consultation.

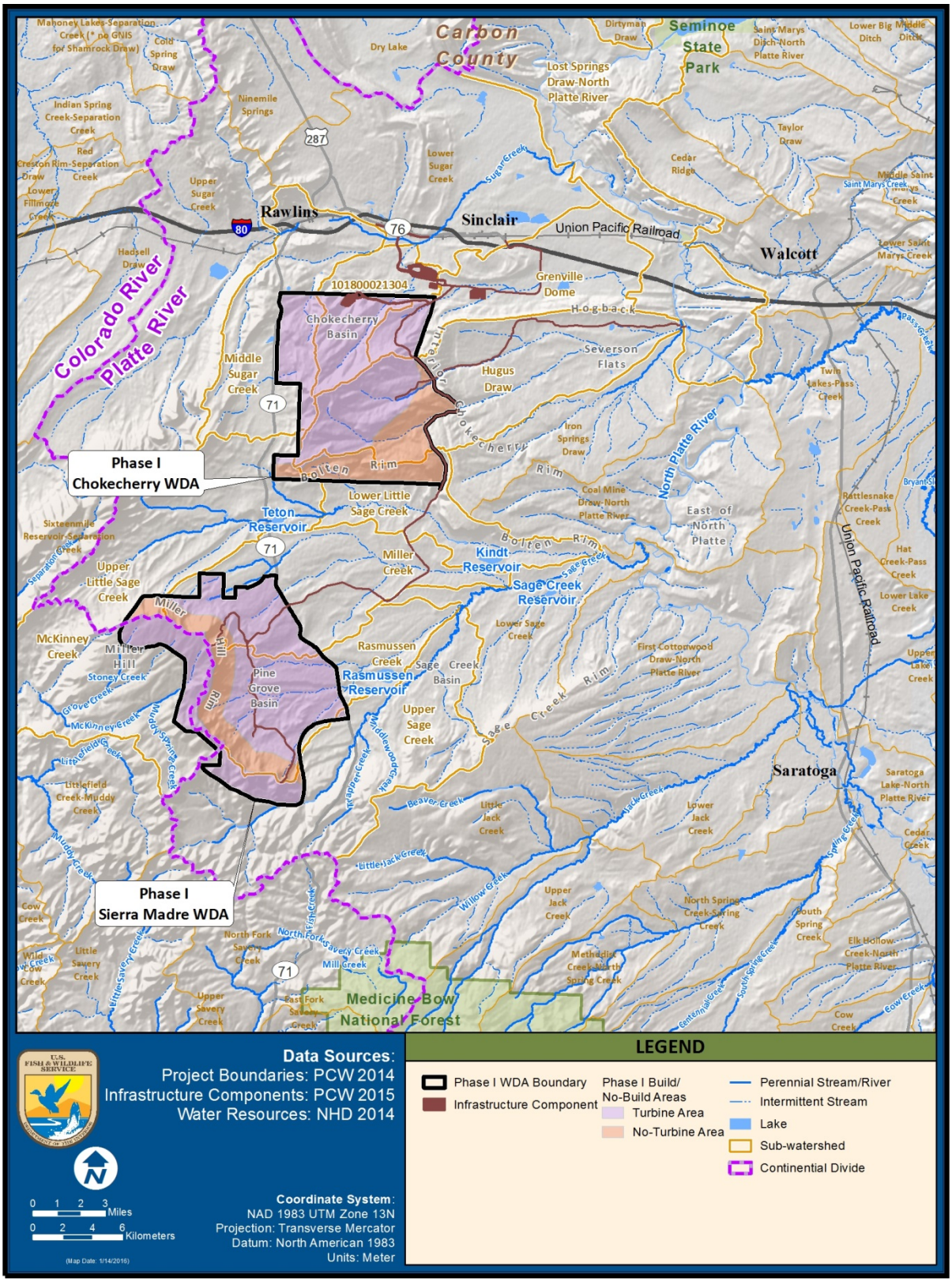

Figure 3-1. Water Resources in the Phase I Development and Infrastructure Areas for the CCSM Phase I Project in Wyoming

3.3.2 Affected Environment

We found that the water resources data in the BLM NEPA documents are adequate for our analysis and we are incorporating into this EIS by reference information about water resources from the following documents:

- BLM FEIS – Section 3.13, found on pages 3.13-1 through 3.13-12
- EA1 – Section 3.12, found on pages 3-39 through 3-41
- EA2 – Section 3.7

The description of water resources in the BLM NEPA documents has not changed substantially since publication of the documents. A summary of information on water resources from these documents, with updated information incorporated, is provided below.

3.3.2.1 Surface Water Resources

As described in the BLM FEIS, the Phase I development and infrastructure areas are located within the water resource regions of two major river systems: the Missouri River Region and the Upper Colorado River Region. All of the Phase I development area within the Phase I Chokecherry WDA, most of the Phase I development area within the Phase I Sierra Madre WDA, and most infrastructure components lie within the Missouri River Region. Only the westernmost portion of the Phase I Sierra Madre WDA is located within the Upper Colorado River Region.

The Phase I development and infrastructure areas are located within eleven HUC-12 sub-watersheds. Ten of these sub-watersheds drain either directly or indirectly to the Upper North Platte River (sub-basin), which drains to the North Platte River (basin and sub-region) and then the Missouri River. One sub-watershed, McKinney Creek, drains to the Upper Muddy Creek watershed and then the Little Snake River sub-basin, which drains to the White-Yampa River (basin and sub-region) and then to the Upper Colorado River.

There are several reservoirs in the general vicinity of the Phase I Chokecherry and Phase I Sierra Madre WDAs, but no reservoirs or lakes are identified within the Phase I development and infrastructure areas. Figure 3-1 provides a map of sub-watersheds that include portions of the study area and streams, rivers, lakes, and reservoirs within or in the vicinity of the Phase I development and infrastructure areas. Table 3-1 lists the sub-watersheds and their larger hydrologic units that are associated with the study area.

Table 3-1. Watersheds in the Water Resources Study Area for the CCSM Phase I Project in Wyoming

Region	Sub-region	Basin	Sub-basin	Watershed	Sub-watershed	HUC-12 Code
Missouri River	North Platte River	North Platte River	Upper North Platte River	Sage Creek	Upper Sage Creek-North Platte River	101800020901
					Rasmussen Creek	101800020902
					Miller Creek	101800020904
					Upper Little Sage Creek	101800020905
					Lower Little Sage Creek	101800020906
				North Platte River-Iron Springs Draw	North Platte River-Lost Springs Draw	101800021002
					Hugus Draw	101800021004
					Grenville Dome	101800021005
				Sugar Creek	Middle Sugar Creek	101800021302
					Unnamed	101800021304
Upper Colorado River	White-Yampa River	White-Yampa River	Little Snake River	Upper Muddy Creek	McKinney Creek	140500040102

Source: BLM 2012a.

As described in the BLM FEIS, snowfall from storms that occur from late fall to early spring is the principal source of precipitation in the study area. Convective thunderstorms that generally take place during late spring and early summer months also contribute precipitation. Snowmelt during the spring months either initiates or augments streamflow within most drainages. The timing of peak flows varies by drainage basin and typically occurs between late March and early June. Low flows typically occur during late summer, fall, and winter. Many smaller streams in the study area are generally dry during these periods (BLM 2012a).

3.3.2.2 Surface Water Quality

Section 303(c) of the Clean Water Act requires each state to review, establish, and revise water quality standards for all surface waters within the state. To comply with this requirement, Wyoming has developed a beneficial use classification system to describe state-designated uses. The BLM FEIS tabulated waterbodies within the FEIS analysis area that are named either in the National Hydrography Dataset or in the Wyoming Surface Water Classification List published by the Wyoming Department of Environmental Quality (WDEQ) in 2001. WDEQ updated the Wyoming Surface Water Classification List in 2013. A few waterbodies that were not classified when the BLM FEIS was written have been classified in the updated list. Otherwise, the updated list is consistent with waterbody classifications presented in the BLM FEIS. Four WDEQ surface water use classifications apply to waterbodies within sub-watersheds that include portions of the study area (WDEQ 2013):

- 2AB – Drinking water, game fish, non-game fish, fish consumption, other aquatic life, recreation, wildlife, agriculture, industry, and scenic value
- 2C – Non-game fish, fish consumption, other aquatic life, recreation, wildlife, agriculture, industry, and scenic value
- 3A – Other aquatic life, recreation, wildlife, agriculture, industry, and scenic value
- 3B – Other aquatic life, recreation, wildlife, agriculture, industry, and scenic value

Waterbodies within sub-watersheds that include portions of the study area provide habitat that supports aquatic life and wildlife. Some of these waterbodies support fish populations. Table 3-2 provides the flow regime and water quality classification of named waterbodies that are located within or near sub-watersheds that include a portion of the study area.

Table 3-2. Waterbodies Within or Near the Water Resources Study Area for the CCSM Phase I Project in Wyoming

Sub-Watershed	Waterbody	Flow Regime	State Water Quality Classification
Upper Sage Creek-North Platte River	Sage Creek	Perennial stream	2AB
	Middlewood Creek	Perennial stream	3B
	Trapper Creek	Perennial stream	2C
	Rawlins Reservoir	Perennial reservoir	2AB
	Adams Reservoir	Perennial reservoir	2AB
Rasmussen Creek	Rasmussen Creek	Ephemeral stream	3B
	Lone Tree Creek	Ephemeral stream	3B
	La Marsh Creek	Ephemeral stream	3B

Sub-Watershed	Waterbody	Flow Regime	State Water Quality Classification
Miller Creek	Deadman Creek	Ephemeral stream	3B
	Miller Creek	Perennial stream	2C
Upper Little Sage Creek	Emigrant Creek	Perennial stream	2C
	Little Sage Creek	Perennial stream	2C
	Pine Grove Creek	Ephemeral stream	2C
	Miller Hill Lake	Perennial lake or pond	2AB
	Little Sage Creek Dam	Perennial reservoir	Not classified
	Teton Reservoir	Perennial reservoir	2AB
Lower Little Sage Creek	Little Sage Creek	Ephemeral stream	2C
North Platte River-Lost Springs Draw	North Platte River	Perennial river	2AB
	Seminoe Reservoir	Perennial reservoir	2AB
Hugus Draw	Hugus Draw	Ephemeral stream	3B
	Smith Draw	Perennial stream	3B
Grenville Dome	No named waterbodies	NA	NA
Middle Sugar Creek	Coal Creek	Ephemeral stream	3B
	Sugar Creek	Perennial stream	3B
	Eightmile Lake	Perennial lake	3A
	Rawlins Peaking Reservoir	Perennial reservoir	Not classified
Unnamed (HUC 101800021304)	No named waterbodies	NA	NA
McKinney Creek	Eagle Creek	Ephemeral stream	3B
	Grove Creek	Perennial stream	2AB
	McKinney Creek	Perennial stream	2AB
	Muddy Spring Creek	Perennial stream	Not classified
	Stoney Creek	Perennial stream	2AB

Sources: BLM 2012a; WDEQ 2013.

Note:

[a] NA = Not Applicable

Section 303(d) of the Clean Water Act requires states to list all streams that do not meet their water use classifications and are therefore considered impaired streams. According to USEPA (2012), an impaired waterbody is one that does not attain water quality standards (that is, designated uses, numeric and narrative criteria, and anti-degradation requirements defined at 40 CFR 131).The BLM FEIS identified one waterbody near the study area that is listed by the State of Wyoming as a threatened stream. According to USEPA, a threatened waterbody is one that currently attains water quality standards, but for which existing and readily available data and information on adverse declining trends indicate that water quality standards will likely be exceeded by the time the next list is required to be submitted to USEPA (2012). The threatened stream near the study area is McKinney Creek, from its confluence with Muddy Creek upstream to Eagle Creek. This reach and other adjacent and downstream reaches within the Muddy Creek sub-basin were listed as threatened for their aquatic life and cold-water fish uses within and downstream of the Phase I Sierra Madre WDA boundary in the BLM FEIS, but all of these reaches are downstream of the Phase I development area. Grazing practices were identified as the source of its threatened status.

Two watershed improvement efforts have been implemented in watersheds that include portions of the study area: Upper Muddy Creek and Sage Creek. The Upper Muddy Creek watershed improvement project was implemented to improve the conditions of uplands, riparian areas, and waterways. According to Wyoming's 2012 and 2014 integrated 305(b) and 303(d) reports, the Upper Muddy Creek and McKinney Creek segments are no longer threatened and were removed from the 303(d) list in 2012 (WDEQ 2012, 2014).

Sage Creek borders the southeastern portions of the Phase I Sierra Madre WDA. This stream was listed in 1996 due to high sediment loads. Dam failures, road construction, and historic grazing practices were identified as contributors to increased erosion and sediment loading to Sage Creek. The Sage Creek watershed improvement project developed and implemented BMPs that include short duration grazing, riparian and snowdrift fencing, and improved road management. The Sage Creek watershed improvement project includes several sub-watersheds that include portions of the study area: Upper Sage Creek-North Platte River, Rasmussen Creek, Lower Sage Creek-Upper North Platte River, Miller Creek, Upper Little Sage Creek, and Lower Little Sage Creek. In 2008, Sage Creek was removed from the 303(d) list (WDEQ 2012, 2014).

3.3.2.3 Surface Water Use

As described in the BLM FEIS, the Wyoming State Engineer's Office manages water use in Wyoming. A water right appropriation consists of capturing, impounding, or diverting water from its natural course and applying it to a designated beneficial use. Water in the North Platte River basin has been fully appropriated, generally preventing development of new uses. Adjudicated (legally appropriated) water uses within and near the study area include diversions for reservoir supply, irrigation, domestic, miscellaneous, recreation, and fish propagation.

3.3.2.4 Floodplains

The Federal Emergency Management Agency (FEMA) develops Flood Insurance Rate Maps to delineate 100-year floodplains throughout the United States. Flood Insurance Rate Maps are not available for any portions of the Phase I development area or infrastructure areas, which means FEMA has not determined flood hazard for these areas. Communities in the vicinity (Rawlins, Sinclair, and Saratoga), the North Platte River, and a portion of Hugus Draw (extending approximately 2 miles upstream of its confluence with the North Platte River) have Flood Insurance Rate Maps that delineate 100-year floodplains for these areas (BLM 2012a).

3.3.2.5 Groundwater

As described in the BLM FEIS, no major alluvial aquifer systems are located near the study area, but depth to groundwater estimates indicate that localized alluvial aquifers exist in areas associated with many of the small drainages, including Little Sage Creek, McKinney Creek, Sage Creek, and Sugar Creek. Depth to initial groundwater across the study area is estimated as ranging from a minimum of under 10 feet along several of the watercourses to a maximum of 50 to 200 feet in the northwestern portion of the Phase I Chokecherry WDA.

Groundwater use in the State of Wyoming is managed by the Wyoming State Engineer's Office. Upper aquifers generally produce freshwater suitable for domestic and livestock use. The North Platte River basin has special conditions restricting new uses of water, including groundwater that is hydrologically connected to surface water.

3.3.3 Environmental Consequences

We have determined the information in the following documents to be adequate for our analysis and we are incorporating into this EIS by reference information about impacts on water resources from the following documents:

- BLM FEIS – Section 4.13, found on pages 4.13-1 through 4.13-24
- EA1 – Section 4.2.12, found on pages 4-41 through 4-45
- EA2 – Section 4.2.7

In addition to the impact analysis in the BLM's NEPA documents, we reviewed the SPODs, Eagle Conservation Plan (ECP), and scoping comments. These data form the basis of our analysis in this section, which uses the impact criteria described in Table 3-3 to evaluate the level of impact of the Proposed Action and alternatives on water resources.

Table 3-3. Impact Criteria for Water Resources for the CCSM Phase I Project in Wyoming

Impact Category	Intensity Type	Definition
Magnitude	Major	The action would substantially affect water resources in the study area. Adverse impacts would include any of the following: • Impacts on surface waters would affect a large portion of a major waterbody or watershed, substantially reducing the ability of these areas to support fish or bird use. • Water quality impacts would alter baseline water quality conditions and cause impairment of waters. • Surface water use from the action would limit existing aquatic life or adversely affect special status fish species. • Floodplains would be substantially altered to limited functionality. • Groundwater conditions would be noticeably affected, and hydrologic connectivity with surface waters or other habitat supported by shallow groundwater would be altered.
	Moderate	The action would measurably affect water resources in the study area. Adverse impacts would include any of the following: • Impacts on surface waters would affect a medium portion of a major waterbody or watershed (or sub-watershed), somewhat reducing the ability of these areas to support fish or bird use. • Water quality impacts would be detectable but would be at or below water quality standards and would not cause impairment of any waters. • Surface water use from the action would measurably affect aquatic life or special status fish species, but would not imperil any populations or species. • Floodplains would be measurably altered to somewhat reduced functionality. • Groundwater conditions would be measurably affected, but hydrologic connectivity with surface waters or other habitat supported by shallow groundwater would not be substantially altered.

Impact Category	Intensity Type	Definition
	Minor	The action could result in some change to water resources in the study area. Adverse impacts would include any of the following: • Impacts on surface waters would affect a small portion of a waterbody or sub-watershed that might slightly affect the ability of these localized areas to support fish or bird use. • Water quality impacts would be detectable but would be well below water quality standards and within desired water quality conditions. • Surface water use from the action would be small but measurable, and would not affect aquatic life or special status fish species. • Floodplain impacts could be measurable, but would be limited to minor and localized effects on floodplain functions. • Groundwater conditions could be measurably affected, but hydrologic connectivity with surface waters or other habitat supported by shallow groundwater would not be measurably affected.
	No effect	Any changes to waterbodies, watersheds, water quality, floodplains, or groundwater would not be measurable or perceptible and would have no consequence on water resources that provide habitat for special status species, migratory birds, or eagle prey species.
Duration	Long-term	30 years (proposed project duration)
	Medium-term	5 years (permit term)
	Temporary	Lasting for the duration of construction
Potential to occur	Probable	More likely than not to occur
	Possible	Potential to occur
	Unlikely	Not reasonably likely to occur
Geographic extent	Extensive	Within the two eagle management units (EMUs) and four Bird Conservation Regions (BCRs)
	Regional	Within the 140-mile radius of the local area population for golden eagles
	Local	Within 1 mile of Phase I development and infrastructure areas
	Limited	Within 300 feet of Phase I development and infrastructure areas

3.3.3.1 Summary Comparison of Alternatives

Based on our analysis of environmental consequences, discussed below, and using the evaluation criteria described in Table 3-3, we identified the following key differentiators for water resources among the alternatives:

- The No Build scenario under Alternative 4 (No Action: Denial of ETPs) would have the least adverse impacts on water resources, followed by Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project).
- Although the expected impacts of Alternative 1 (Proposed Action) and Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would have similar intensities, most impacts on water resources would be lower under Alternative 3 than under Alternative 1.
- Alternative 1 (Proposed Action) and the Build Without ETPs scenario under Alternative 4 (No Action: Denial of ETPs) would have similar impacts on water resources. Benefits to water resources would also be similar because conservation measures that would improve water resources are included with the Proposed Action and are not dependent on the ETPs.
- Alternative 2 (Proposed Action with Different Mitigation) would have impacts on and benefits to water resources that would be similar to Alternative 1 (Proposed Action), but different mitigation, such as decommissioning of older wind facilities or habitat enhancement, might provide additional benefits.

3.3.3.2 Alternative 1 – Proposed Action: Issue ETPs for Phase I Wind Turbine Development and Infrastructure Components

3.3.3.2.1 Construction

Surface Water Resources and Surface Water Quality

Under Alternative 1 (Proposed Action), soil compaction associated with construction would alter hydrologic processes (including infiltration and transport) and surface runoff patterns (collection, concentration, and conveyance). In addition, construction of the North Platte River Water Extraction Facility, part of the Phase I Haul Road and Facilities, could affect the North Platte River. This facility would be located outside the 100-year floodplain of the river, which would help reduce potential water quality impacts. Other minimization measures, including use of culverts and at-grade crossings, would help maintain drainage connectivity and sustain downstream flows. However, stream crossings along roads (via pipe culverts and at-grade low water crossings) would contribute to channel instability that could lead to side cutting into banks, modified channel configurations, and increased erosion. Including wetlands and perennial, intermittent, and ephemeral streams, a total of 128 road crossings of waterways would be included in construction of the CCSM Phase I Project. Modified channels could result in degradation of aquatic habitat and adjacent riparian zones. Erosion could affect surface water quality by increasing sediment loads, turbidity, salt runoff, or other constituents if present in the area. As stated in the BLM FEIS, Appendix C, ACM A-3-89, access roads would be located to minimize stream crossings and would be constructed to avoid decreasing channel stability or increasing water velocity. A Clean Water Act Section 404 Permit with Section 401 water quality certification would be required for project

impacts on waters of the United States under the jurisdiction of the U.S. Army Corps of Engineers (USACE), including streams, which would require mitigation to compensate for lost stream functions. Section 3.4 provides additional discussion on the Clean Water Act Section 404 Permit and Section 401 water quality certification and addresses expected impacts on and mitigation for wetlands and riparian zones.

Site modification from construction would increase the potential for upland erosion. Marston and Dolan (1988) concluded that slope and vegetation are typically the most important factors in determining upland erosion rates. They found that as vegetation density in an upland area decreases, the rate of erosion generally increases. Consequently, the amount of surface modification within a given watershed provides an indicator of the potential for increased erosion. Surface modification would be limited to the construction footprint for wind turbines and all associated infrastructure.

As described in Section 2.2.1.2.1, site preparation and modification during construction is categorized as initial clearing and grading, cutting or partial cutting of activity areas, or long-term modification. Initial clearing and grading is the total area that would be altered for construction of the CCSM Phase I Project and includes long-term modification. Initial clearing and grading areas would be reclaimed as construction is completed, while long-term modification areas (such as gravel pad areas and roads) would remain unvegetated after construction is complete and during operation of the CCSM Phase I Project. Activity areas are areas near the wind turbine sites where activities would not require ground alteration but may require cutting or partial cutting of vegetation higher than 1 foot. Table 3-4 summarizes impact areas associated with construction of the CCSM Phase I Project for each HUC-12 sub-watershed in the study area. Cutting or partial cutting of vegetation higher than 1 foot in activity areas would not affect surface water resources because these areas would not be graded and vegetation would not be completely removed.

Table 3-4. Initial Clearing and Grading and Long-Term Modification of HUC-12 Sub-Watersheds in the Phase I Development and Infrastructure Areas for the CCSM Phase I Project in Wyoming

Sub-Watershed	Sub-Watershed Total Area (acres)	Initial Clearing and Grading		Long-Term Modification	
		Area (acres)	Percent of Sub-Watershed (%)	Area (acres)	Percent of Sub-Watershed (%)
North Platte River Basin					
Upper Sage Creek - North Platte River	40,935	224	0.5	32	0.1
Rasmussen Creek	23,488	669	2.8	105	0.4
Miller Creek	28,571	587	2.1	129	0.5
Upper Little Sage Creek	30,732	2	<0.1	<1	<0.1
Lower Little Sage Creek	16,898	131	0.8	28	0.2

Sub-Watershed	Sub-Watershed Total Area (acres)	Initial Clearing and Grading		Long-Term Modification	
		Area (acres)	Percent of Sub-Watershed (%)	Area (acres)	Percent of Sub-Watershed (%)
Lower Little Sage Creek - Upper North Platte River	20,079	15	0.1	4	<0.1
North Platte River - Lost Springs Draw	47,020	1	<0.1	0	0.0
Hugus Draw	35,341	765	2.2	145	0.4
Grenville Dome	22,059	446	2.0	81	0.4
Middle Sugar Creek	24,897	252	1.0	35	0.1
Lower Sugar Creek	42,909	44	0.1	16	<0.1
Unnamed (HUC 101800021304)	11,042	892	8.1	204	1.8
White-Yampa River Basin					
McKinney Creek	30,433	436	1.4	71	0.2
Total	**374,404**	**4,465**	**1.2**	**850**	**0.2**

Sources: BLM 2014, 2016a.

Construction of the CCSM Phase I Project would initially alter 4,465 acres within 13 sub-watersheds, including the Sage Creek watershed improvement area (Rasmussen Creek, Miller Creek, Upper Little Sage Creek, Lower Little Sage Creek, and Lower Little Sage Creek-Upper North Platte River sub-watersheds) and the Upper Muddy Creek watershed improvement area (McKinney Creek sub-watershed). Long-term modification would occur across 850 acres, but this modification would not exceed 1.8 percent of any sub-watershed. Initial clearing and grading also would include a total of 1.4 acres of streams and open water.

Removal of vegetative cover associated with surface modification would increase erosion. PCW would implement reclamation techniques across 3,615 acres (area of initial clearing and grading minus long-term modification) as construction is completed. Erosion would decrease as vegetation becomes established. The BLM FEIS estimates that the erosion rate would approach pre-construction levels within 5 to 10 years of initiating reclamation. Gravel placement on turbine pad areas and infrastructure construction over altered areas would help decrease erosion in long-term modification areas, but roads and other features would continue to contribute to erosion.

Potential hazardous materials spills and leaks from construction equipment and infrastructure components could impact surface water quality. However, with implementation of a spill prevention, control, and countermeasure (SPCC) plan, no degradation to surface water

quality would be anticipated. This plan would include measures such as secondary containment at all onsite hazardous materials and waste storage facilities and would define procedures to be followed in the case of an accidental spill from a vehicle or equipment.

PCW has requested BLM approval to use magnesium chloride as an alternative to water for dust control. Several studies performed along roadways in Colorado where magnesium chloride has been used indicate that its use might increase the levels of magnesium and chloride in waterways depending on several factors, including application rates, road proximity to a waterway, and weather patterns. However, these studies show that the increases did not approach concentration limits implemented by WDEQ or USEPA in water quality classifications or drinking water secondary standards, respectively (Goodrich et al. 2009; Lewis 1999; Stevens 2001). PCW would implement a dust control plan that includes stipulations for application of commercial dust suppressants. Any commercial suppressants approved by the BLM (including magnesium chloride) would be applied in accordance with the manufacturer's specifications and would not be applied within 500 feet of perennial streams on federal lands. With implementation of the dust control plan, no measurable impacts on water quality from magnesium chloride are anticipated.

Several measures would help avoid, minimize, and mitigate potential impacts on surface water resources. Implementation of an environmental training program and an adaptive management process would help to reduce impacts and successfully reclaim altered areas. PCW has committed to follow site plans that include multiple BMPs, such as an environmental compliance plan, erosion control plan, storm water pollution prevention plan (SWPPP), dust control plan, SPCC plan, site-specific reclamation plan, and watershed monitoring plan. The watershed monitoring plan would include stream monitoring sites to provide data to quantify impacts of sedimentation and erosion from the CCSM Phase I Project on water quality and would continue through construction, operation, and decommissioning of the CCSM Phase I Project. Potential soil erosion would be controlled at culvert outlets with erosion control devices. Catch basins, roadway ditches, and culverts would be cleaned and maintained regularly. The SWPPP would describe site-specific erosion control and stream crossing measures that would be implemented during construction. PCW and the BLM would evaluate the effectiveness of the implemented erosion control measures to identify the need for any additional measures through adaptive management.

With implementation of avoidance, minimization, and mitigation measures, water quality impacts are not expected to contribute to impairment of beneficial uses of waterbodies. Nevertheless, a site-specific increase in erosion that would occur during construction and initial reclamation would not be completely avoided or mitigated, and lower levels of erosion related to long-term modification areas would persist.

Probable impacts on surface water quality related to erosion from construction in initial clearing and grading areas, including stream crossings, would constitute limited, moderate impacts of temporary to medium-term duration (see Table 3-3 for definitions of impact criteria). Impacts from erosion in the long-term modification areas are probable, and would be minor in magnitude, limited in extent, and long-term in duration (see Table 3-3). With implementation of BMPs, including an SPCC plan, potential impacts from hazardous materials spills and leaks and use of magnesium chloride during construction would possibly

result in detectable effects on water quality but would be unlikely to exceed water quality standards and would remain within desired water quality conditions. Hence, it is possible that hazardous material spills and leaks and the use of magnesium chloride could result in impacts on surface water quality that are minor in magnitude, limited in extent, temporary in duration (see Table 3-3).

Surface Water Use

Alternative 1 (Proposed Action) would use a combination of surface water, groundwater, and municipal water resources to meet the water demands for construction of the CCSM Phase I Project. Water would be used for dust control, and human use and consumption, and is expected to total 336 acre-feet for all construction associated with Phase I development and infrastructure and would not exceed 105 acre-feet in any given year (PCW 2014a, 2014b, 2014c, 2014d). The primary components of the water system for the CCSM Phase I Project would include seven water stations consisting of pipelines and filling stations with connections to available water sources. Wastewater would be treated by septic systems and potentially by the City of Rawlins through wastewater connections. Groundwater or water from municipal sources would be needed for construction of the North Platte River Water Extraction Facility and other components of the Phase I Haul Road and Facilities.

Existing water infrastructure, water rights, and municipal water supplies would be used when available, reducing potential surface water use. Water resources would be used in compliance with all applicable Wyoming State Engineer's Office rules and regulations. TOTCO owns numerous water rights within its ranch in excess of the amounts required for construction. These rights are generally approved for irrigation, domestic, and stock watering uses. The temporary or permanent change of these existing water rights for use by the CCSM Phase I Project has been negotiated with TOTCO. Additional options to meet water supply needs include purchasing bulk water and negotiating a water supply agreement with the City of Rawlins or the Town of Sinclair, or both.

Endangered Species Act Recovery Programs for the Upper Colorado River and the Platte River

We initiated the Upper Colorado River Endangered Fish Recovery Program on January 22, 1988. The recovery program was intended to be the reasonable and prudent alternative to avoid jeopardy of the endangered fish by depletions from the Upper Colorado River. Additionally, on June 16, 2006, we issued a programmatic biological opinion (PBO) for the Platte River Recovery Implementation Program and water-related activities affecting flow volume and timing in the central and lower reaches of the Platte River in Nebraska. The PBO established a two-tiered consultation process for future federal actions on existing and new water-related activities subject to Section 7(a)(2) of the ESA, with issuance of the PBO being Tier 1 and all subsequent site-specific project analyses constituting Tier 2 consultations covered by the PBO (USFWS 2006).

On September 5, 2012, we issued a final biological opinion (BO) regarding the effects of the CCSM Project as assessed in the BLM FEIS on species included in the Upper Colorado River Endangered Fish Recovery Program and the Platte River Recovery Implementation Program (USFWS 2012c). This final BO was presented in the BLM ROD in Appendix F and

is considered a Tier 2 BO to the PBO. The final BO considers downstream impacts of the CCSM Project on the endangered bonytail chub (*Gila elegans*), Colorado pikeminnow (*Ptychocheilus lucius*), humpback chub (*Gila cypha*), razorback sucker (*Xyrauchen texanus*), and whooping crane (*Grus americana*), including their critical habitat, and the endangered interior least tern (*Sterna antillarum*), pallid sturgeon (*Scaphirhyncus albus*), and western prairie fringed orchid (*Platanthera praeclara*), and the threatened piping plover (*Charadrius melodus*). Special status plant species are discussed further in Section 3.4.2.4, special status fish species are discussed further in Section 3.5.2.2, and special status bird species are discussed further in Section 3.7.2.3.

In our final BO, we concurred that the CCSM Project *may affect* and is *likely to adversely affect* the four federally endangered fishes of the Upper Colorado River basin and their designated critical habitat due solely to the associated 0.33 acre-foot average annual water depletion originally attributed to the 30-year life of the proposed project. However, we concluded that the recovery program for endangered fish species in the Upper Colorado River basin adequately addresses effects on the species, and no additional conservation measures are needed to reduce impacts from the CCSM Project. Similarly, we concurred with BLM's *likely to adversely affect* determinations for Platte River species and critical habitat. We also determined that the CCSM Project is a component of "the continued operation of existing and certain new water-related activities" (USFWS 2012c) and is consistent with the scope and the determination of effects in the Tier 1 PBO (USFWS 2006). Because PCW elected to participate in the Platte River Recovery Implementation Program, compliance with the ESA for flow-related effects on federally listed endangered and threatened species and designated critical habitat from the CCSM Project is provided to the extent described in the Tier 1 PBO.

In our final BO, we concluded that the CCSM Project is consistent with the Tier 1 PBO for effects on listed species and critical habitat addressed in the Tier 1 PBO, and that the CCSM Project is not likely to jeopardize the continued existence of the endangered whooping crane, interior least tern, pallid sturgeon, and western prairie fringed orchid, or the threatened northern Great Plains population of the piping plover, in the central and lower Platte River. We determined that the CCSM Project is also not likely to destroy or adversely modify designated critical habitat for the whooping crane (USFWS 2012c).

Our final BO for the CCSM Project allows a maximum depletion of up to 600 acre-feet of consumptive use during construction, but only up to 200 acre-feet within a given year. No more than 1.99 acre-feet of water used per year may be from the Colorado River basin with the remainder coming from the Platte River system (USFWS 2012c). As described above, proposed water consumption during construction of the CCSM Phase I Project would not exceed these thresholds. According to the Phase I SPODs, no surface water depletions would occur within the Colorado River basin. Groundwater use from existing, permitted sources would occur within the Colorado River basin, but these are accounted for as existing system depletions in the BO. Additional discussion of the impacts of surface water use associated with construction of the CCSM Phase I Project on ESA-listed fish species is included in Section 3.5.3.2.1.

Summary of Surface Water Use

PCW would use a combination of water from the surface water, groundwater, and municipal water. PCW would not exceed the maximum water depletions considered in our final BO. While our BO includes withdrawals from the Colorado River, PCW does not propose to directly withdraw surface water from the Colorado River basin, but withdraw hydrologically connected groundwater to the Colorado River basin, as part of the CCSM Phase I Project. Groundwater use would be from existing water rights and as such is already accounted for as an existing depletion. Water use would primarily be for dust control, with some water used for compaction and concrete batching during construction. PCW estimates that water demands may be reduced by as much as 30 percent by using magnesium chloride for dust control, if approval is granted from the BLM.

While several BMPs would help protect water quality, most BMPs would have no effect on the amount of surface water use. Minimization measures to reduce the amount of surface modification, and the proposed use of magnesium chloride for dust control would reduce water requirements for construction.

In summary, surface water use associated with construction of the CCSM Phase I Project would involve pumping surface water and ground water from the North Platte River system and groundwater from the Colorado River system. The amount of water use from this source would be limited annually and in total by existing water rights and the consultation amount in our final BO (USFWS 2012c). It is probable that surface water use for construction would result in impacts on the Platte River system (as it applies to ESA recovery programs) that are minor in magnitude, temporary in duration, and occur over an extensive area (see Table 3-3 for definitions of impact criteria).

Floodplains

The North Platte River Water Extraction Facility would be constructed outside of and immediately adjacent to the North Platte River floodplain. The facility would consist of a submersible pump and concrete wet well adjacent to the North Platte River. The wet well would be connected to the river by a 24-inch-diameter intake pipe with a check valve. No permanent infrastructure components would be located within FEMA-designated 100-year floodplains. Therefore, construction under Alternative 1 (Proposed Action) would have no effect on FEMA-designated floodplains.

FEMA-designated floodplains have not been delineated for many streams in the Phase I development and infrastructure areas, but the extent of stream boundaries delineated by PCW includes their active floodplains. Active floodplains of most intermittent and ephemeral streams and some perennial streams are located within the banks of stream channels. Riparian zones and wetlands associated with some streams generally indicate the extent of regular floodplain activity. Surface modification in these areas would affect floodplain functions such as flood water storage and filtration, erosion control, and supporting riparian habitat. Stream crossings would contribute to channel instability that could lead to side cutting into banks, which would degrade floodplain functions. Minimization measures and BMPs described above for surface waters would help reduce potential channel instability and

erosion. Section 3.4 addresses expected impacts on wetlands and riparian zones. Probable impacts on floodplains from construction in initial clearing and grading areas, including stream crossings, would constitute impacts that are minor in magnitude, limited in extent, and temporary to medium-term in duration (see Table 3-3 for definitions of impact criteria). Impacts on floodplains are probable and would be minor in magnitude, limited in extent and long-term in duration (see Table 3-3).

Groundwater

Outside of the immediate vicinity of streams in the Phase I development and infrastructure areas, estimated depths from the ground surface to initial groundwater range from 10 to 200 feet. Potential degradation of groundwater quality from hazardous material spills and leaks would likely be avoided through implementation of an SPCC plan. In consideration of the high elevation of the proposed turbine sites (relative to the surrounding landscape) and the shallow excavation depth required for installation of turbines, no disruption of or water quality effects on groundwater resources from construction under Alternative 1 (Proposed Action) are expected.

As described under Surface Water Use, a combination of surface water, groundwater, and municipal water resources would be used to meet the water demands of construction of the CCSM Phase I Project. No adverse impacts from groundwater use for construction under Alternative 1 (Proposed Action) are expected. PCW would make use of existing water resources and infrastructure by using existing water rights in compliance with all applicable Wyoming State Engineer's Office rules and regulations.

Summary of Construction Impacts under Alternative 1

Under Alternative 1 (Proposed Action), construction of the CCSM Phase I Project would result in the following impacts on water resources (see Table 3-3 for definitions of impact criteria):

- Surface modification and stream crossings would alter hydrologic processes and increase erosion and stream channel instability, resulting in probable, limited, moderate, temporary to medium-term impacts and probable, limited, minor, long-term impacts on surface water quality from construction in initial clearing and grading and long-term modification areas, respectively.
- Potential hazardous materials spills and leaks and use of magnesium chloride could result in possible, limited, minor, temporary impacts on surface water quality in the study area.
- Surface water use would have a probable, extensive, minor, temporary impact on the Platte River system as it applies to ESA recovery programs.
- Surface modification and stream crossings would have probable limited, minor, temporary to medium-term impacts and probable limited, minor, long-term impacts on floodplain functions from construction in initial clearing and grading and long-term modification areas, respectively.

- No disruption of or water quality effects on groundwater resources and no adverse impacts from groundwater use for construction under Alternative 1 (Proposed Action) are expected.

3.3.3.2.2 Operation

Surface Water Resources and Surface Water Quality

Operation under Alternative 1 (Proposed Action) would include regular inspections and maintenance of turbines, the electrical system, roads, drainage features, and other infrastructure components. Road use and maintenance could contribute to increased erosion and channel instability at stream crossings, but ground alteration associated with these activities would not extend beyond long-term modification areas. Increased erosion and channel instability would result in probable, limited, minor, long-term impacts on surface water quality (see Table 3-3 for definitions of impact criteria). PCW would continue to implement BMPs during operation, including a SWPPP to monitor and maintain site-specific erosion control and stream crossing measures, and to identify the need for any additional measures through adaptive management.

Potential hazardous materials spills and leaks from operation and maintenance equipment and use of magnesium chloride for dust control could result in possible, limited, minor, temporary impacts on surface water quality (see Table 3-3 for definitions of impact criteria). PCW would continue to implement an SPCC plan to contain hazardous materials and respond to accidental spills. No degradation of surface water quality from hazardous materials is expected.

PCW would employ several conservation measures as part of its sage-grouse conservation plan. Conservation measures such as wind conservation easements, suspension of hunting, and relic agricultural field enhancements would have no effect on surface water resources. However, beneficial impacts would result from other conservation measures. Depending on the conservation measure, these probable beneficial impacts would be regional, minor to moderate, and long-term (see Table 3-3 for definitions of impact criteria). Land management commitments to conserve or enhance aquatic habitat, and mesic habitat improvement projects associated with greater sage-grouse conservation would likely improve surface water resources within the study area and regionally as habitat for migratory birds and eagle prey species. The magnitude of these beneficial effects is somewhat uncertain pending further development and implementation of site-specific plans and potential variability of restoration success at different sites.

Retrofitting high-risk power poles for compensatory mitigation would not likely affect surface water resources. Construction activities associated with this mitigation measure would likely cause erosion in limited areas, but implementation of BMPs described under Alternative 1 (Proposed Action) would help prevent sedimentation from entering waterways. Similarly, implementation of the SPCC plan would protect waters from potential hazardous materials spills and leaks from construction equipment.

Surface Water Use

Because we expected municipal water sources would be used during operation, water use from the Platte River system during operation was not included in our BO. If PCW is unable to obtain the necessary volume from municipal water sources, and Platte River surface water withdrawals would be needed for operation, PCW would need to submit an application to the Wyoming State Engineer's Office, and subsequent ESA consultation would be required to evaluate the impacts of long-term water consumption on the western prairie fringed orchid. The specific effects of water consumption would be evaluated during consultation.

Less than 50 acre-feet of water per year would be used during operation. Dust generated from roads due to vehicular traffic associated with operation and maintenance activities would be controlled with water and, if approved by BLM, magnesium chloride. Most conservation measures would not impact surface water use, but land management commitments to conserve or enhance aquatic habitat and mesic habitat improvements associated with greater sage-grouse conservation could potentially use surface water. It is unlikely that these measures would result in adverse effects on surface water use because site-specific plans could likely be developed that would avoid depletions to the Platte River system or the Colorado River system. If surface water were to be used for operation of the CCSM Phase I Project, the impact on the Platte River system as it applies to ESA recovery programs would need to be evaluated during ESA consultation.

Retrofitting high-risk power poles for compensatory mitigation would not affect surface water use.

Floodplains

Operation would not occur in any FEMA-designated floodplains. Increased erosion and channel instability would result in probable limited, minor, long-term impacts on floodplain functions (see Table 3-3 for definitions of impact criteria). Pending further development and implementation of site-specific plans, conservation measures including land management commitments to conserve or enhance aquatic habitat and mesic habitat improvements associated with greater sage-grouse conservation could improve floodplain function of select streams.

Retrofitting high-risk power poles for compensatory mitigation is unlikely to affect floodplains.

Groundwater

No impacts on groundwater resources from operation activities are anticipated. Operation would not disrupt groundwater resources or affect groundwater quality because it would not include excavation in any new areas, and contamination would be avoided through implementation of an SPCC plan. Limited groundwater use would occur under existing water rights. Pending further development and implementation of site-specific plans, mesic habitat improvements associated with conservation measures could use groundwater, but would likely occur under existing water rights and would not adversely impact groundwater resources.

Retrofitting high-risk power poles for compensatory mitigation would not affect groundwater.

Summary of Operation Impacts under Alternative 1

Under Alternative 1 (Proposed Action), operation of the CCSM Phase I Project would result in the following impacts on water resources (see Table 3-3 for definitions of impact criteria):

- Increase in erosion and channel instability associated with operation and maintenance activities would result in probable, limited, minor, long-term impacts on surface water quality.
- Potential hazardous materials spills and leaks and use of magnesium chloride could result in possible limited, minor, temporary impacts on surface water quality in the study area.
- Surface water use would have a probable, extensive, minor, long-term impact on the Platte River system as it applies to ESA recovery programs. ESA consultation would be required for surface water use.
- Increase in erosion and channel instability associated with operation and maintenance activities would result in probable, limited, minor, long-term impacts on floodplain functions.
- No impacts on groundwater resources from operation activities are anticipated.

3.3.3.3 Alternative 2 – Proposed Action with Different Mitigation

3.3.3.3.1 Construction

Under Alternative 2 (Proposed Action with Different Mitigation), the Phase I Chokecherry and Phase I Sierra Madre WDAs would be developed as proposed by PCW, but the compensatory mitigation for eagle take would be different from that described in PCW's ETP application. Construction impacts on water resources would be consistent with those described under Alternative 1 (Proposed Action) in Section 3.3.3.2.1.

3.3.3.3.2 Operation

Under Alternative 2 (Proposed Action with Different Mitigation), operation impacts described under Alternative 1 (Proposed Action) in Section 3.3.3.2.2 would be mitigated by one or more options, as discussed in Section 2.2.2.1. Carcass removal, carcass avoidance, and rehabilitation of injured eagles would not affect water resources. Lead abatement would be unlikely to measurably affect water quality because lead has not been identified as a water quality concern in the study area or surrounding areas. A wind conservation easement would be unlikely to affect water resources because it would protect land from future wind energy development, but it would not necessarily protect these resources from other land uses.

Mitigation of older wind facilities may or may not affect water resources. Measures such as curtailing operations or upgrading equipment would not affect water resources, but decommissioning of older wind facilities could be beneficial to water resources depending on whether roads and water crossing structures are removed and rehabilitated. Decommissioning

would likely benefit surface water quality and would potentially improve other stream functions if it results in revegetating slopes or areas near water bodies (including ephemeral streams) or includes naturalizing segments of stream channels through removing crossing structures.

Habitat enhancement measures such as improving uplands without increasing vegetation cover to reduce erosion would not likely affect water resources. However, habitat enhancement measures that measurably increase vegetation cover at a watershed scale, such as restoring altered or burned areas with desirable vegetation, would provide long-term benefits to surface water resources by reducing erosion and sedimentation. Similarly, habitat enhancement measures that directly improve aquatic habitats, such as stream, lakes, riparian, or mesic habitat improvement measures, would provide long-term benefits to surface water resources by improving floodplain functions through enhancing or expanding mesic and riparian habitats near waterways. Depending on the location, extent, and scale, habitat enhancement measures could have probable local to regional, minor to moderate, long-term beneficial effects on water resources (see Table 3-3 for definitions of impact criteria).

3.3.3.3.3 Summary of Construction and Operation Impacts under Alternative 2

Construction and operation under Alternative 2 (Proposed Action with Different Mitigation) would have the same impacts as described under Alternative 1 (Proposed Action) in Sections 3.3.3.2.1 and 3.3.3.2.2. However, mitigation would be different and could result in the following benefits to water resources (see Table 3-3 for definitions of impact criteria):

- Lead abatement, carcass removal, carcass avoidance, wind conservation easements, and rehabilitation of injured eagles would not affect water resources.
- Mitigating older wind facilities by curtailing operations or upgrading equipment would not affect water resources.
- Decommissioning of older wind facilities could be beneficial to water resources depending on whether roads and water crossing structures are removed and rehabilitated.
- Habitat enhancement would result in probable local to regional, minor to moderate, long-term beneficial effects on water resources.

3.3.3.4 Alternative 3 – Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project

3.3.3.4.1 Construction

Under Alternative 3, only the Phase I Sierra Madre WDA and the infrastructure components would be developed as proposed by PCW. Construction under Alternative 3 would result in impacts on water resources as described under Alternative 1 (Proposed Action) in Section 3.3.3.2.1, except impacts associated with construction of the Phase I Chokecherry WDA would not occur.

Surface Water Resources and Surface Water Quality

Under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), construction would result in temporary to long-term impacts on surface water resources that would be similar to those described under Alternative 1 (Proposed Action), but overall, fewer surface waters would be impacted because the Phase I Chokecherry WDA would not be constructed. Construction under Alternative 3 would involve 101 road crossings of waterways, including wetlands and perennial, intermittent, and ephemeral streams. Initial clearing and grading areas would total about 3,262 acres, which is about 1,203 acres less than under Alternative 1. Long-term modification areas would total about 658 acres, which is about 192 acres less than under Alternative 1. Apart from surface modification limited to infrastructure areas, construction impacts would not occur in sub-watersheds that intersect Phase I of the Chokecherry WDA. Surface modification in the Sage Creek watershed improvement area and the Upper Muddy Creek watershed improvement area would be the same as under Alternative 1.

The effects of avoidance and minimization efforts, permit stipulations related to construction, and mitigation measures on water resources would be similar to the effects described under Alternative 1 (Proposed Action) in Section 3.3.3.2.1, but would be proportionate to the reduced development area under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project). PCW would potentially use magnesium chloride as an alternative to water for dust control. With implementation of BMPs, including an SPCC plan, potential impacts from hazardous materials spills and leaks and use of magnesium chloride during construction would possibly result in detectable effects on water quality but would likely be below water quality exceedance standards and within desired water quality conditions.

Overall, impacts on surface water resources would be similar to those described under Alternative 1 (Proposed Action), but impacts from surface modification would be about 27 percent less under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project). Probable impacts on surface water quality related to erosion from construction in initial clearing and grading areas, including stream crossings, would constitute limited, moderate impacts of temporary to medium-term duration (see Table 3-3 for definitions of impact criteria). Probable, limited, minor, long-term impacts would occur from erosion in long-term modification areas (see Table 3-3). Potential hazardous materials spills and leaks and use of magnesium chloride could result in possible, limited, minor, temporary impacts on surface water quality within the Phase I Sierra Madre WDA and infrastructure area (see Table 3-3).

Surface Water Use

As under Alternative 1 (Proposed Action), PCW would use a combination of surface water, groundwater, and municipal water resources to meet the water demands for construction of the CCSM Phase I Project under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project). Surface water use would involve pumping water from the North Platte River. Existing water resources, infrastructure, water rights, and municipal water supplies would be used when available, reducing potential surface water use. Minimization

measures to reduce the amount of surface modification and the proposed use of magnesium chloride for dust control would reduce water requirements for construction. The amount of surface water use would be less than under Alternative 1. That is, expected surface water use during construction would not exceed 336 acre-feet total. Surface water use would be limited annually and in total by existing water rights and the consultation amount in our final BO (USFWS 2012c). Because construction under Alternative 3 would require less water, impacts from surface water use would be less than under Alternative 1, but would still result in probable, extensive, minor, temporary impacts on the Platte River system as it applies to ESA recovery programs (see Table 3-3 for definitions of impact criteria). More information on impacts from construction of Alternative 3 on ESA-listed fish is provided in Section 3.5.3.4.1.

Floodplains

Under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), infrastructure components, including the North Platte River Water Extraction Facility, would be the same as under Alternative 1 (Proposed Action). No permanent infrastructure components would be located within FEMA-designated 100-year floodplains. Therefore, construction under Alternative 3 would have no effect on FEMA-designated floodplains.

Stream crossings would contribute to channel instability that could lead to side cutting into banks, which would degrade floodplain functions. Probable impacts on floodplains from construction in initial clearing and grading areas, including stream crossings, would constitute limited, minor, temporary to medium-term impacts (see Table 3-3 for definitions of impact criteria). Probable, limited, minor, long-term impacts would occur in long-term modification areas (see Table 3-3). Overall, these impacts would be less than under Alternative 1 (Proposed Action) because under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), 27 fewer waterways would be crossed.

Groundwater

As under Alternative 1 (Proposed Action), no disruption of or water quality effects on groundwater resources and no adverse impacts from groundwater use for construction under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) are expected. PCW would make use of existing water resources and infrastructure by using existing water rights in compliance with all applicable Wyoming State Engineer’s Office rules and regulations.

Summary of Construction Impacts under Alternative 3

Under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), construction of Phase I of the Sierra Madre WDA and infrastructure components would result in the following impacts on water resources (see Table 3-3 for definitions of impact criteria):

- Surface modification and stream crossings would alter hydrologic processes and increase erosion and stream channel instability, resulting in probable, limited, moderate, temporary to medium-term impacts on surface water quality from construction in initial clearing and grading. Probable, limited, minor, long-term impacts are expected on surface water quality from construction in long-term modification areas. Under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), these impacts would be reduced from those associated with Alternative 1 (Proposed Action) because surface modification would be about 27 percent less and there would be 27 fewer road crossings of waterways.
- Potential hazardous materials spills and leaks and use of magnesium chloride could result in possible, limited, minor, temporary impacts on surface water quality. The likelihood and potential extent of these impacts would be less than under Alternative 1 (Proposed Action) because construction of the Phase I Chokecherry WDA would not occur.
- Surface water use would have probable, extensive, minor, temporary impacts on the Platte River system as it applies to ESA recovery programs, but anticipated use would be less than under Alternative 1 (Proposed Action).
- Surface modification and stream crossings would have probable, limited, minor, temporary to medium-term impacts and probable, limited, minor, long-term impacts on floodplain functions from construction in initial clearing and grading and long-term modification areas, respectively. Overall, these impacts would be less than under Alternative 1 (Proposed Action) because under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), 27 fewer waterways would be crossed.
- No disruption of or water quality effects on groundwater resources and no adverse impacts from groundwater use for construction under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) are expected.

3.3.3.4.2 Operation

Under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), operation impacts would be the same as those described under Alternative 1 (Proposed Action) in Section 3.3.3.2.1 except impacts associated with operation in the Phase I Chokecherry WDA would not occur.

Surface Water Resources and Surface Water Quality

Road use and maintenance could contribute to localized increased erosion and channel instability at stream crossings within the Phase I Sierra Madre WDA and infrastructure areas, but impacts associated with these activities would not extend beyond long-term modification areas. Increased erosion and channel instability would result in probable, limited, minor, long-term impacts on surface water quality and floodplain functions (see Table 3-3 for definitions of impact criteria). PCW would continue to implement BMPs during operation, including a SWPPP to monitor and maintain site-specific erosion control and stream crossing measures, and to identify the need for any additional measures through adaptive management.

Potential hazardous materials spills and leaks from operation and maintenance equipment and use of magnesium chloride for dust control could result in possible, limited, minor, temporary impacts on surface water quality (see Table 3-3 for definitions of impact criteria), similar to under Alternative 1 (Proposed Action), but would be limited to the Phase I Sierra Madre WDA and infrastructure areas. PCW would continue to implement an SPCC plan to contain hazardous materials and respond to accidental spills.

Surface Water Use

Under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), surface water use during operation would be similar to that under Alternative 1 (Proposed Action), but overall water requirements for dust control would be less than under Alternative 1 in proportion to the reduced operation area. PCW is hoping to avoid the use of surface water during operation by using municipal water sources. As described under Alternative 1, use of surface water from the Platte River for operation would require ESA consultation, and the specific effects of water consumption would be evaluated during consultation.

Floodplains

Operation would not occur in any FEMA-designated floodplains. Increased erosion and channel instability would result in probable, limited, minor, long-term impacts on floodplain functions (see Table 3-3 for definitions of impact criteria).

Groundwater

No impacts on groundwater resources from operation activities are anticipated. Operation would not disrupt groundwater resources or impact groundwater quality because it would not include excavation in any new areas, and contamination would be avoided through implementation of an SPCC plan. Limited groundwater use (less than under Alternative 1 [Proposed Action]) would occur under existing water rights.

Conservation Measures

Conservation measures included in PCW’s sage-grouse conservation plan such as land management commitments to conserve or enhance aquatic habitat and mesic habitat improvements associated with greater sage-grouse conservation would improve water resources within the study area and regionally. These measures would possibly result in regional, minor to moderate, long-term beneficial effects on surface waters (see Table 3-3 for definitions of impact criteria). However, conservation measures would be reduced in amount from Alternative 1 (Proposed Action) relative to overall surface modification, so the benefit to water resources would be less than under Alternative 1.

Retrofitting high-risk power poles for compensatory mitigation would not likely affect surface water resources.

Summary of Operation Impacts under Alternative 3

Under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), operation of Phase I of the Sierra Madre WDA and infrastructure components would result in the following impacts on water resources (see Table 3-3 for definitions of impact criteria):

- Localized increase in erosion and channel instability associated with operation and maintenance activities would result in probable, limited, minor, long-term impacts on surface water quality, but these impacts would be less than under Alternative 1 (Proposed Action).
- Potential hazardous materials spills and leaks and use of magnesium chloride could result in possible, limited, minor, temporary impacts on surface water quality in the study area.
- PCW is hoping to avoid surface water use during operation. ESA consultation would be required for surface water use during operation. The specific effects of water consumption would be evaluated during consultation.
- Localized increase in erosion and channel instability associated with operation and maintenance activities would result in probable, limited, minor, long-term impacts on floodplain functions, but these impacts would be less than under Alternative 1 (Proposed Action).
- No impacts on groundwater resources from operation activities are anticipated.
- Certain conservation measures would possibly result in regional, minor to moderate, long-term beneficial effects on water resources. These potential benefits would be similar to those under Alternative 1 (Proposed Action), but would likely be reduced in proportion to the reduced impacts under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project).

3.3.3.5 Alternative 4 – No Action: Denial of ETPs

Under Alternative 4 (No Action: Denial of ETPs), standard and programmatic ETPs would not be issued because the permits would be denied or because the permit applications would be withdrawn. If no ETPs are issued for the CCSM Phase I Project, PCW may decide not to build the proposed project or may decide to move forward with the proposed project without ETPs.

3.3.3.5.1 No Build

If PCW decides not to build the CCSM Phase I Project, no direct or indirect impacts would occur on water resources from construction or operation of the CCSM Phase I Project. Conservation measures in PCW's sage-grouse conservation plan would not be implemented, so no beneficial effects on water resources would occur from these measures.

3.3.3.5.2 Build Without ETPs

If PCW decides to move forward with the CCSM Phase I Project without ETPs, we assume that the company would construct and operate the proposed project as outlined in its SPODs

and as permitted by the BLM. However, we assume that none of the measures described in the ETP applications and the ECP (see Attachment A) and as outlined in Section 2.2.1.4 would be implemented, including experimental advanced conservation practices (EACPs), monitoring, adaptive management, and compensatory mitigation. In addition, stipulations we would include with the ETPs would not be implemented. Constructing and operating the CCSM Phase I Project without standard and programmatic ETPs would result in all of the adverse impacts described under Alternative 1 (Proposed Action) in Section 3.3.3.2.2. Several BMPs and measures described in the weed management plan and site-specific reclamation plans would still be implemented and a Clean Water Act Section 404 permit would still be required, so impacts on water resources would be similar to those described under Alternative 1 (Proposed Action).

Conservation measures that would benefit vegetation and wetlands would still be implemented by PCW as part of its sage-grouse conservation plan, as required by the BLM. Mesic habitat improvements associated with greater sage-grouse conservation would provide probable, minor to moderate, long-term benefits to water resources within the study area and regionally (see Table 3-3 for definitions of impact criteria).

3.3.3.6 Summary of Impacts under Each Alternative

Impacts on water resources from construction and operation of the CCSM Phase I Project would be as follows:

- **Alternative 1 (Proposed Action) –** Surface water quality and floodplains would be impacted by construction activities and by maintenance activities during operation. Surface waters of the Platte River system would also be affected by water withdrawals during construction; water withdrawals would comply with stipulations outlined during ESA consultation. If water withdrawals were needed during operation, separate ESA consultation would be required.
- **Alternative 2 (Proposed Action with Different Mitigation) –** Impacts would be similar to those under Alternative 1. Compensatory mitigation would be different under Alternative 2, which would result in different levels of impacts and benefits for water resources depending on the compensatory mitigation option selected (see Table 3-5).
- **Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) –** Impacts would be similar to those under Alternatives 1 and 2, but most impacts would be reduced under Alternative 3 because the number of wind turbines would be reduced.
- **Alternative 4 (No Action: Denial of ETPs)**
    - The No Build scenario would result in no impacts on water resources.
    - The Build Without ETPs scenario would result in impacts similar to those under Alternatives 1, 2, and 3 if PCW decides to move forward with the proposed project without ETPs.

Table 3-5 compares potential compensatory mitigation under Alternative 1 (Proposed Action) and Alternative 2 (Proposed Action with Different Mitigation); see Table 3-3 for definitions of impact criteria.

Table 3-5. Comparison of Compensatory Mitigation Measures for Water Resources for the CCSM Phase I Project in Wyoming

Compensatory Mitigation Measure	Effects on Water Quality
Power pole retrofits	No effect on water resources.
Mitigation of existing wind facilities	Decommissioning of older wind facilities could be beneficial to water resources depending on whether roads and water crossing structures are removed and rehabilitated. Curtailing operations or upgrading equipment would have no effect on water resources.
Lead abatement	No effect on water resources.
Carcass removal and carcass avoidance	No effect on water resources.
Wind conservation easement	No effect on water resources.
Habitat enhancement	Benefits to water resources would be minor to moderate, long-term, probable, and local to regional depending on the types and landscape distribution of enhancements.
Rehabilitation of injured eagles	No effect on water resources.

3.4 Vegetation and Wetlands

3.4.1 Approach

Vegetation and wetlands within the Phase I development and infrastructure areas are discussed because they provide habitat for special status species, migratory birds, eagles, and eagle prey species. This section also discusses noxious weeds and invasive plants because these species, if introduced in a favorable environment, can out-compete native species, resulting in changes to plant communities. Changes in plant communities can affect wildlife distributions and populations at a local level, which can, in turn, affect eagles.

For our analysis of vegetation and wetlands, we reviewed the BLM FEIS and ROD, EA1, EA2, and the SPODs for the Phase I development and infrastructure areas. We also reviewed public, agency, and tribal comments regarding vegetation and wetlands that were received during the scoping process and tribal consultation.

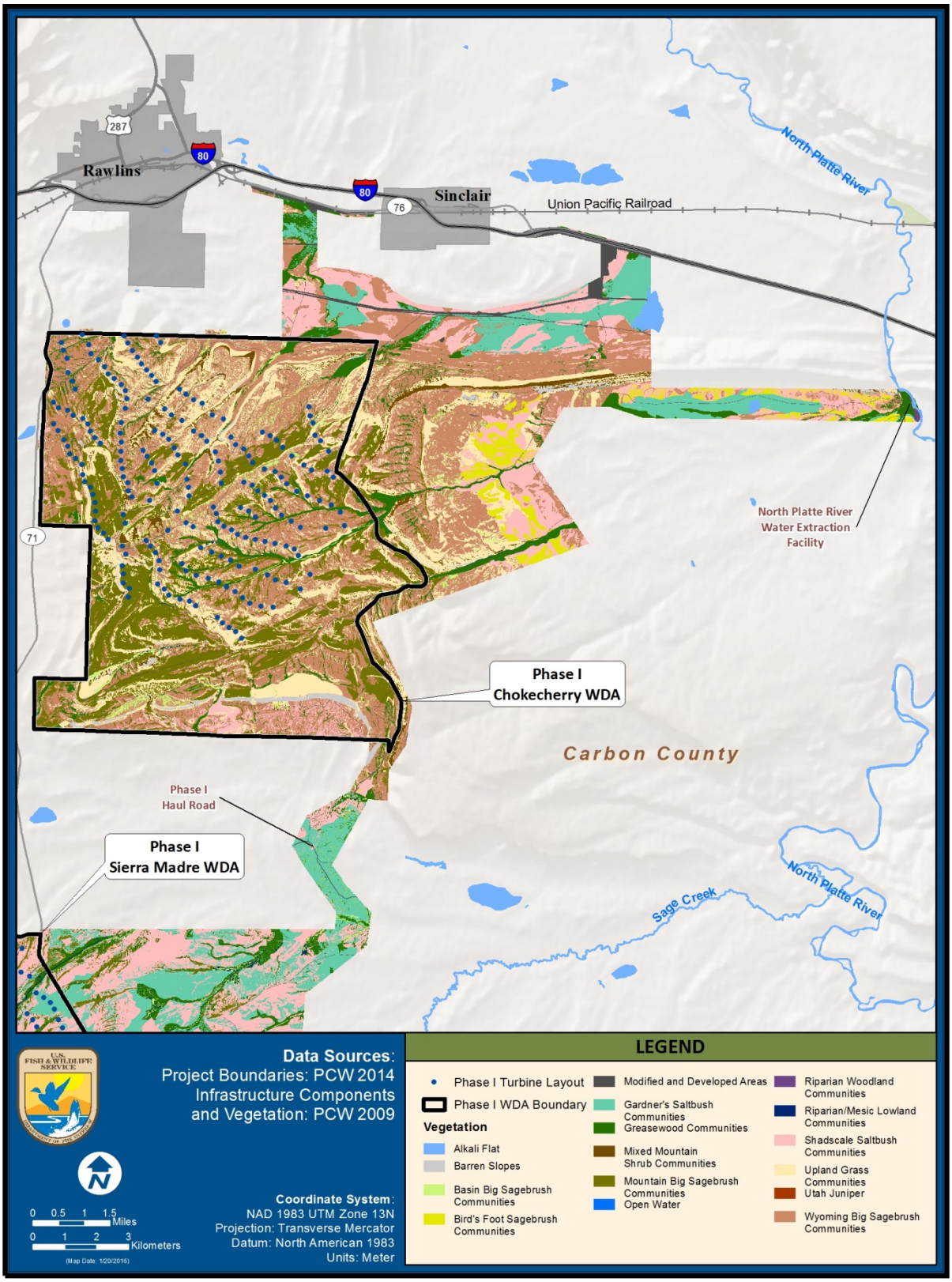

Figure 3-2. Vegetation Communities in the Phase I Chokecherry Wind Development Area and Infrastructure Areas for the CCSM Phase I Project in Wyoming

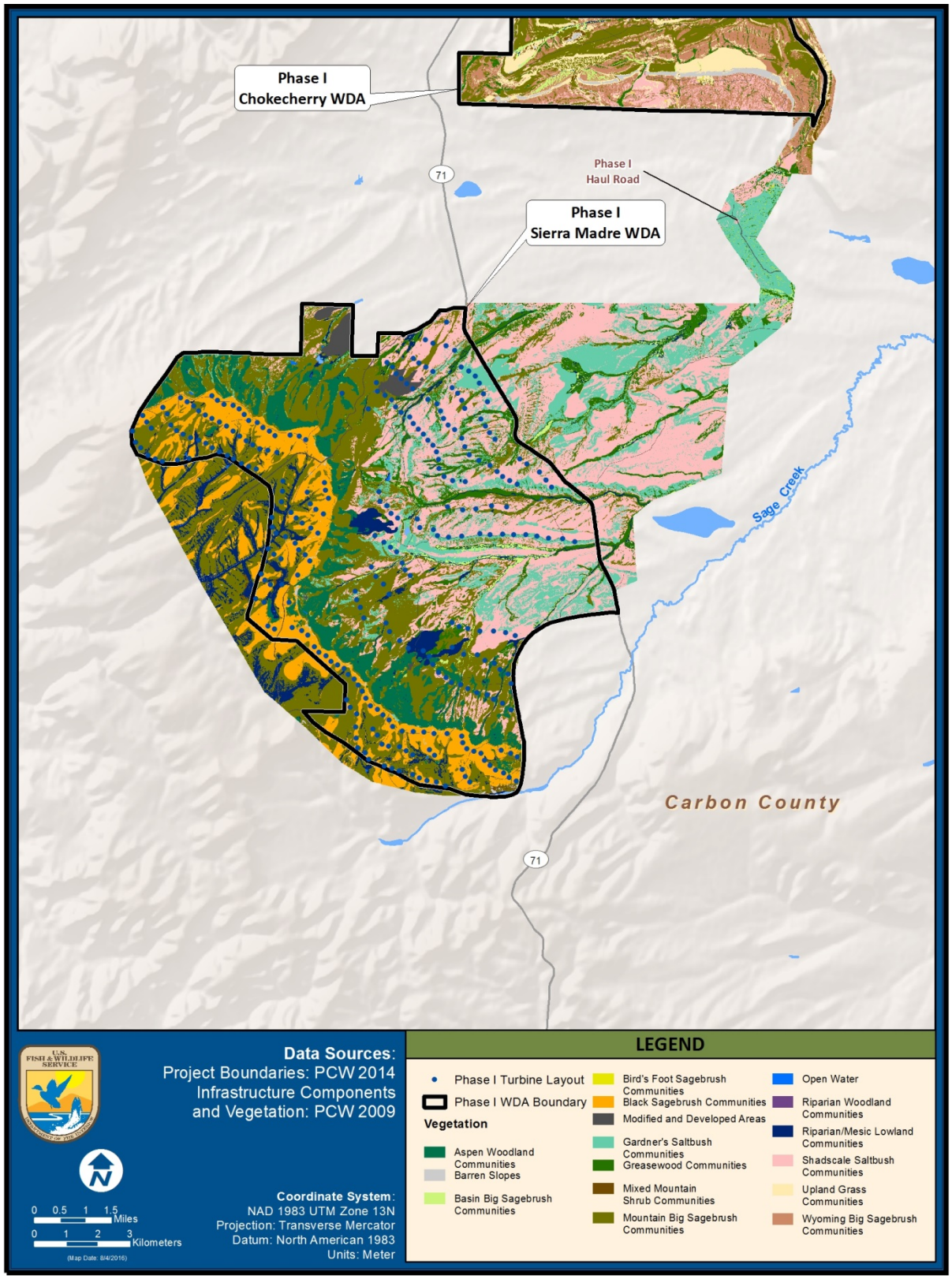

Figure 3-3. Vegetation Communities in the Phase I Sierra Madre Wind Development Area and Infrastructure Areas for the CCSM Phase I Project in Wyoming

3.4.2 Affected Environment

We have found the vegetation and wetlands data in the BLM NEPA documents to be largely adequate for our analysis. We are incorporating into this EIS, by reference, information about vegetation and wetlands from the following documents:

- BLM FEIS – Section 3.11, found on pages 3.11-1 through 3.11-18; and Section 3.15, found on pages 3.15-1 through 3.15-20
- EA1 – Section 3.10, found on pages 3-29 through 3-38; and Section 3.14, found on pages 3-46 through 3-63
- EA2 – Section 3.6 and Section 3.9

The description of vegetation, wetlands, and special status plant species in the BLM NEPA documents has not changed substantially since publication of the documents. A summary of information on vegetation and wetlands from these documents is provided below, along with information on USFWS special status species.

3.4.2.1 Vegetation Communities

As described in the BLM FEIS, the Phase I development and infrastructure areas lie within three ecoregions based on USEPA Level IV mapping: rolling sagebrush steppe, salt desert shrub basins, and foothill shrublands. An ecoregion, or ecological region, is an area within which ecosystems (and the type, quality, and quantity of environmental resources) are generally similar. A majority of both the Phase I Chokecherry and Phase I Sierra Madre WDAs is rolling sagebrush steppe. The northeast portion of the Phase I Chokecherry WDA is salt desert shrub basins, while the southwest portion of the Phase I Sierra Madre WDA is foothill shrublands. After the BLM FEIS was published, PCW conducted field surveys to refine the descriptions and maps of vegetation communities within the Phase I development and infrastructure areas. The results of these surveys are summarized in EA1, Section 3.10, and EA2, Section 3.6. Additional details are provided in site-specific reclamation plans, included in each of the SPODs for Phase I development and infrastructure areas as Appendix L.

Figures 3-2 and 3-3 provide mapping by vegetation type within the Chokecherry and Sierra Madre WDAs and infrastructure areas. Most vegetation in the mapped area is comprised of shrubland communities, including sagebrush, saltbush, and other shrub communities. A small proportion of the mapped area is forested, including aspen woodland communities, riparian woodland communities, and portions of riparian/mesic lowland communities (that is, areas along the bank of a river or stream that have a moderate or well-balanced supply of moisture). In addition, a small proportion of the mapped area is comprised of modified and developed areas. Brief descriptions of each of the major vegetation communities found in the Phase I development and infrastructure areas are provided in the following paragraphs.

Wyoming big sagebrush is the most common vegetative community within the Phase I development and infrastructure areas. It is found primarily throughout the Phase I Chokecherry WDA (Figures 3-2 and 3-3). For the purposes of mapping vegetation for the CCSM Project, Wyoming big sagebrush was mapped below 7,000 feet in elevation.

Wyoming big sagebrush is a subspecies of big sagebrush (*Artemisia tridentata*) and is closely related to mountain big sagebrush which overlaps in range and elevation. Hybridization with mountain big sagebrush is known to occur. Wyoming big sagebrush plants can grow to 0.9 meters tall and exhibits main stems which branch from the ground (NRCS 2006). Wyoming big sagebrush is a crucial food source for greater sage-grouse (Howard 1999). Numerous other sagebrush obligates are dependent on this vegetation community for survival, including a number of important eagle prey species.

Mountain big sagebrush is the second most common vegetation community within the Phase I development and infrastructure areas. It is a sub-type of Wyoming big sagebrush. This vegetation community generally inhabits elevations from 2,600 feet to 10,000 feet and grows on moderately deep, well-drained soils with high amounts of clay (NRCS 2006). This community is found in the higher elevations and steep slopes of both WDAs (Figures 3-2 and 3-3). The most common species in this community is mountain big sagebrush, a subspecies of big sagebrush (BLM 2012a). A wide variety of grasses and shrubs form the understory of this community. Along with Wyoming big sagebrush, this vegetation community is a critical component of the sagebrush steppe ecosystem which provides habitat for greater sage-grouse, numerous sagebrush obligate species, and the eagles which prey upon them.

When combined, the two saltbush (*Atriplex* spp.) communities (that is, shadscale saltbush and Gardner's saltbush) form the most common vegetation community in the Phase I development and infrastructure areas. Both saltbush communities are almost entirely found within the Phase I Sierra Madre WDA and are nearly absent from the Phase I Chokecherry WDA (Figures 3-2 and 3-3). Shadscale grows in dense clumps in alkaline soils on plains and hills (U.S. Department of Agriculture, Forest Service 1988). Often, the majority of the land surface is bare soil. Saltbush communities general range from 4,500 to 6,000 feet in elevation (Wyoming Geographic Information Science Center 2016). Shadscale is an important forage species for livestock (BLM 2012a).

The upland grass vegetation community is relatively uncommon in the Phase I development and infrastructure areas and is generally found interspersed between the big sagebrush communities throughout the Phase I Chokecherry WDA and northern parts of the Haul Road (Figures 3-2 and 3-3). Upland grasses generally include the understory grasses of the big sagebrush communities, such as wheatgrass (*Elymus* spp.), bluegrass (*Poa* spp.), and fescue (*Festuca idahoensis* or *Leucopa kingii*) as well as some sedges (BLM 2012a).

Black sagebrush is also fairly common in the Phase I development and infrastructure areas, but less so than the big sagebrush communities. This vegetation community is found almost exclusively along Miller Hill Rim in the Phase I Sierra Madre WDA adjacent to the Wyoming big sagebrush communities (Figures 3-2 and 3-3). This community is found within a narrow elevation band between 7,500 and 8,200 feet (Wyoming Geographic Information Science Center 2016). The black sagebrush community is heavily browsed by ungulates and provides cover for small mammals and birds (NRCS 2006).

Greasewood is relatively uncommon in the Phase I development and infrastructure areas. It is primarily found along ephemeral and intermittent drainages in both the Phase I Chokecherry and Phase I Sierra Madre WDAs (Figures 3-2 and 3-3). In Wyoming, this community is

generally found from 4,500 to 8,500 feet in elevation (Wyoming Geographic Information Science Center 2016). Greasewood has been known to grow up to 10 feet in height, but in the Phase I development and infrastructure areas it is generally from 3 to 5 feet tall. Greasewood communities exhibit low understory diversity, but could include various species of sagebrush, saltbush, and grasses or forbs (BLM 2012a). The tall canopy of the greasewood community makes it an ideal location for small mammals and birds to find cover and protection (NRCS 2006).

Riparian and mesic lowland vegetation communities are fairly uncommon in the Phase I development and infrastructure areas and primarily found within the Sierra Madre WDA and along the Haul Road (Figures 3-2 and 3-3). Common shrub species associated with the riparian and mesic lowland community include various species of willow (*Salix* spp.), shrubby cinquefoil (*Pentaphylloides floribunda*), river birch (*Betula occidentalis*), wild rose (*Rosa woodsii*), and golden currant (*Ribes aureum*). Various grasses and sedges that are tolerant of wet conditions are also common in the understory of this community. Riparian areas are disproportionately important to many wildlife species and this community provides important forage to a variety of eagle prey species.

Other less common vegetation communities found in the Phase I development and infrastructure areas include aspen woodlands, basin big sagebrush, mixed mountain shrub, bird's foot sagebrush, and riparian woodlands. Aspen woodlands are found on the north and east slope of Miller Hill Rim in the Phase I Sierra Madre WDA (Figure 3-3) and generally are found above 6,000 feet in elevation (Wyoming Geographic Information Science Center 2016). This community is generally located within the wind turbine exclusion area and therefore would not experience substantial direct impacts. Basin big sagebrush, mixed mountain shrub, and Bird's foot sagebrush are generally associated with the more common big sagebrush communities and form narrow bands of transitional vegetation zones on the periphery of these more dominant communities (Figures 3-2 and 3-3). Riparian woodlands account for less than one acre of the Phase I development and infrastructure areas and consist of narrowleaf cottonwood (*Populus angustifolia*), box elder (*Acer negundo*) and wild plum (*Prunus* sp.) (NRCS 2006). Within the mapped area, this vegetation community is found only in the vicinity of the North Platte River Water Extraction Facility (Figure 3-2).

3.4.2.2 Wetlands and Riparian Zones

The wetland and riparian areas within the Phase I development and infrastructure areas are pertinent to our analysis because these areas are habitat for migratory birds and eagle prey species. As shown in Figures 3-2 and 3-3, a small proportion of the mapped vegetation consists of riparian/mesic lowland vegetation communities, which include wetlands and riparian areas. These communities occur along streambeds, open water, drainage terraces, washes, draws, flats and plains formed of alluvium (that is, a deposit of clay, silt, sand, and gravel left by flowing streams), floodplains, and hillslopes. Riparian/lowland assemblages within the study area include meadow foxtail communities, willow/herbaceous wetland communities, willow communities, wet fresh meadow communities, and basin wildrye communities.

The BLM FEIS provides the results of a desktop analysis to identify the location and type of wetlands and associated riparian zones in the Phase I development and infrastructure areas. Subsequently, PCW conducted a wetland delineation within the Phase I development and infrastructure areas. A wetland delineation is a field survey conducted to determine whether an area qualifies as a wetland and to identify the wetland boundaries. The vegetation, soils, and hydrologic characteristics of the area are used to classify the area as wetland or upland. PCW delineated a total of 60.6 acres of wetlands within the riparian/mesic lowland and riparian woodland vegetation communities within and adjacent to the Phase I development and infrastructure areas. Delineated wetlands were classified as riverine palustrine emergent and scrub-shrub wetlands. Riverine palustrine emergent wetlands are marshes adjacent to rivers and streams that are dominated by grasses and grass-like plants such as sedges, rushes, and cattails. Scrub-shrub wetlands are areas dominated by woody vegetation less than 6 meters (20 feet) tall. The species include true shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions. Delineation results for CCSM Phase I Project are detailed in each of the SPODs in Appendix K and are summarized in EA1, Section 3.10, and EA2, Section 3.6.

3.4.2.3 Noxious Weeds and Invasive Plant Species

The BLM FEIS provides information on noxious weeds and invasive plant species that had been previously documented within and near the Phase I development and infrastructure areas. Subsequently, PCW conducted surveys for noxious weeds and invasive plant species within the Phase I development and infrastructure area plus a minimum 100-foot buffer. The results of these surveys are summarized in EA1, Section 3.10, and EA2, Section 3.6. Detailed information is provided in each of the SPODs for Phase I development and infrastructure areas in Appendix J.

During these surveys, no additional species were observed that were not previously documented in the BLM FEIS. A few species included in the BLM FEIS were not observed during these surveys. Table 3-6 lists noxious weeds and invasive plant species potentially occurring in the Phase I development and infrastructure areas.

Table 3-6. Noxious Weeds and Invasive Plant Species Potentially Occurring in the Phase I Development and Infrastructure Areas for the CCSM Phase I Project in Wyoming[a]

Common Name	Scientific Name	CCSM Phase I Development Area[b]	CCSM Infrastructure Area[b]
Wyoming Weed and Pest Control Council[c] Designated Noxious Weeds			
Canada thistle	*Cirsium arvense*	Yes	Phase I Haul Road and Facilities, Road Rock Quarry
Common burdock	*Arctium minus*	Not documented	Not documented
Common tansy	*Tanacetum vulgare*	Not documented	Not documented
Dalmatian toadflax	*Linaria dalmatica*	Not documented	Not documented
Diffuse knapweed	*Centaurea diffusa*	Not documented	Not documented
Field bindweed	*Convolvulus arvensis*	Not documented	Not documented
Hoary cress (whitetop)	*Cardaria draba*	Not documented	Phase I Haul Road and Facilities
Houndstongue	*Cynoglossum officinale*	Not documented	Not documented
Leafy spurge	*Euphorbia esula*	Not documented	Phase I Haul Road and Facilities
Musk thistle	*Carduus nutans*	Yes	Phase I Haul Road and Facilities
Oxeye daisy	*Leucanthemum vulgare*	Not documented	Not documented
Perennial pepperweed	*Lepidium latifolium*	Not documented	Phase I Haul Road and Facilities, West Sinclair Rail Facility
Perennial sowthistle	*Sonchus arvensis*	Not documented	Not documented
Quackgrass	*Elymus repens*	Not documented	Not documented
Russian knapweed	*Acroptilon repens*	Yes	Phase I Haul Road and Facilities, West Sinclair Rail Facility
Russian olive	*Elaeagnus angustifolia*	Not documented	Not documented
Saltcedar (tamarisk)	*Tamarix* spp.	Not documented	Not documented
Spotted knapweed	*Centaurea stoebe* ssp. *Micranthos*	Not documented	Not documented
Yellow toadflax	*Linaria vulgaris*	Not documented	Not documented

Common Name	Scientific Name	CCSM Phase I Development Area[b]	CCSM Infrastructure Area[b]
Other Invasive BLM Species of Concern			
Black henbane	*Hyoscyamus niger*	Not documented	Not documented
Cheatgrass	*Bromus tectorum*	Yes	Phase I Haul Road and Facilities, West Sinclair Rail Facility, Road Rock Quarry
Common cocklebur	*Xanthium strumarium*	Not documented	Not documented
Halogeton	*Halogeton glomeratus*	Yes	Phase I Haul Road and Facilities, West Sinclair Rail Facility

Sources: BLM 2014, 2016a.

Notes:

[a] This table includes plant species designated as noxious by the Wyoming Weed and Pest Control Council that have been documented but not eradicated in Carbon County, and invasive species of concern identified by BLM that occur in or adjacent to the Phase I development and infrastructure areas.

[b] Surveys for noxious weeds and invasive species took place within Phase I development and infrastructure areas plus a minimum 100-foot buffer. Therefore, it is possible that species that were not documented during these surveys occur elsewhere in the vicinity.

[c] The Wyoming Weed and Pest Control Council was established under the State of Wyoming's Weed and Pest Control Act. The council designates and declares noxious weeds and pests, and invasive species in the State of Wyoming.

3.4.2.4 Special Status Plant Species

The BLM FEIS, EA1, and EA2 provide information on ESA-listed species and BLM sensitive species. Information from surveys for ESA-listed and BLM sensitive species is summarized in the BLM FEIS, Section 3.15; EA1, Section 3.14; and EA2, Section 3.9.

PCW conducted surveys for rare plants within the Phase I development and infrastructure areas plus a minimum 100-foot buffer. No individuals or populations of ESA listed or candidate plant species were identified during the rare plant surveys. Table 3-7 summarizes the special status plant species evaluated for the CCSM Phase I Project.

Table 3-7. Special Status Plant Species Potentially Occurring in the Phase I Development and Infrastructure Areas for the CCSM Phase I Project in Wyoming

Common Name	Scientific Name	Status	Habitat Requirements	Occurrence or Habitat in Phase I Development and Infrastructure Areas
Colorado butterfly plant	*Gaura neomexicana* ssp. *coloradensis*	Threatened	Sub-irrigated, alluvial soils on level or slightly sloping floodplains and drainage bottoms; elevations of 5,000 to 6,400 feet above mean sea level	No individuals or populations were identified through species-specific surveys conducted in 2008 that covered development and infrastructure areas in the Sierra Madre WDA and portions of development and infrastructure areas in the Chokecherry WDA. During the 2012–2014 growing season, PCW conducted habitat assessments within the Phase I development and infrastructure areas plus a minimum 100-foot buffer and determined that these areas did not contain any suitable habitat.
Ute ladies'-tresses orchid	*Spiranthes diluvialis*	Threatened	Adapted to early to mid-succession, moist to wet conditions, where competition for light, space, water, and other resources is normally kept low by periodic or recent habitat altering events; elevations of 4,200 to 7,000 feet above mean sea level	No individuals or populations were identified through species-specific surveys conducted in 2008 within the Phase I development and infrastructure areas. During the 2012–2014 growing season, PCW conducted habitat assessments within the Phase I development and infrastructure areas plus a minimum 100-foot buffer and

Common Name	Scientific Name	Status	Habitat Requirements	Occurrence or Habitat in Phase I Development and Infrastructure Areas
				determined that these areas did not contain any suitable habitat.
Western prairie fringed orchid	*Platanthera praeclara*	Threatened	Wet mesic sub-irrigated prairies and sedge meadows along the floodplain of the Platte River	This species does not occur in or near the Phase I development and infrastructure areas, but was evaluated for potential indirect effects on the Platte River system.
Blowout Penstemon	*Penstemon haydenii*	Endangered	Known range in Wyoming consists of the Ferris Dunes area in northwest Carbon County where it occurs on steep, northwest-facing slopes of active sand dunes with less than 5 percent vegetation cover and north-facing sandy slopes on the sheltered side of active blowouts (crater-like depression) with 25 to 40 percent vegetative cover. Known populations in Wyoming are found between 6,680 to 7,440 feet above mean sea level.	The known range for this species, including a designated Area of Influence, is outside the project vicinity, in northwest Carbon County.

Sources: PCW 2014a, 2014b, 2014c, 2014d; USFWS 2015b.

3.4.2.5 Climate Change

As discussed in the BLM FEIS, Section 5.1.2, if climate change results in a warmer and drier climate, the spatial ranges of cool season plant species are predicted to move north, and extinction of endemic special status plant species may be accelerated. A warmer and drier climate may result in shifts in the distribution and composition of plant communities, intensified water stress, increased spread of non-native species, and reduction in wetlands

and riparian areas (National Fish, Wildlife and Plants Climate Adaptation Strategy 2012). Within the Phase I development and infrastructure areas, climate change could result in the following changes to vegetation:

- Reduction in the amount of land cover of aspen woodland communities, riparian/lowland communities, and mixed mountain shrub communities
- Increase in non-native species abundance and infestations
- Reduction in species vigor and overall vegetative biomass

3.4.3 Environmental Consequences

We have determined that the information is adequate for our analysis and we are incorporating into this EIS by reference information about impacts on vegetation and wetlands from the following documents:

- BLM FEIS – Section 4.11, found on pages 4.11-1 through 4.11-37; and Section 4.15, found on pages 4.15-1 through 4.15-37
- EA1 – Section 4.2.10, found on pages 4-25 through 4-29; and Section 4.2.14, found on pages 4-47 through 4-56
- EA2 – Section 4.2.6 and Section 4.2.9

In addition to the impact analysis in the BLM's NEPA documents, we reviewed the SPODs, ECP, and scoping comments. These data form the basis of our analysis in this section, which uses the impact criteria described in Table 3-8 to evaluate the level of impact of the Proposed Action and alternatives on vegetation and wetlands.

Table 3-8. Impact Criteria for Vegetation and Wetlands for the CCSM Phase I Project in Wyoming

Impact Category	Intensity Type	Definition
Magnitude	Major	The action would noticeably change the amount or condition of vegetation or wetlands in the study area. Adverse impacts would result in a large reduction in acreage or extensive degradation of vegetation types and wetlands that provide habitat for special status species, migratory birds, or eagle prey species. Major degradation would include a proliferation of noxious weeds or invasive plants across large areas. Major adverse impacts would also include the following: • Loss of any populations or subpopulations of special status plant species or their designated critical habitat • Measurable unmitigated consequences to wetlands Major beneficial impacts would result in a large increase or enhancement of vegetation types and

Impact Category	Intensity Type	Definition
		wetlands that provide habitat for special status species, migratory birds, or eagle prey species.
	Moderate	The action would result in some change to the amount or condition of vegetation or wetlands. Adverse impacts would result in a measurable but modest reduction in acreage or degradation of vegetation types and wetlands that provide habitat for special status species, migratory birds, or eagle prey species. Moderate adverse impacts would also include the following: • Measureable but moderate adverse consequence to populations or subpopulations of special status plant species • Readily apparent effects on wetlands over a small area that would have a moderate effect on habitat for special status species, migratory birds, or eagle prey species Beneficial impacts would result in a moderate increase or enhancement of vegetation types and wetlands that provide habitat for special status species, migratory birds, or eagle prey species.
	Minor	The action could result in some change to the amount or condition of vegetation or wetlands. Adverse impacts would result in a measurable but small reduction in acreage or degradation of vegetation types and wetlands that provide habitat for special status species, migratory birds, or eagle prey species. Minor adverse impacts would also include the following: • Measureable but small adverse consequence to special status plant species • Minor impacts on wetlands that would have a limited effect on habitat for special status species, migratory birds, or eagle prey species Beneficial impacts would result in a slight increase or enhancement of vegetation types and wetlands that provide habitat for special status species, migratory birds, or eagle prey species.
	No effect	Any change to vegetation or wetlands would not be measurable or perceptible and would have no consequence on habitat for special status species, migratory birds, or eagle prey species.

Impact Category	Intensity Type	Definition
Duration	Long-term	30 years (proposed project duration)
	Medium-term	5 years (permit term)
	Temporary	Lasting for the duration of construction
Potential to occur	Probable	Not avoidable
	Possible	Potential to occur (may be able to mitigate)
	Unlikely	Not reasonably likely to occur
Geographic extent	Extensive	Within the two EMUs and four BCRs
	Regional	Within the 140-mile radius of the local area population for golden eagles
	Local	Within 1 mile of Phase I development and infrastructure areas
	Limited	Within 300 feet of Phase I development and infrastructure areas

3.4.3.1 Summary Comparison of Alternatives

Based on our analysis of environmental consequences, discussed below, and using the evaluation criteria described in Table 3-8, we identified the following key differentiators for vegetation and wetlands among the alternatives:

- The No Build scenario under Alternative 4 (No Action: Denial of ETPs) would have the least adverse impacts on vegetation and wetlands, followed by Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project).
- Although the expected impacts of Alternative 1 (Proposed Action) and Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would have similar intensities, most impacts on vegetation and wetlands would be lower under Alternative 3 than under Alternative 1.
- Alternative 1 (Proposed Action) and the Build Without ETPs scenario under Alternative 4 (No Action: Denial of ETPs) would have similar impacts on vegetation and wetlands. Benefits to vegetation and wetlands would also be similar because conservation measures that would improve vegetation and wetlands are included with the Proposed Action and are not dependent on the ETPs.
- Alternative 2 (Proposed Action with Different Mitigation) would have impacts on and benefits to vegetation and wetlands that would be similar to Alternative 1 (Proposed Action), but different mitigation might provide additional benefits.

3.4.3.2 Alternative 1 – Proposed Action: Issue ETPs for Phase I Wind Turbine Development and Infrastructure Components

3.4.3.2.1 Construction

Vegetation Communities

Construction of the CCSM Phase I Project under Alternative 1 (Proposed Action) would result in temporary to long-term impacts on vegetation communities that provide habitat for special status species, migratory birds, and eagle prey species. Direct impacts on vegetation communities from construction would be related primarily to surface modification associated with construction of the turbines and infrastructure components. Adjacent areas would be affected by construction-generated dust, alteration of hydrologic processes and surface runoff patterns, fragmentation, potential spread of noxious weeds and invasive plant species (discussed separately in the Noxious Weeds and Invasive Plant Species section below), and increased risk of wildfire.

Direct loss of vegetation from compaction and vegetation removal as a result of surface modification would be limited to the Phase I development and infrastructure areas. As described in Section 2.2.1.2.1, surface modification during construction is categorized as initial clearing and grading areas, vegetation cutting or partial cutting in activity areas, and long-term modification areas. Many of the surface modification areas (in particular, the long-term modification areas) would require placement of aggregate fill material. Initial clearing and grading areas would be reclaimed as construction is completed, while long-term modification areas, such as roads and turbine pads, would be used to support operation.

Clearing and grading would not occur in activity areas. The activity areas are areas near the wind turbine sites where workers and vehicles may need access to support the construction of the wind turbines. Within activity areas, vegetation would be subject to cutting or partial cutting without ground modification (such as mowing tall grasses and cutting or partially cutting woody plants). Specifically, vegetation higher than 1 foot could be cut to allow safe vehicle access and to reduce risk of fire. Table 3-9 summarizes direct vegetation impacts from construction under Alternative 1 (Proposed Action). In Table 3-9, the initial clearing and grading areas include activity areas and long-term modification, so the total area of direct impact is 4,465 acres.

Table 3-9. Summary of Vegetation Community Areas Directly Impacted (in acres) by the CCSM Phase I Project in Wyoming

Vegetation Community	Initial Clearing and Grading Areas	Activity Areas	Long-Term Modification Areas
Mountain big sagebrush	812	110	130
Wyoming big sagebrush	1,054	84	197
Shadscale saltbush	746	77	141
Upland grass	396	43	62
Black sagebrush	473	42	76
Gardner's saltbush	466	28	123
Aspen woodland	21	2	3
Greasewood	144	22	33
Riparian and mesic lowland	51	7	7
Modified and developed areas	264	19	73
Basin big sagebrush	19	4	3
Mixed mountain shrub	5	2	1
Barren slopes	7	<1	2
Bird's foot sagebrush	8	<1	2
Riparian woodland	<1	0	0
Total	**4,465**	**440**	**850**

Sources: BLM 2014, 2016a.

Note:

[a] Values are rounded to whole acres. This table lists areas that would be directly impacted by Alternative 1 (Proposed Action). The probable intensity and duration of these direct impacts are discussed below. In addition to direct impacts, Alternative 1 (Proposed Action) would directly and indirectly impact adjacent vegetation communities. Vegetation communities impacted beyond the project footprint may comprise areas much larger than the project footprint.

Excluding existing modified and developed areas, 4,202 acres of vegetated areas would be impacted for initial clearing and grading, and 777 acres of vegetated areas would be impacted for long-term modification under Alternative 1 (Proposed Action). Most impacts would occur in shrubland communities, especially in sagebrush communities (Table 3-9). Initial clearing and grading areas within shrubland communities would total 3,718 acres. Despite the large amount of initial clearing and grading, many large tracts of shrublands and most other vegetation communities that would be impacted would continue to exist within the local and regional extents (see Table 3-8 for definitions of impact criteria), and each of these shrubland communities is regionally abundant. Riparian communities are limited in the vicinity of the Phase I development and infrastructure areas and are of importance for many migratory bird species, including eagles, and other wildlife species. Woody riparian subcommunities occur in both the riparian and mesic lowland community and the riparian woodland community. Additional information about impacts on riparian areas is provided in the Wetlands and Riparian Zones section below.

Activity areas would impact a small amount of vegetation within communities in the Phase I development and infrastructure areas. Cutting or partial cutting would diminish the aboveground vegetative structure and might affect species composition of vegetation within activity areas, but these areas would still provide marginal to suitable habitat for some special status species, migratory birds, and eagle prey species. Overall, one-time cutting or partial cutting in activity areas would have a minor effect on vegetation communities limited to the activity areas (see Table 3-8 for definitions of impact criteria). The duration of impacts from mowing grasses and forbs would be temporary because these plants would recover quickly (see Table 3-8). Impacts on woody vegetation would be temporary to medium-term depending on the species and their height before cutting or partial cutting (see Table 3-8).

On federal lands, initial clearing and grading areas would be reclaimed with seed mixtures tailored to establish species diversity, composition, and ground cover that reflects the baseline conditions. Seed mixtures for private and state lands would be developed in coordination with private landowners and state agencies. The BLM FEIS estimates that grass and forb vegetation communities would recover within 5 years of reclamation, while the recovery period for sagebrush shrublands is estimated to be between 15 and 50 years to reach full maturity. Forested or woodland communities are expected to recover in 20 to 100 years, depending on the current age class of the existing forest or woodland communities. However, fewer mature shrubs and trees, which would provide habitat for migratory birds and eagle prey species, would likely be established within 5 years. Implementation of an environmental training program as part of the environmental compliance and monitoring plan for the CCSM Phase I Project, BMPs, and an adaptive management process would help ensure that impacts on vegetation in areas adjacent to the construction footprint would be reduced and that areas modified during construction would be successfully reclaimed. Applicable BMPs included in the CCSM Phase I Project include seeding reclamation areas with native species and implementing site plans such as an erosion control plan and a SWPPP. In consideration of site-specific reclamation plans, the likely recovery periods for affected communities, and the large amount of remaining vegetation adjacent to the Phase I development and infrastructure areas that would not be affected, anticipated direct impacts on vegetation communities in initial clearing and grading areas would constitute moderate impacts of short-term to long-term duration (see Table 3-8 for definitions of impact criteria).

In addition to impacts within the project footprint, Alternative 1 (Proposed Action) would directly and indirectly impact adjacent vegetation communities. Forman and Alexander (1998) described a “road-effect zone” as the distance from the edge of the road over which ecological effects can be detected. Similarly, vegetation communities would be impacted by Alternative 1 (Proposed Action) within an affected zone beginning at the edge of the construction footprint. Ecological effects beyond project footprints are often difficult to quantify, and many data gaps are associated with known and other potential effects. Several studies examining roadside vegetation have found both similarities and differing results that are apparently dependent on multiple factors, including natural environments (such as deserts versus rainforests), infrastructure design, and vegetation management (van der Ree et al. 2011). Construction-generated dust, alteration of hydrologic processes and surface runoff patterns, fragmentation, potential spread of noxious weeds and invasive plant species, and increased risk of wildfire would impact adjacent vegetation communities. Impacts on wetlands and riparian zones and the potential spread of noxious weeds and invasive plant species are discussed separately in sections below.

Heavy equipment used to construct roads and grade the turbine pads would likely generate an extensive amount of dust that would temporarily affect adjacent vegetation. Dust deposition from roads and other activities can have both physical and chemical impacts on vegetation, and may also exacerbate secondary stresses, such as drought or pathogens (Farmer 1993). Dust can cause reduced photosynthesis, leading to the loss of plant yield, and can hinder the pollination of small seeded fruit by insects, thus reducing effective fertility (McCrea 1984). Thompson et al. (1984) found that vehicle exhaust dust applied to leaf surfaces reduces photosynthesis, but estimated that the effects of dust loads from high traffic volume roadways (approximately 80,000 vehicles per day) would likely be small. However, construction activities would likely deposit substantially more dust onto adjacent vegetation than an existing roadway. Impacts on vegetation as a result of dust are likely temporary in nature, and dust would likely affect adjacent vegetation only during construction and heavy road use until it can be washed off by rain or other means. If plant mortality were to occur, vegetation would be restored through natural regeneration or reclamation efforts.

Alteration of hydrologic processes and surface runoff patterns described in Section 3.3.3 would impact adjacent vegetation communities through increased runoff, erosion, or sedimentation in some areas and reduced hydrology in other areas. Removal of snow from work areas into accumulation areas would contribute to these effects. Soil erosion and localized changes to hydrology could affect plant growth, vigor, and community composition. Implementation of site plans and BMPs described in Section 3.3.3 would help minimize these effects as would gravel placement.

Construction of Alternative 1 (Proposed Action) would also increase fragmentation in the study area. The additional fragmentation would likely have a number of effects on vegetation as wildlife habitat, including a reduction in habitat patch size, an increase in the perimeter-to-area ratio of patches and associated edge effects, reduced connectivity between habitat patches, and the introduction of barriers to dispersal for some species (Smith and Smith 2009). The potential effects of fragmentation on wildlife are discussed further in Sections 3.5.3, 3.6.3, 3.7.3, and 3.8.3 for different groups of wildlife. Fragmentation is unlikely to measurably affect seed dispersal among large vegetation community patches, but

fragmented edges of communities and small patches that are mostly surrounded by the construction footprint would likely be degraded. These areas would likely have fewer desirable plant species and might be converted to alternative communities. Implementation of site reclamation plans and adaptive management would help improve these areas over time.

Construction activity would create an increased risk of wildfires. Vegetation communities that are burned could be severely degraded. The degree of increased wildfire risk is unknown but would be minimized through implementation of the site safety plan, and the reclamation plan would be implemented to restore any burned areas.

Overall, these effects on vegetation communities would likely be increasingly pronounced the nearer they are to the edge of the construction footprint. While the precise extent of these effects and their variable intensity across affected zones is unknown, construction would likely result in limited, temporary to long-term, moderate impacts on adjacent vegetation communities (see Table 3-8 for definitions of impact criteria).

Wetlands and Riparian Zones

Direct impacts of Alternative 1 (Proposed Action) on wetlands and riparian zones (within the riparian/mesic lowland vegetation community) would include 51 acres of initial clearing and grading and 7 acres of long-term modification, and direct impacts on riparian woodland would include less than 1 acre of initial clearing and grading and no long-term modification, as summarized above in Table 3-9. Wetlands under the jurisdiction of USACE, identified as approximately 13 acres in BLM's EA2 (BLM 2016a), would require a Clean Water Act Section 404 permit for wetlands fill. The permit would require mitigation to compensate for lost wetland functions. Non-wetland riparian and other mesic habitats that are not under the jurisdiction of USACE would not be mitigated and would be converted to uplands. Initial clearing and grading areas would be revegetated, but it would likely be difficult for most areas to become reestablished as wetlands or riparian zones because of construction-related changes to surface runoff patterns and hydrologic processes (BLM 2012a). A total of 7 acres of the riparian/mesic lowland vegetation community occur within activity areas. Cutting or partial cutting within activity areas would alter the structure of vegetation, but the activity areas would remain as riparian, wetland, or mesic communities that would continue to provide habitat for migratory birds and eagle prey species.

Construction under Alternative 1 (Proposed Action) would also indirectly affect wetlands and riparian areas adjacent to initial clearing and grading and long-term modification by altering surface runoff patterns and hydrologic processes due to project infrastructure and soil compaction, fragmentation, dust deposition, and increased risk of wildfire. These effects would likely be similar to those described for general vegetation communities but would likely be magnified because wetlands and riparian zones are less common than upland shrubland vegetation communities in the vicinity of the CCSM Phase I Project and provide important habitat for special status species, migratory birds, and eagle prey species. The Clean Water Act Section 404 permit would require mitigation for these types of wetland impacts, but adjacent non-wetland riparian and other mesic habitats would be degraded and possibly converted to uplands in some areas if hydrology is overly reduced.

Because wetlands and riparian zones provide important habitat, PCW has committed to avoiding and minimizing impacts on wetlands and riparian zones by avoiding surface modification within floodplains, 100 feet from the inner gorge of ephemeral channels, and within 500 feet of perennial waters, springs, wetlands, and riparian zones. With implementation of an environmental training program as part of the environmental compliance and monitoring plan for the CCSM Phase I Project, BMPs, and an adaptive management process, direct impacts on wetlands and riparian zones would be limited to the long-term modification area footprint. Indirect impacts would be limited to immediately adjacent areas and would be minimized in these areas. Most wetlands and riparian zones in the initial clearing and grading area would be reclaimed as uplands. The loss of wetland functions for approximately 13 acres of wetlands under the jurisdiction of USACE would be mitigated. Overall, probable impacts on wetlands and riparian zones would be moderate, long-term, and limited in extent (see Table 3-8 for definitions of impact criteria). Other than vegetation recovery of 7 acres of the riparian/mesic lowland community addressed in the Vegetation Communities section above, cutting or partially cutting vegetation in activity areas would have no additional consequential effects on wetlands and riparian zones.

Noxious Weeds and Invasive Plant Species

Surface modification from construction under Alternative 1 (Proposed Action) would provide increased opportunities for the spread and establishment of noxious weeds and invasive plant species. These species could become established in initial clearing and grading and long-term modification areas and then spread into adjacent areas. Additionally, fragmentation, alteration of runoff patterns and hydrologic processes, and equipment and vehicle travel could result in the spread of noxious weeds and invasive plant species (Forman and Alexander 1998; van der Ree et al. 2011).

Invasive plants can increase the potential for fire and perpetuate the spread of weeds following a fire, which severely reduces the quality of sagebrush habitat (USFWS 2008a). However, the potential magnitude, duration, and extent of these impacts on habitat for special status species, migratory birds, and eagle prey species have been reduced through several measures. PCW would implement BMPs and other measures in the weed management and site-specific reclamation plans to reduce potential impacts. Overall, probable effects of noxious weeds and invasive plant species on vegetation that provides habitat for special status species, migratory birds, and eagle prey species would constitute minor, medium-term impacts that would be limited to the Phase I development and infrastructure areas and immediately adjacent areas (see Table 3-8 for definitions of impact criteria).

Vegetation cutting or partial cutting in the activity areas would increase the risk of the spread of noxious weeds and invasive plant species. Davies et al. (2012) studied the effects of mowing Wyoming big sagebrush communities and found that mowing does not appear to promote native herbaceous vegetation and may facilitate the conversion of shrublands to non-native annual grasslands without additional efforts. However, through implementation of BMPs and other measures in the weed management plan, such as monitoring and treatments to remove undesirable species, potential impacts would be minimized. Consequently, within activity areas, construction under Alternative 1 (Proposed Action) would result in a negligible increase in noxious weeds and invasive plant species.

Special Status Plant Species

As described in Section 3.4.2.4, the Phase I development and infrastructure areas do not provide suitable habitat for any special status plant species, and no special status plants were identified during rare plant surveys in these areas. Consequently, no direct impacts on special status plant species are anticipated from construction under Alternative 1 (Proposed Action).

The western prairie fringed orchid, a plant species that is federally listed as threatened, does not occur in or near the Phase I development and infrastructure areas, but is included in our analysis to evaluate whether it could be indirectly affected under Alternative 1 (Proposed Action) as a result of water depletions to the Platte River system.

As described in Section 3.3.3, construction under Alternative 1 (Proposed Action) could include the consumptive use of water from either the Platte River system or Colorado River system during the construction period. Additional water needed would be obtained from groundwater or municipal water resources. In the final BO we prepared for the BLM FEIS, we concurred with the BLM determination that project-related water depletions to the Platte River system are "likely to adversely affect" Platte River species, including the western prairie fringed orchid (USFWS 2012c). The consumptive use of water would have a probable, minor, temporary, and geographically extensive effect on western prairie fringed orchid (see Table 3-8 for definitions of impact criteria); however, this water use would occur under an existing depletion (see Section 3.3.3.2.1). We determined that the flow-related adverse effects of the CCSM Phase I Project would be consistent with those evaluated in our Tier 1 PBO for Platte River species (USFWS 2006) and would not likely jeopardize the continued existence of Platte River species. As described in EA1 and EA2, the CCSM Phase I Project would not exceed the maximum annual water depletions considered in the final BO. Consequently, water use from the Platte River for construction under Alternative 1 (Proposed Action) would have a probable, minor, temporary, extensive effect on western prairie fringed orchid (see Table 3-8).

Summary of Construction Impacts Under Alternative 1

Under Alternative 1 (Proposed Action), construction of the CCSM Phase I Project would result in the following impacts on vegetation and wetlands (see Table 3-8 for definitions of impact criteria):

- Initial clearing and grading of 4,202 acres of vegetated areas, cutting or partial cutting within 421 acres of activity areas, and long-term modification of 777 acres of vegetated areas, resulting in probable, limited, moderate, short- to long-term impacts on vegetation communities.
- Probable, limited, moderate, long-term impacts from initial clearing and grading of 51 acres and long-term modification of 7 acres in riparian/mesic lowlands, and initial clearing and grading of less than 1 acre in riparian woodlands. Most wetlands and riparian areas would be reclaimed as uplands. Mitigation would be required to compensate for the loss of 13 acres of wetlands under the jurisdiction of the USACE.
- The potential spread of noxious weeds and invasive plants as a result of construction limited by weed control measures and site-specific reclamation techniques that are

included as part of Alternative 1 (Proposed Action), resulting in probable, minor, medium-term impacts that would be limited to the Phase I development and infrastructure areas and immediately adjacent areas.

- Water use from the Platte River for construction would have a probable, minor, temporary, and geographically extensive effect on western prairie fringed orchid; however, this water use would occur under an existing depletion.

3.4.3.2.2 Operation

Vegetation Communities

Vegetation in long-term modification areas impacted during construction under Alternative 1 (Proposed Action) would remain developed during operation of the CCSM Phase I Project. Potential dust from occasional road traffic and maintenance activities would be reduced through implementation of a dust control plan, so effects from dust on nearby vegetation during operation would be inconsequential. No other effects on vegetation are anticipated from operation or maintenance activities.

Several conservation measures that would be implemented by PCW as part of its sage-grouse conservation plan would benefit vegetation. The sage-grouse conservation plan includes wind conservation easements, habitat improvement measures, enhancements to relic agricultural fields, and other stabilization and revegetation measures. Wind conservation easements would protect lands from future wind development but would not necessarily protect vegetation communities from other land uses. Habitat improvement projects would likely improve vegetation communities in targeted areas. Relic agricultural field enhancements would establish desirable types of vegetation communities within portions of the approximately 2,023 acres of identified relic fields that are currently dominated by introduced plant species such as cheatgrass or crested wheatgrass. Similarly, stabilization and burned area revegetation projects would help protect intact sagebrush communities and re-establish native species. The magnitude of these beneficial effects is somewhat uncertain pending further development and implementation of site-specific plans and potential variability of restoration success at different sites.

Retrofitting high-risk power poles as compensatory mitigation for eagle take would likely result in a small amount of temporary vegetation modification at each of a large number of sites that would be distributed over a wide geographic area. With implementation of BMPs and reclamation techniques as appropriate, power pole retrofits would possibly have a minor and temporary effect on vegetation providing habitat for special status species, migratory birds, or eagle prey species, but would occur over an extensive geographic area (see Table 3-8 for definitions of impact criteria).

Wetlands and Riparian Zones

Long-term loss of wetlands and riparian zones from road construction and maintenance is discussed in Section 3.4.3.2.1, Construction, above, based on when the impacts would occur. With implementation and maintenance of erosion control measures and other BMPs during operation, no indirect effects on wetlands and riparian zones are anticipated.

Through implementation of PCW's sage-grouse conservation plan, improvements to mesic habitats would likely enhance some wetlands and riparian zones and create new wet meadows. This conservation measure would have probable, moderate, long-term, regionally beneficial effects on wetlands and riparian zones (see Table 3-8 for definitions of impact criteria). Other conservation measures are unlikely to have any measurable effects on wetlands or riparian zones.

The effects of power pole retrofits as compensatory mitigation on wetlands and riparian zones are unknown because the locations of potential power pole retrofits are unknown; however, these effects are presumed to be minor, temporary, unlikely, and could occur within an extensive geographic area (see Table 3-8 for definitions of impact criteria).

Noxious Weeds and Invasive Plant Species

Continued implementation of a weed management plan and other BMPs during operation under Alternative 1 (Proposed Action) would result in a negligible impact of noxious weeds and invasive plant species on special status species, migratory birds, and eagle prey species.

Conservation measures included in the sage-grouse conservation plan related to habitat improvement and reclamation would likely have moderate to major long-term beneficial effects on vegetation communities by reducing noxious weeds and invasive plant species cover in the region (see Table 3-8 for definitions of impact criteria). Habitat improvements for greater sage-grouse conservation would reduce undesirable plant cover. Relic agricultural field enhancements, if successful, would greatly reduce the amount of undesirable plant cover across 2,023 acres of identified relic fields that are currently dominated by cheatgrass, crested wheatgrass, or other introduced plant species. Stabilization and burned area revegetation projects would also reduce undesirable plant cover by re-establishing native species. However, native plant community restoration across a large area may face challenges and take many years to accomplish. The magnitude of these beneficial effects is somewhat uncertain pending further development and implementation of site-specific plans and potential variability of restoration success at different sites.

Retrofitting high-risk power poles as compensatory mitigation for eagle take has the potential to introduce noxious weeds and invasive plant species throughout the four BCRs. With appropriate BMPs, this activity would have a minor, long-term, unlikely, and extensive impact (see Table 3-8 for definitions of impact criteria).

Special Status Plant Species

The Phase I development and infrastructure areas do not provide suitable habitat for any special status plant species, and no special status plants were identified during rare plant surveys in these areas. Consequently, no direct impacts on special status plant species are anticipated from operation under Alternative 1 (Proposed Action).

As described in Section 3.3.3, Alternative 1 (Proposed Action) may include the consumptive use of up to 50 acre-feet of water per year from the Platte River system during operation of the CCSM Phase I Project. Because water use from the Platte River system during project operation was not included in our BO, if PCW uses surface water during operation of the

CCSM Phase I Project, the impact on the Platte River system as it applies to ESA recovery programs would need to be evaluated. ESA consultation would need to be reinitiated to evaluate the impacts of long-term water consumption on the western prairie fringed orchid. The effects of water consumption would be evaluated during consultation.

The effects of power pole retrofits as compensatory mitigation on special status species are unknown because the locations of potential power pole retrofits are unknown; however, these effects are presumed to be minor, temporary, and unlikely, but could occur over an extensive geographic area (see Table 3-8 for definitions of impact criteria).

Summary of Operation Impacts Under Alternative 1

Under Alternative 1 (Proposed Action), operation of the CCSM Phase I Project would result in the following impacts on vegetation and wetlands (see Table 3-8 for definitions of impact criteria):

- Dust from occasional road traffic and maintenance activities would be reduced through implementation of a dust control plan, so effects from dust on nearby vegetation during operation under Alternative 1 (Proposed Action) would be inconsequential. No other effects on vegetation are anticipated from operation or maintenance activities.
- With implementation of BMPs, operation under Alternative 1 (Proposed Action) is unlikely to affect wetlands and riparian zones.
- Continued implementation of the weed management plan and other BMPs during operation under Alternative 1 (Proposed Action) would result in a negligible impact from noxious weeds and invasive plant species. Surface water use during operation would have a probable, minor, long-term, and geographically extensive effect on western prairie fringed orchid; however, this water use would occur under an existing depletion.
- Conservation measures related to habitat improvement and reclamation would have probable, moderate to major, long-term, regionally beneficial effects on vegetation and wetlands.
- Retrofitting high-risk power poles as compensatory mitigation for eagle take would likely result in a small amount of temporary vegetation modification at each of a large number of sites that would be distributed over a wide geographic area. With implementation of BMPs and reclamation techniques as appropriate, power pole retrofits would possibly have a minor, temporary, and extensive effect on vegetation providing habitat for special status species, migratory birds, or eagle prey species. Specific effects on wetlands and riparian areas and special status plant species are unknown because the locations of potential power pole retrofits are unknown; however, these effects are presumed to be minor, temporary, unlikely, and occur over an extensive geographic area.

3.4.3.3 Alternative 2 – Proposed Action with Different Mitigation

3.4.3.3.1 Construction

Under Alternative 2 (Proposed Action with Different Mitigation), the Phase I Chokecherry and Phase I Sierra Madre WDAs would be developed as proposed by PCW, but the compensatory mitigation for eagle take would be different than that described in PCW's ETP application. Construction impacts on vegetation and wetlands would be consistent with those described under Alternative 1 (Proposed Action) in Section 3.4.3.2.1.

3.4.3.3.2 Operation

Under Alternative 2 (Proposed Action with Different Mitigation), operation impacts described under Alternative 1 (Proposed Action) in Section 3.4.3.2.2 would be mitigated by one or more mitigation options, as discussed in Section 2.2.2.1. Lead abatement, carcass removal, carcass avoidance, and rehabilitation of injured eagles would not affect vegetation or wetlands. A wind conservation easement would be unlikely to affect wetlands and vegetation because it would protect land from future wind energy development. However, it may not necessarily protect these resources from impacts associated with other land uses permitted under the wind conservation easement.

Mitigation options for older wind facilities, such as curtailing operations or upgrading equipment, would not affect vegetation or wetlands. These mitigation options are unlikely to include activities that would cause any measurable impacts on vegetation or wetlands, and do not include potential improvements to vegetation communities or wetlands. Decommissioning of older wind facilities would benefit vegetation communities through reclamation of impacted areas, such as tower pads and access roads. Probable, long-term, regional benefits would range from minor to moderate depending on the size of the facilities to be decommissioned and the amount of altered areas reclaimed as desirable vegetation communities (see Table 3-8 for definitions of impact criteria).

Habitat enhancement would result in probable, long-term, moderate to major, regionally beneficial effects for vegetation communities (see Table 3-8 for definitions of impact criteria). While some potential enhancement measures would not affect vegetation communities, establishing conservation banks for eagles would protect desirable vegetation and likely include measures to improve vegetation communities as habitat for eagle prey species. Habitat enhancement would likely include measures to reduce existing cover and spreading of noxious weeds and invasive plant species. Habitat enhancement projects could include restoring altered, burned, or overgrazed areas with native vegetation communities. Projects to restore woody riparian habitat for eagles could also be selected. It is unknown whether selected habitat enhancement measures would include benefits to wetlands and riparian zones, but no adverse impacts from habitat enhancement to wetlands are anticipated.

3.4.3.3.3 Summary of Construction and Operation Impacts Under Alternative 2

Construction and operation under Alternative 2 (Proposed Action with Different Mitigation) would have the same impacts as described under Alternative 1 (Proposed Action) in Sections 3.4.3.2.1 and 3.4.3.2.2. However, mitigation would be different and could result in

the following benefits to vegetation and wetlands (see Table 3-8 for definitions of impact criteria):

- Lead abatement, carcass removal, carcass avoidance, wind conservation easements, and rehabilitation of injured eagles would not affect vegetation or wetlands.
- Mitigating older wind facilities by curtailing operations or upgrading equipment would not affect vegetation or wetlands.
- Decommissioning of older wind facilities would benefit vegetation communities through reclamation of altered areas. Probable, long-term, regional benefits would range from minor to moderate depending on the size of the facilities to be decommissioned and the amount of altered areas reclaimed as desirable vegetation communities.
- Habitat enhancement would result in probable, long-term, moderate to major, regionally beneficial effects for vegetation communities.

3.4.3.4 Alternative 3 – Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project

3.4.3.4.1 Construction

Under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), only the Phase I Sierra Madre WDA and the infrastructure components would be developed as proposed by PCW. Construction under Alternative 3 would result in impacts on vegetation and wetlands as described under Alternative 1 (Proposed Action) in Section 3.4.3.2.1, except impacts associated with construction of the Phase I Chokecherry WDA would not occur.

Vegetation Communities

Under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), initial clearing and grading areas would total about 3,262 acres, which is about 1,203 acres less than under Alternative 1 (Proposed Action). Alternative 3 includes about 288 acres of activity areas, which is about 152 acres less than under Alternative 1. Long-term modification areas would total about 658 acres, which is about 192 acres less than under Alternative 1.

Overall, impacts on vegetation communities would be similar to those described under Alternative 1 (Proposed Action), but direct impacts would be about 27 percent less under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project). However, impacts on vegetation vary by vegetation community, as shown in Table 3-10. Among the dominant vegetation communities, Alternative 3 would result in 54.9 and 29.5 percent less long-term modification within Wyoming big sagebrush communities and Mountain big sagebrush communities, respectively, as compared to Alternative 1. Conversely, Alternative 3 would result in only 1.1 percent less long-term modification in shadscale saltbush communities and would result in no change in impacts on black sagebrush communities as compared to Alternative 1 (see Table 3-10). Taking into consideration PCW's proposed site-specific reclamation plans, the likely recovery periods for affected

communities, and the large amount of remaining vegetation in the vicinity that would not be affected, we anticipate that direct impacts on vegetation communities in initial clearing and grading areas would constitute moderate impacts of short-term to long-term duration. Minor, long-term impacts would occur to vegetation in the long-term modification areas (see Table 3-8 for definitions of impact criteria).

Table 3-10. Summary of Temporary and Long-term Impacts (in acres) on Vegetation Community Areas under Alternative 3 and Percent Decrease from Alternative 1

Vegetation Community	Initial Clearing and Grading Areas		Long-Term Modification Areas	
	Area (acres)[a]	Percent Decrease from Alternative 1	Area (acres)[a]	Percent Decrease from Alternative 1
Mountain big sagebrush	573	29.5	93	28.2
Wyoming big sagebrush	475	54.9	102	48.5
Shadscale saltbush	738	1.1	141	0.5
Upland grass	72	81.8	12	80.4
Black sagebrush	473	0	76	0
Gardner's saltbush	466	0.1	123	0.1
Aspen woodland	21	0	3	0
Greasewood	129	10.5	32	7.8
Riparian and mesic lowland	46	9.1	7	0
Modified and developed areas	234	11.3	67	9.2
Basin big sagebrush	21	12.7	3	12.2
Mixed mountain shrub	2	55.9	<1	36.0
Barren slopes	7	2.6	2	1.9
Bird's foot sagebrush	8	0	2	0
Riparian woodland	<1	0	<1	0
Total	**3,262**	**26.9**	**658**	**22.6**

Sources: BLM 2014, 2016a.

Note:

[a] Values are rounded to whole acres. This table lists areas that would be directly impacted by Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project). The probable intensity and duration of these direct impacts are discussed below. In addition to direct impacts, Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would directly and indirectly impact adjacent vegetation communities. Vegetation communities impacted beyond the project footprint may comprise areas much larger than the project footprint.

Wetlands and Riparian Zones

Impacts on riparian/mesic lowland and riparian woodland would likely be similar but somewhat less than those described under Alternative 1 (Proposed Action). A total direct loss of about 13 acres of wetlands under the jurisdiction of USACE would occur in surface modification areas for construction under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project). Most of the wetlands that would be impacted by the CCSM Phase I Project are in the Phase I Sierra Madre WDA or infrastructure areas, as shown in Table 3-10 and in Figures 3-2 and 3-3. Less than half an acre of wetlands under the jurisdiction of USACE occur in Phase I of the Chokecherry WDA. Therefore, Alternative 3 would not appreciably reduce impacts on wetlands in comparison to Alternative 1. Construction would also indirectly affect adjacent wetlands and riparian zones by altering surface runoff patterns and hydrologic processes due to project infrastructure and soil compaction. Most wetlands and riparian zones in the initial clearing and grading areas would be reclaimed as uplands, so probable impacts on these resources across all surface modification areas would be limited, moderate, and long-term (see Table 3-8 for definitions of impact criteria). Other than vegetation recovery of riparian/mesic lowland areas addressed under Vegetation Communities, cutting or partially cutting vegetation in activity areas would have no additional consequential effects on wetlands and riparian zones.

Noxious Weeds and Invasive Plant Species

The effects of construction under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) on the spread of noxious weeds and invasive plant species would be similar in and near initial clearing and grading areas as those described under Alternative 1 (Proposed Action). The overall magnitude of impacts would be less than under Alternative 1 because vegetation removal associated with the Phase I Chokecherry WDA would not occur. Through implementation of BMPs and other measures in the weed management plan and site-specific reclamation plans, potential impacts would be minimized. Overall, probable effects of noxious weeds and invasive plant species on vegetation that provides habitat for special status species, migratory birds, and eagle prey species would constitute minor, medium-term impacts that would be limited to the project footprint and immediately adjacent areas (see Table 3-8 for definitions of impact criteria).

Special Status Plant Species

No direct impacts on special status plant species are anticipated from construction under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project). Construction under Alternative 3 would include the consumptive use of water from the Platte River system, but would require less water than Alternative 1 (Proposed Action). This consumptive use would have a probable, minor, temporary, extensive effect on western prairie fringed orchid (see Table 3-8 for definitions of impact criteria); however, this water use would occur under an existing depletion.

Summary of Construction Impacts Under Alternative 3

Under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), construction of Phase I of the Sierra Madre WDA and infrastructure components would result in the following impacts on vegetation and wetlands (see Table 3-8 for definitions of impact criteria):

- Initial clearing and grading of 3,262 acres including vegetation cutting or partial cutting in 288 acres of activity areas, and long-term modification of 658 acres, resulting in probable, limited, moderate, short-term to long-term impacts on vegetation communities.
- Probable, limited, moderate, long-term impacts from initial clearing and grading and long-term modification in wetlands and riparian zones. Most wetlands and riparian areas would be reclaimed as uplands. Mitigation would be required to compensate for the loss of about 13 acres of wetlands under the jurisdiction of USACE.
- The potential spread of noxious weeds and invasive plants as a result of construction limited by weed control measures and site-specific reclamation techniques that are included as part of Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), resulting in minor, medium-term impacts that would be limited in extent.
- Water use from the Platte River for construction would have a probable, minor, temporary, and geographically extensive effect on western prairie fringed orchid; however, this water use would occur under an existing depletion.

3.4.3.4.2 Operation

Under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), operation impacts would be the same as those described under Alternative 1 (Proposed Action) in Section 3.4.3.2.2 except impacts associated with operation in the Phase I Chokecherry WDA would not occur.

Through implementing BMPs and other measures in the weed management plan, the effects of noxious weeds and invasive plant species during operation under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would be inconsequential to habitat for special status species, migratory birds, or eagle prey species.

Operation under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would include the consumptive use of water from the Platte River system, but would require less water than under Alternative 1 (Proposed Action). This consumptive use would have a probable, minor, temporary, and extensive effect on western prairie fringed orchid (see Table 3-8 for definitions of impact criteria); however, this water use would occur under an existing depletion.

The effects of avoidance and minimization efforts, permit stipulations related to construction, and mitigation on vegetation communities would be similar to the effects described under Alternative 1 (Proposed Action) in Section 3.4.3.2.2, but would be proportionate to the reduced total development area under Alternative 3 (Issue ETPs for Only the Sierra Madre

Portion of the CCSM Phase I Project). Conservation measures such as habitat improvements for greater sage-grouse conservation, relic agricultural field enhancements, and revegetation projects would be reduced in comparison to Alternative 1, but would still likely have probable, moderate to major, regionally beneficial effects on vegetation and wetlands (see Table 3-8 for definitions of impact criteria).

Retrofitting high-risk power poles for compensatory mitigation would result in impacts similar to those described under Alternative 1 (Proposed Action) in Section 3.4.3.2.2.

Summary of Operation Impacts Under Alternative 3

Under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), operation of Phase I of the Sierra Madre WDA and infrastructure components would result in impacts on vegetation and wetlands similar to those described under Alternative 1 (Proposed Action), although to a lesser extent.

3.4.3.5 Alternative 4 – No Action: Denial of ETPs

Under Alternative 4 (No Action: Denial of ETPs), standard and programmatic ETPs would not be issued because the permits would be denied or because the permit applications would be withdrawn. If no ETPs are issued for the CCSM Phase I Project, PCW may decide not to build the proposed project or may decide to move forward with the proposed project without ETPs.

3.4.3.5.1 No Build

If PCW decides not to build the CCSM Phase I Project, no direct or indirect impacts would occur on vegetation and wetlands from construction or operation of the CCSM Phase I Project. Conservation measures in PCW's sage-grouse conservation plan would not be implemented, so associated vegetation enhancement would not occur and existing degraded areas in the region would remain the same.

3.4.3.5.2 Build Without ETPs

If PCW decides to move forward with the CCSM Phase I Project without ETPs, we assume that the company would construct and operate the proposed project as outlined in its SPODs and as permitted by the BLM. However, we assume that none of the measures described in the ETP applications and the ECP (see Attachment A) and as outlined in Section 2.2.1.4 would be implemented, including EACPs, monitoring, adaptive management, and compensatory mitigation. In addition, stipulations we would include with the ETPs would not be implemented. Constructing and operating the CCSM Phase I Project without standard and programmatic ETPs would result in all of the adverse impacts described under Alternative 1 (Proposed Action) in Section 3.4.3.2.2. Several BMPs and measures described in the weed management plan and site-specific reclamation plans would still be implemented and a Clean Water Act Section 404 permit would still be required, so impacts on vegetation and wetlands would be similar to those described under Alternative 1 (Proposed Action).

ETP stipulations, including potential EACPs, eagle monitoring, adaptive management, and compensatory mitigation, would not be implemented under Alternative 4 (No Action: Denial of ETPs), but conservation measures that would benefit vegetation and wetlands would still be implemented by PCW as part of its sage-grouse conservation plan. Habitat enhancement and revegetation projects would likely provide moderate to major, regional, long-term benefits for vegetation and wetlands (see Table 3-8 for definitions of impact criteria).

3.4.3.6 Summary of Impacts under Each Alternative

Impacts on vegetation and wetlands from construction and operation of the CCSM Phase I Project would be as follows:

- **Alternative 1 (Proposed Action)** – Vegetation would be directly impacted by clearing, grading, and vegetation cutting and partial cutting during construction. The duration of the impact would vary based on whether the site would be maintained as a gravel surface or revegetated. In revegetation areas, woody vegetation such as shrubs would require many years to mature. Wetlands would be affected by construction, but some wetlands would be restored and mitigated. Project construction and operation has the potential to spread noxious weeds and invasive plants. Finally, water use from the Platte River may affect the threatened western prairie fringed orchid.
- **Alternative 2 (Proposed Action with Different Mitigation)** – Impacts would be similar to those under Alternative 1 (Proposed Action). Compensatory mitigation would be different under Alternative 2, which would result in different levels of impacts and benefits for vegetation and wetlands depending on the compensatory mitigation option selected (see Table 3-11).
- **Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project)** – Impacts would be similar to those under Alternatives 1 (Proposed Action) and 2 (Proposed Action with Different Mitigation), but most impacts would be reduced under Alternative 3 because the number of wind turbines would be reduced.
- **Alternative 4 (No Action: Denial of ETPs)**
    - The No Build scenario would result in no impacts on vegetation and wetlands.
    - The Build Without ETPs scenario would result in impacts similar to those under Alternatives 1 (Proposed Action), 2 (Proposed Action with Different Mitigation), and 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) if PCW decides to move forward with the proposed project without ETPs.

Table 3-11 compares potential compensatory mitigation under Alternative 1 (Proposed Action) and Alternative 2 (Proposed Action with Different Mitigation); see Table 3-8 for definitions of impact criteria.

Table 3-11. Comparison of Compensatory Mitigation Measures for Vegetation and Wetlands for the CCSM Phase I Project in Wyoming

Compensatory Mitigation Measure	Effects on Vegetation and Wetlands
Power pole retrofits	Impacts on vegetation would be minor, temporary, and possible, but occur over an extensive area. Effects on wetlands, riparian areas, and special status plant species are presumed to be minor, temporary, unlikely, but occur over an extensive area.
Mitigation of existing wind facilities	Decommissioning of older wind facilities could be beneficial to vegetation and wetlands depending on whether roads and water crossing structures are removed and rehabilitated. Probable, long-term, regional benefits would range from minor to moderate depending on the size of the facilities to be decommissioned and the amount of altered areas reclaimed as desirable vegetation communities. Curtailing operations or upgrading equipment would have no effect on vegetation and wetlands.
Lead abatement	No effect on vegetation and wetlands.
Carcass removal and carcass avoidance	No effect on vegetation and wetlands.
Wind conservation easement	No effect on vegetation and wetlands.
Habitat enhancement	Benefits to vegetation and wetlands would be moderate to major, long-term, probable, and regional.
Rehabilitation of injured eagles	No effect on vegetation and wetlands.

3.5 Fish, Amphibians, and Reptiles

3.5.1 Approach

Fish, amphibians, and reptiles within the Phase I development and infrastructure areas are discussed because many of these species are prey for eagles and migratory birds. Additionally, several special status species are located immediately downstream of the Phase I development and infrastructure areas. The study area for fish, amphibians, and reptiles encompasses the Phase I development and infrastructure areas and the adjacent waterbodies located downstream of these areas (for water-dependent species).

For our analysis of fish, amphibians, and reptiles, we have reviewed the BLM FEIS and ROD, EA1, and EA2. Public, agency, and tribal input regarding fish, amphibians, and reptiles that was received during the scoping process and tribal consultation has been included in the analysis of this resource.

3.5.2 Affected Environment

We are incorporating into this EIS by reference information about fish, amphibians, and reptiles from the following documents, as we have found it to be adequate for our analysis:

- BLM FEIS – Section 3.14, found on pages 3.14-1 through 3.14-28; and Section 3.15, found on pages 3.15-1 through 3.15-20
- EA1 – Section 3.13, found on pages 3-42 through 3-45; and Section 3.14, found on pages 3-46 through 3-63
- EA2 – Section 3.8 and Section 3.9

The description of fish, amphibians, and reptiles in the BLM NEPA documents has not changed substantially since publication of those documents. A summary of information from these documents describing the affected environment for fish, amphibians, and reptiles is provided below, along with additional information on USFWS special status species and species of concern.

3.5.2.1 Fish, Amphibians, and Reptiles

In the BLM FEIS, Section 3.14 describes the affected environment for common wildlife and fisheries resources, including habitat, within and adjacent to the Phase I development and infrastructure areas. For EA1 and EA2, BLM reviewed the affected environment for wildlife and fisheries resources and determined that no changes had occurred to documented wildlife or fisheries since publication of the BLM FEIS.

3.5.2.1.1 Fish

Fish habitats in the study area include perennial and intermittent streams, springs, lakes, and reservoirs. As described in Section 3.3.2, Water Resources, the Phase I development and infrastructure areas are located within two water resource regions: the Missouri River Region and the Upper Colorado River Region. The quality of fish habitat is affected in part by the hydrologic conditions of the riparian areas and uplands associated with, or contributing to, a specific stream or waterbody and to stream channel characteristics. Most ephemeral and some intermittent waterbodies in the study area do not support fish.

The Upper Muddy Creek watershed supports habitat for coldwater game fish, including Colorado River cutthroat trout (*Oncorhynchus clarki pleuriticus*), and non-game coldwater fish, including mountain sucker (*Catostomus platyrhynchus*) and speckled dace (*Rhinichthys osculus*). Several other watersheds within the study area support non-native trout and several common species of warmwater fish, including creek chub (*Semolitus atromaculatus*), and white sucker (*Catostomus catostomus*).

3.5.2.1.2 Amphibians

Five amphibians are known to occur or have the potential to occur within the study area: tiger salamander (*Ambyrtoma tigrinum*), Great Basin spadefoot toad (*Spea intermontanus*), northern leopard frog (*Rana pipiens*), and boreal chorus frog (*Pseudacris maculata*).

3.5.2.1.3 Reptiles

Four reptiles are commonly found in sagebrush landscapes and have been observed within the study area: greater short horned lizard (*Phrynosoma douglasi*), northern sagebrush lizard (*Sceloporus graciosus graciosus*), intermountain wandering garter snake (*Thamnophis elegans vagrans*), and prairie rattlesnake (*Crotalus viridis viridis*).

3.5.2.2 Special Status Fish, Amphibian, and Reptile Species

In the BLM FEIS, Section 3.15 discusses ESA-listed and BLM sensitive fish, amphibians, and reptiles that could be affected by the CCSM Phase I Project. Our focus here is on ESA-candidate and listed species, as well as species of concern in Wyoming (an unofficial list maintained by our USFWS Wyoming Ecological Services Field Office).

No fish, amphibians, or reptiles federally listed as threatened or endangered occur within the Phase I development and infrastructure areas, but federally listed species associated with the Platte River system and Colorado River system could be indirectly affected if a depletion of water occurred in those systems. One endangered fish species, the pallid sturgeon (*Scaphirhyncus albus*), is associated with the Platte River system, and four endangered fish species occur in the Colorado River system: bonytail chub (*Gila elegans*), Colorado pikeminnow (*Ptychocheilus lucius*), humpback chub (*Gila cypha*), and razorback sucker (*Xyrauchen texanus*).

Species of concern in Wyoming potentially occurring in the study area include four fish: bluehead sucker (*Catostomus discobolus*), Colorado River cutthroat trout (*Oncorhynchus clarkii pleuriticus*), flannelmouth sucker (*Catostomus latipinnis*), and roundtail chub (*Gila robusta*) (USFWS 2015b). Downstream of the westernmost portion of the Sierra Madre WDA, Muddy Creek (which is part of the Colorado River basin) supports the only viable assemblage of bluehead suckers, flannelmouth suckers, and roundtail chubs known to still exist in Wyoming (BLM 2012a).

3.5.3 Environmental Consequences

We are incorporating into this EIS by reference information about impacts on fish, amphibians, and reptiles which we have found to be adequate for our analysis from the following documents:

- BLM FEIS – Section 4.14, found on pages 4.14-1 through 4.14-52; and Section 4.15, found on pages 4.15-1 through 4.15-37
- EA1 – Section 4.2.13, found on pages 4-45 through 4-47; and Section 4.2.14, found on pages 4-47 through 4-56
- EA2 – Section 4.2.8 and Section 4.2.9

In addition to the impact analysis in the BLM's NEPA documents, we reviewed the SPODs, ECP, and scoping comments. These data form the basis of our analysis in this section, which uses the impact criteria described in Table 3-12 to evaluate the level of impact of the Proposed Action and alternatives on fish, amphibians, and reptiles.

Table 3-12. Impact Criteria for Fish, Amphibians, and Reptiles for the CCSM Phase I Project in Wyoming

Impact Category	Intensity Type	Definition
Magnitude	Major	The action would result in substantial indirect habitat impacts from disruption, alteration, or irreplaceable loss of vital and high value habitats, or of a large amount of suitable habitat for fish, amphibians, or reptiles. The action would result in substantial direct fatality or injury of fish, amphibians, or reptiles. The action would adversely affect special status fish, amphibian, or reptile species with substantial consequence to the individual, population, or habitat.
	Moderate	The action would result in some indirect disruption, alteration, or loss of habitat that would be expected to result in measureable but modest impacts on fish, amphibians, or reptiles. The action would result in some direct but localized fatality or injury of fish, amphibians, or reptiles. The action would have a measureable but modest effect on special status fish, amphibian, or reptile species or their critical habitat.
	Minor	The action would result in some indirect change in the amount or condition of habitat for fish, amphibians, or reptiles. The action would result in a limited amount of direct but localized fatality of fish, amphibians, or reptiles that would not be expected to have any long-term effects on any populations of fish, amphibians, or reptiles. The action would slightly affect special status fish, amphibian, or reptile species or their critical habitat.
	No effect	The action would not result in any measureable or observable indirect or direct impacts on fish, amphibians, or reptiles or their habitat.
Duration	Long-term	30 years (proposed project duration)
	Medium-term	5 years (permit term)
	Temporary	Lasting for the duration of construction
Potential to occur	Probable	More likely than not to occur
	Possible	Potential to occur
	Unlikely	Not reasonably likely to occur

Impact Category	Intensity Type	Definition
Geographic extent	Extensive	Within the two EMUs and four BCRs
	Regional	Within the 140-mile radius of the local area population for golden eagles
	Local	Within 1 mile of Phase I development and infrastructure areas
	Limited	Within 300 feet of Phase I development and infrastructure areas

3.5.3.1 Summary Comparison of Alternatives

Based on our analysis of environmental consequences, discussed below, and using the evaluation criteria described in Table 3-12, we identified the following key differentiators for fish, amphibians, and reptiles among the alternatives:

- The No Build scenario under Alternative 4 (No Action: Denial of ETPs) would have the least adverse impacts on fish, amphibians, and reptiles, followed by Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project).
- Although the expected impacts of Alternative 1 (Proposed Action) and Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would have similar intensities, most impacts on fish, amphibians, and reptiles would be lower under Alternative 3 than under Alternative 1.
- Alternative 1 (Proposed Action) and the Build Without ETPs scenario under Alternative 4 (No Action: Denial of ETPs) would have similar impacts on fish, amphibians, and reptiles. Benefits to fish, amphibians, and reptiles would also be similar because conservation measures that would improve habitat are included with the Proposed Action and are not dependent on the ETPs.
- Alternative 2 (Proposed Action with Different Mitigation) would have impacts on and benefits to fish, amphibians, and reptiles that would be similar to impacts and benefits under Alternative 1 (Proposed Action), but different mitigation, such as habitat enhancement projects that measurably increase vegetation cover at a watershed scale or mitigation measures that directly improve aquatic habitats, might provide additional benefits.

3.5.3.2 Alternative 1 – Proposed Action: Issue ETPs for Phase I Wind Turbine Development and Infrastructure Components

3.5.3.2.1 Construction

Under Alternative 1 (Proposed Action), construction of the CCSM Phase I Project would impact fish, amphibians, and reptiles through direct habitat loss, habitat alteration, degradation of aquatic habitat, disruption, displacement, direct fatality from vehicles and equipment, and surface water use. Construction would result in a loss of 4,202 acres of vegetated areas within the footprint for initial clearing and grading, and a loss of 777 acres of

vegetated areas within the footprint for long-term modification. While habitat suitability is species-specific, all terrestrial areas provide potential habitat for at least some species of amphibian or reptile. The various aquatic habitats in the study area, including perennial, intermittent, and ephemeral streams, lakes, and wetlands, vary in supporting fish, amphibians, and reptiles.

Surface modification of uplands could also degrade surface waters through alteration of hydrologic processes and increasing erosion, as described in Section 3.3.3.2.1. Construction of new roads and associated stream crossings could degrade surface waters and potentially create movement barriers for fish, amphibians, or reptiles. Construction under Alternative 1 (Proposed Action) would require a total Incidental Take of 128 road crossings of waterways.

Specific impacts on fish, amphibians, and reptiles are described in the following sections.

Fish

Some fish are important prey for bald eagles. Under Alternative 1 (Proposed Action), construction would affect fish habitat through surface modification and installation of new stream crossings. Proposed stream crossings include only a few perennial streams that support fish. However, culverts across these streams could potentially create movement barriers. Through appropriate design and construction methods in accordance with BLM environmental constraints, culverts would maintain fish passage. Most intermittent and ephemeral streams in the study area do not provide fish habitat, but many downstream waters support fish and fisheries. Surface modification and increased channel instability could affect water quality in downstream waters, as described in Section 3.3.3.2.1, which could degrade downstream fish habitat. Some fish species, including trout, are highly sensitive to sedimentation in streams (Bryce et al. 2010). As described in Section 3.5.2.1.1, several watersheds within the study area support trout species. Surface modification and construction of stream crossings could degrade aquatic habitat, which would result in probable, limited, moderate, temporary to medium-term impacts on fish and fish habitat for initial clearing and grading areas and probable, limited, minor, long-term impacts on fish and fish habitat for long-term modification areas (see Table 3-12 for definitions of impact criteria).

Several measures would help avoid, minimize, and mitigate potential impacts on fish and their habitat. Access roads have been sited to minimize stream crossings and would be constructed to avoid decreasing channel stability or increasing water velocity. Use of properly designed and installed culverts and at-grade crossings would help maintain drainage connectivity and sustain downstream flows. In-stream construction would be allowed only during low flow periods and is not expected to cause fish mortality. Potential hazardous materials spills and leaks and use of magnesium chloride are not expected to impact fish habitat because of implementation of BMPs, including an SPCC plan. Through implementation of an environmental training program and other BMPs, including an environmental compliance plan, erosion control plan, SWPPP, weed management plan, site-specific reclamation plans, watershed monitoring plan, and wildlife monitoring and protection plan, potential impacts on fish and fish habitat would be minimized.

PCW estimates it would use up to 105 acre-feet per year from surface water, groundwater, and municipal water sources in the Colorado and Platte River systems during the peak of construction (USFWS 2012c). As described in Section 3.3.3.2.1, the surface water used for the CCSM Phase I Project would be pumped from the North Platte River. No surface water depletions would occur from within the Colorado River basin, and groundwater use from within the Colorado River basin would occur from existing, permitted water rights. The level of impact on fish and fish habitat associated with the Colorado and North Platte River would depend on the actual amount of annual water consumed and the water conditions each year (whether wet, dry, or near average). Surface water use associated with construction of the CCSM Phase I Project would have a probable extensive, minor, temporary impact on fish and fish habitat in the North Platte River (see Table 3-12 for definitions of impact criteria).

Amphibians and Reptiles

Potential impacts from wind energy development on amphibians and reptiles in Wyoming are generally unknown (WGFD 2010a) and are difficult to assess because amphibians and reptiles have unique life histories and varying responses to habitat alterations (Hampton et al. 2010). The loss or degradation of surface water during the larval period (the tadpole stage for frogs and toads) could adversely affect amphibian populations. Roads would contribute to habitat fragmentation and could create movement barriers, but properly designed and installed culverts would help maintain habitat connectivity. Surface water degradation would impact aquatic habitats for amphibians and reptiles**,** including streams, wetlands, and riparian zones. Within the construction footprint, no areas are identified as vital or high value habitats for amphibians and reptiles, but wetlands and riparian zones generally provide important habitat for many of these species. Approximately 51 acres of the riparian/mesic lowland vegetation community, which includes wetlands and riparian zones, occur within initial clearing and grading areas. Approximately 7 acres of the riparian/mesic lowland vegetation community are located within long-term modification areas. As described in Section 3.4.3.2.1, one-time vegetation cutting or partial cutting would occur within 440 acres of activity areas, which could disrupt amphibians and reptiles in these areas and displace them if their habitat is degraded. Overall, surface modification, vegetation cutting or partial cutting, and construction of stream crossings would result in probable, limited, moderate impacts on amphibians and reptiles, ranging from temporary in activity areas, to temporary to medium-term duration in initial clearing and grading areas, to long-term duration in long-term modification areas (see Table 3-12 for definitions of impact criteria).

Fatality during construction may be expected for common, slow-moving amphibians and reptiles. The adverse ecological impacts of roads and traffic on amphibians and reptiles have been estimated to extend outward from the road edge as much as 328 feet (Jochimsen et al. 2004). Construction of turbine pads, roads, or other facilities could cause fatality of individual amphibians and reptiles through vehicle collisions and crushing individuals in underground burrows, rock refuges, or winter quarters. Amphibians may be more vulnerable to vehicle collision and crushing because their life histories often involve migration between wetland and upland habitats, and individuals are often inconspicuous and sometimes slow-moving (Trombulak and Frissell 2000). Construction activity would also likely cause behavioral avoidance and alterations of movement patterns.

Avoidance measures and applicable BMPs described for fish would similarly help reduce impacts on amphibians and reptiles. In addition to minimizing impacts on surface waters, these measures would minimize direct habitat loss in uplands and indirect impacts on adjacent habitats, as described in Section 3.4.3. Quantifying impacts for amphibians and reptiles is not possible because we lack detailed population data for these species. However, the high reproductive potential of these species would enable populations to quickly occupy modified areas following successful reclamation. Consequently, the disruption, displacement, and fatality that would occur during construction would likely result in probable, limited, minor, temporary to medium-term impacts on amphibians and reptiles (see Table 3-12 for definitions of impact criteria).

Special Status Fish, Amphibian, and Reptile Species

ESA-Listed Species

As described in Section 3.3.3.2.1, we initiated a recovery program for endangered fish species in the Upper Colorado River basin and issued a Tier 1 PBO for the Platte River Recovery Implementation Program and water-related activities that affect flow volume and timing in the central and lower reaches of the Platte River in Nebraska. We also issued a final BO for the CCSM Project to address potential impacts on Platte and Colorado River system federally listed species as part of formal consultation with the BLM. In the final BO, we determined that project-related water depletions to the Colorado and Platte River systems are "likely to adversely affect" Colorado and Platte River ESA-listed fish species (USFWS 2012c). We determined that the adverse effects on Colorado River fishes would be addressed by participation in the Colorado Recovery Program. We also determined that these adverse effects would be consistent with those evaluated in the Tier 1 PBO for Platte River species and would not likely jeopardize the continued existence of Platte River species. Surface water use during construction of the CCSM Phase I Project would not exceed the maximum annual water withdrawal considered in the final BO. According to the CCSM Phase I SPODs, surface water consumption would not occur within the Colorado River basin and groundwater consumption would occur from existing, permitted sources. Therefore, impacts on Colorado River fish would not occur from project-related surface water use. The consumptive surface water use from the North Platte River would have a probable, extensive, minor, temporary effect on the pallid sturgeon (see Table 3-12 for definitions of impact criteria). Impacts from surface modification or stream crossings during construction are unlikely to affect ESA-listed fish species.

Species of Concern in Wyoming

Four fish species that are listed as species of concern in Wyoming (that is, bluehead sucker, Colorado River cutthroat trout, flannelmouth sucker, and roundtail chub) are known to occur downstream of the westernmost portion of the Sierra Madre WDA in Muddy Creek (which is part of the Colorado River basin). These fish would not be affected by surface water use because PCW does not propose to withdraw any surface water from within the Colorado River basin. Avoidance measures and applicable BMPs described above for fish would minimize impacts on surface water quality. However, surface modification and construction of stream crossings could degrade aquatic habitat, which would result in probable, limited,

moderate, temporary to medium-term impacts for initial clearing and grading areas and probable, limited, minor, long-term impacts for long-term modification areas (see Table 3-12 for definitions of impact criteria).

Summary of Construction Impacts Under Alternative 1

Under Alternative 1 (Proposed Action), construction of the CCSM Phase I Project would result in the following impacts on fish, amphibians, and reptiles (see Table 3-12 for definitions of impact criteria):

- Surface modification and construction of 128 stream crossings could degrade aquatic habitat, which would result in probable, limited, moderate, temporary to medium-term impacts on fish and fish habitat for initial clearing and grading areas and probable, limited, minor, long-term impacts for long-term modification areas for fish and fish habitat (including Species of Concern).
- Surface modification and construction of stream crossings would result in direct habitat loss and habitat alteration for amphibians and reptiles that would constitute probable, limited, moderate, temporary to medium-term impacts in initial clearing and grading areas and probable, limited, moderate, long-term impacts in long-term modification areas.
- Habitat alteration from vegetation cutting or partial cutting in activity areas would result in probable, limited, moderate, temporary impacts on habitat for amphibians and reptiles.
- Construction-caused disruption, displacement, and fatality would likely result in probable, limited, minor, temporary to medium-term impacts on amphibians and reptiles.
- Surface water use would have a probable extensive, minor, temporary impact on the pallid sturgeon (an ESA-listed species) and on fish habitat in the North Platte River.

3.5.3.2.2 Operation

Under Alternative 1 (Proposed Action), potential impacts on fish, amphibians, and reptiles associated with the operation and maintenance of the CCSM Phase I Project include aquatic habitat degradation, disruption, displacement, fatality, and surface water use. PCW would continue to implement BMPs, including site plans, during operation, which would help minimize habitat alteration and degradation. Through continued implementation of an SPCC plan, potential hazardous materials spills and leaks from operation and maintenance equipment are not expected to degrade aquatic habitat. As described in Section 3.3.3.2.2, operation and maintenance activities would contribute to surface water degradation, which would result in probable, limited, minor, long-term impacts on aquatic habitat for fish, amphibians, and reptiles (see Table 3-12 for definitions of impact criteria).

Disruption impacts on amphibians and reptiles during operation and maintenance would be similar to those described for construction, but the potential annual extent of impacts would be less because fewer workers, vehicles, and equipment would be needed during operation than construction. Potential fatalities of amphibians and reptiles from vehicle collisions and maintenance equipment is expected to be similar to construction, but would be less annually

during operation compared to construction because the annual amount of traffic would be lower. Vehicle traffic, human presence, and maintenance work would cause probable limited, minor, long-term impacts from disruption, displacement, and fatality on amphibians and reptiles (see Table 3-12 for definitions of impact criteria). No impacts from disruption, displacement, or fatality are expected for fish during operation.

Operation of the CCSM Phase I Project would use less water than construction. PCW estimates that less than 50 acre-feet of water per year would be used during project operation. PCW is currently consulting with municipalities and hopes to use municipal water sources during operation. However, PCW has no guarantee of the outcome of those consultations at this time and, therefore, needs the option of pursuing North Platte River surface water withdrawals for project operation. In order for surface water withdrawals to occur, PCW would need to submit an application to the Wyoming State Engineer's Office, and subsequent ESA Section 7 consultation would be required. As during construction, no surface water depletions would occur within the Colorado River basin. Impacts on the pallid sturgeon and the habitat of the Platte River system would be evaluated during the ESA consultation process.

Retrofitting existing high-risk power poles for compensatory mitigation would not likely affect fish, amphibians, or reptiles. Construction activity associated with this mitigation measure could include unlikely, limited, minor, temporary impacts on potentially suitable habitat for amphibians and reptiles (see Table 3-12 for definitions of impact criteria).

Summary of Operation Impacts Under Alternative 1

Under Alternative 1 (Proposed Action), operation of the CCSM Phase I Project would result in the following impacts on fish, amphibians, and reptiles (see Table 3-12 for definitions of impact criteria):

- Surface modification and construction could degrade aquatic habitat, which could cause probable, limited, minor, long-term impacts on aquatic habitat for fish, amphibians, and reptiles.
- Disruption, displacement, and fatality would result in probable limited, minor, long-term impacts on amphibians and reptiles. No impacts from disruption, displacement, or fatality are expected on fish during operation.
- PCW is currently negotiating municipal water sources and hopes not to use surface water from the North Platte River during operation. ESA consultation would be required for surface water use.

3.5.3.3 Alternative 2 – Proposed Action with Different Mitigation

3.5.3.3.1 Construction

Under Alternative 2 (Proposed Action with Different Mitigation), the CCSM Phase I Project would be developed as proposed by PCW, but the compensatory mitigation for eagle take would be different from that described in PCW's ETP application. Construction impacts on

fish, amphibians, and reptiles would be consistent with those described under Alternative 1 (Proposed Action) in Section 3.5.3.2.1.

3.5.3.3.2 Operation

Under Alternative 2 (Proposed Action with Different Mitigation), operation impacts described under Alternative 1 (Proposed Action) in Section 3.5.3.2.2 would be mitigated by one or more options, as discussed in Section 2.2.2.1. Lead abatement, carcass removal, carcass avoidance, and rehabilitation of injured eagles would not affect fish, amphibians, and reptiles. A wind conservation easement would be unlikely to affect fish, amphibians, and reptiles because it would protect land from future wind energy development, but it would not necessarily protect these resources from other land uses.

Mitigation of older wind facilities by curtailing operations or upgrading equipment would not affect fish, amphibians, and reptiles any more than existing operation currently affects these species. Decommissioning of older wind facilities could have possible extensive, moderate, long-term benefits to fish habitat depending on whether roads and water crossing structures are removed and rehabilitated (see Table 3-12 for definitions of impact criteria). Decommissioning of older wind facilities would provide probable extensive, moderate, long-term benefits to amphibians and reptiles through improving habitat by reclaiming of modified areas (such as tower pads and access roads), and through removal of vehicle traffic, human presence, and maintenance work (see Table 3-12).

Habitat enhancement measures such as improving uplands without increasing vegetation cover to reduce erosion would not likely affect fish. However, habitat enhancement measures that measurably increase vegetation cover at a watershed scale or that directly improve aquatic habitats would likely provide long-term benefits to habitat for fish, amphibians, and reptiles. Habitat enhancement measures in uplands could also provide direct habitat improvements for amphibians and reptiles. Beneficial enhancement measures could include restoring altered, burned, or overgrazed areas with native vegetation communities. Habitat enhancement measures could also benefit fish and provide additional benefits to amphibians and reptiles if they include measures to improve riparian and aquatic habitats. Depending on the type, location, extent, and scale, habitat enhancement measures could have probable local to regional, minor to moderate, long-term beneficial effects on fish, amphibians, and reptiles (see Table 3-12 for definitions of impact criteria).

3.5.3.3.3 Summary of Construction and Operation Impacts Under Alternative 2

Construction and operation under Alternative 2 (Proposed Action with Different Mitigation) would have the same impacts as described under Alternative 1 (Proposed Action) in Sections 3.5.3.2.1 and 3.5.3.2.2. However, mitigation would be different and could result in the following benefits to fish, amphibians, and reptiles (see Table 3-12 for definitions of impact criteria):

- Lead abatement, carcass removal, carcass avoidance, wind conservation easements, and rehabilitation of injured eagles would not affect fish, amphibians, and reptiles.

- Mitigating older wind facilities by curtailing operations or upgrading equipment would not affect fish, amphibians, and reptiles any more than existing operations currently affect these species.
- Decommissioning of older wind facilities could result in possible extensive, moderate, long-term benefits to fish habitat if roads and water crossing structures are removed and rehabilitated.
- Decommissioning of older wind facilities would provide probable extensive, moderate, long-term benefits to amphibians and reptiles through improving habitat by reclaiming of altered areas (such as tower pads and access roads), and through removal of vehicle traffic, human presence, and maintenance work.
- Habitat enhancement would result in probable local to regional, minor to moderate, long-term beneficial effects on fish, amphibians, and reptiles.

3.5.3.4 Alternative 3 – Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project

3.5.3.4.1 Construction

Under Alternative 3, only the Phase I Sierra Madre WDA and the infrastructure components would be developed as proposed by PCW. Construction under Alternative 3 would result in impacts on fish, amphibians, and reptiles as described under Alternative 1 (Proposed Action) in Section 3.5.3.2.1, except impacts associated with construction of the Phase I Chokecherry WDA would not occur.

Under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), construction would result in temporary to long-term impacts on fish, amphibians, and reptiles that would be similar to those described under Alternative 1 (Proposed Action), but impacts from clearing and grading would be about 27 percent less under Alternative 3 because the Phase I Chokecherry WDA would not be constructed. Initial clearing and grading areas would total about 3,262 acres, which is about 1,203 fewer acres than under Alternative 1. Activity areas would total about 288 acres, which is about 152 fewer acres than under Alternative 1. Long-term modification areas would total about 658 acres, which is about 192 fewer acres than the Alternative 1. Construction under Alternative 3 would involve 101 road crossings of waterways, which is 27 fewer crossings than under Alternative 1.

The effects of avoidance and minimization efforts and BMPs on fish, amphibians, and reptiles would be similar to those described under Alternative 1 (Proposed Action) in Section 3.5.3.2.1, but would be proportionate to the reduced development area under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project). Hazardous materials spills and leaks are not expected to impact fish, amphibians, or reptiles because of implementation of BMPs. Surface modification and construction of stream crossings under Alternative 3 could degrade aquatic habitat, which would result in probable, limited, moderate, temporary to medium-term impacts for initial clearing and grading areas and probable, limited, minor, long-term impacts for long-term modification areas on aquatic habitat for fish, amphibians, and reptiles (see Table 3-12 for definitions of impact criteria). In addition, surface modification and construction of stream crossings would result in direct habitat loss and habitat alteration for amphibians and reptiles that would constitute probable,

limited, moderate, temporary to medium-term impacts for initial clearing and grading areas and probable, limited, moderate, long-term impacts for long-term modification areas (see Table 3-12).

Under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), inadvertent disruption, displacement, and fatality of amphibians and reptiles would be similar to that under Alternative 1 (Proposed Action), but would be less extensive because the Phase I Chokecherry WDA would not be constructed. Consequently, the disruption, displacement, and fatality that would occur during construction would likely result in probable, limited, minor, temporary to medium-term impacts on amphibians and reptiles (see Table 3-12 for definitions of impact criteria).

As under Alternative 1 (Proposed Action), PCW would use a combination of surface water, groundwater, and municipal water resources to meet the water demands of construction of the CCSM Phase I Project under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project). Surface water depletion would not occur within the Colorado River basin. The level of impact on fish and fish habitat associated with the North Platte River would depend on the actual amount of annual water consumed and the water conditions each year (whether wet, dry, or near average). Surface water use for construction under Alternative 3 would be less than under Alternative 1, but would still have a probable extensive, minor, temporary impact on the pallid sturgeon and on fish habitat in the North Platte River (see Table 3-12 for definitions of impact criteria).

Summary of Construction Impacts Under Alternative 3

Under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), construction of Phase I of the Sierra Madre WDA and infrastructure components would result in the following impacts on fish, amphibians, and reptiles (see Table 3-12 for definitions of impact criteria):

- Surface modification and construction of stream crossings would result in probable, limited, moderate, temporary to medium-term impacts in initial clearing and grading areas and probable limited, minor, long-term impacts in long-term modification areas on aquatic habitat for fish, amphibians, and reptiles. Under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), these impacts would be reduced from those associated with Alternative 1 (Proposed Action) because surface modification would be about 27 percent less and there would be 27 fewer stream crossings.
- Direct habitat loss and habitat alteration for amphibians and reptiles would constitute probable, limited, moderate, temporary to medium-term impacts in initial clearing and grading areas and probable, limited, moderate, long-term impacts in long-term modification areas. Direct habitat loss would be about 27 percent less than under Alternative 1 (Proposed Action).
- Construction-caused disruption, displacement, and fatality would likely result in probable, limited, minor, temporary to medium-term impacts on amphibians and reptiles, but these impacts would be less extensive than under Alternative 1 (Proposed Action).

- Surface water use would have a probable, extensive, minor, temporary impact on the pallid sturgeon and on fish habitat in the North Platte River.

3.5.3.4.2 Operation

Under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), operation impacts would be similar to those under Alternative 1 (Proposed Action) but would not include operation or maintenance activities associated with the Phase I Chokecherry WDA. Potential impacts on fish, amphibians, and reptiles would include aquatic habitat degradation, disruption, displacement, fatality, and surface water use.

PCW would continue to implement BMPs during operation, which would help minimize aquatic habitat degradation. Impacts on aquatic habitat would be similar to operation under Alternative 1 (Proposed Action) but would be less extensive geographically. Therefore, under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), operation and maintenance activities would result in probable, limited, minor, long-term impacts on aquatic habitat for fish, amphibians, and reptiles (see Table 3-12 for definitions of impact criteria).

Disruption impacts on amphibians and reptiles during operation and maintenance would be similar to those described under Alternative 1 (Proposed Action), but the potential extent of impacts would be less. Likewise, under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), vehicle traffic, human presence, and maintenance work would be less than under Alternative 1. Therefore, disruption, displacement, and fatality would result in probable limited, minor, long-term impacts on amphibians and reptiles (see Table 3-12 for definitions of impact criteria). No impacts from disruption, displacement, or fatality are expected for fish during operation.

As described under Alternative 1 (Proposed Action), use of surface water from the North Platte River necessary for operation would require ESA consultation and would include evaluating impacts on the pallid sturgeon.

Certain conservation measures would likely have beneficial effects on fish, amphibians, and reptiles. These potential benefits would be similar to those under Alternative 1 (Proposed Action), but they would likely be reduced in proportion to the reduced impacts under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project).

Summary of Operation Impacts Under Alternative 3

Under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), operation of Phase I of the Sierra Madre WDA and infrastructure components would result in the following impacts on fish, amphibians, and reptiles (see Table 3-12 for definitions of impact criteria):

- Surface water degradation would result in probable, limited, minor, long-term impacts on aquatic habitat for fish, amphibians, and reptiles.

- Disruption, displacement, and fatality would result in probable limited, minor, long-term impacts on amphibians and reptiles. No impacts from disruption, displacement, or fatality are expected for fish during operation.
- Surface water use from the North Platte River, if necessary, would require ESA consultation.
- Certain conservation measures would likely have beneficial effects on fish, amphibians, and reptiles. These potential benefits would be similar to those under Alternative 1 (Proposed Action), but they would likely be reduced in proportion to the reduced impacts under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project).

3.5.3.5 Alternative 4 – No Action: Denial of ETPs

Under Alternative 4 (No Action: Denial of ETPs), standard and programmatic ETPs would not be issued because the permits would be denied or because the permit applications would be withdrawn. If no ETPs are issued for the CCSM Phase I Project, PCW may decide not to build the proposed project or may decide to move forward with the proposed project without ETPs.

3.5.3.5.1 No Build

If PCW decides not to build the CCSM Phase I Project, no direct or indirect impacts would occur on fish, amphibians, and reptiles from construction or operation of the CCSM Phase I Project. Conservation measures in PCW's sage-grouse conservation plan would not be implemented, so no beneficial effects would occur on fish, amphibians, and reptiles from these measures.

3.5.3.5.2 Build Without ETPs

If PCW decides to move forward with the CCSM Phase I Project without ETPs, we assume that the company would construct and operate the proposed project as outlined in its SPODs and as permitted by the BLM. However, we assume that none of the measures described in the ETP applications and the ECP (see Attachment A) and as outlined in Section 2.2.1.4 would be implemented, including EACPs, monitoring, adaptive management, and compensatory mitigation. In addition, stipulations we would include with the ETPs would not be implemented. Constructing and operating the CCSM Phase I Project without standard and programmatic ETPs would result in all the adverse impacts described under Alternative 1 (Proposed Action) in Section 3.5.3.2.2. BMPs, conservation measures, and implementation of site plans would still be required by the BLM, so impacts on fish, amphibians, and reptiles would be similar to those described under Alternative 1 (Proposed Action).

3.5.3.6 Summary of Impacts under Each Alternative

Impacts on fish, amphibians, and reptiles from construction and operation of the CCSM Phase I Project would be as follows:

- **Alternative 1 (Proposed Action)** – Fish, amphibians, and reptiles would be impacted by stream crossings, loss and modification of vegetation, disruption, displacement, and fatality. Surface water use could affect habitat of the endangered pallid sturgeon.
- **Alternative 2 (Proposed Action with Different Mitigation)** – Impacts would be similar to those under Alternative 1 (Proposed Action). Compensatory mitigation would be different under Alternative 2, which would result in different levels of impacts and benefits for fish, amphibians, and reptiles depending on the compensatory mitigation option selected (see Table 3-13).
- **Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project)** – Impacts would be similar to those under Alternatives 1 (Proposed Action) and 2 (Proposed Action with Different Mitigation), but most impacts would be reduced under Alternative 3 because the number of wind turbines would be reduced.
- **Alternative 4 (No Action: Denial of ETPs)**
    - The No Build scenario would result in no impacts on fish, amphibians, and reptiles.
    - The Build Without ETPs scenario would result in impacts similar to those under Alternatives 1 (Proposed Action), 2 (Proposed Action with Different Mitigation), and 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) if PCW decides to move forward with the proposed project without ETPs.

Table 3-13 compares potential compensatory mitigation under Alternative 1 (Proposed Action) and Alternative 2 (Proposed Action with Different Mitigation); see Table 3-12 for definitions of impact criteria.

Table 3-13. Comparison of Compensatory Mitigation Measures for Fish, Amphibians, and Reptiles for the CCSM Phase I Project in Wyoming

Compensatory Mitigation Measure	Effects on Fish, Amphibians, and Reptiles
Power pole retrofits	No effect on fish, amphibians, and reptiles.
Mitigation of existing wind facilities	Decommissioning of older wind facilities could be beneficial to fish, amphibians, and reptiles depending on whether roads and water crossing structures are removed and rehabilitated. Curtailing operations or upgrading equipment would have no effect on fish, amphibians, and reptiles.
Lead abatement	No effect on fish, amphibians, and reptiles.
Carcass removal and carcass avoidance	No effect on fish, amphibians, and reptiles.

Compensatory Mitigation Measure	Effects on Fish, Amphibians, and Reptiles
Wind conservation easement	No effect on fish, amphibians, and reptiles.
Habitat enhancement	Benefits to fish, amphibians, and reptiles would be minor to moderate, long-term, probable, and local to regional in extent depending on the types of habitat enhancement and whether fish-bearing waters are part of the enhancement.
Rehabilitation of injured eagles	No effect on fish, amphibians, and reptiles.

3.6 Mammals

3.6.1 Approach

Mammals that occur within the Phase I development and infrastructure areas are discussed because they provide prey and carrion for eagles, particularly golden eagles. ESA-candidate and listed species, as well as species of concern in Wyoming (an unofficial list maintained by our USFWS Wyoming Ecological Services Field Office), are also discussed in this section. BLM sensitive mammal species are adequately discussed in the BLM NEPA documents and therefore are not addressed here.

The study area for mammals encompasses areas within and beyond the Phase I development and infrastructure areas. Ranges of big game species that extend beyond the Phase I development and infrastructure areas were considered as part of the study area because big game species migrate seasonally in response to changes in food availability (Avgar et al. 2014) and, therefore, occupy areas larger than the Phase I development and infrastructure areas. Big game carcasses are an important winter food source for eagles (Marr and Knight 1983). Mortality of big game species that occurs during their migration can result in carrion availability for eagles and other raptors.

For our analysis of mammals, we have reviewed the BLM FEIS and ROD, EA1, and EA2. New information gathered since the publication of these documents or information that affects mammals and is relevant to our decision to issue standard and programmatic ETPs has been included in the resource description and subsequent environmental impact analysis. Public, agency, and tribal input regarding mammals received during the scoping process and tribal consultation has been included in the analysis of this resource.

3.6.2 Affected Environment

We are incorporating into this EIS by reference information about mammals that we have determined is adequate for our analysis from the following documents:

- BLM FEIS – Section 3.14, found on pages 3.14-1 through 3.14-28; and Section 3.15, found on pages 3.15-1 through 3.15-20

- EA1 – Section 3.13, found on pages 3-42 through 3-45; and Section 3.14, found on pages 3-46 through 3-63
- EA2 – Section 3.8 and Section 3.9

We find the discussion of mammals in the BLM NEPA documents to be adequate for our analysis. The description of mammals in the BLM NEPA documents has not changed substantially since their publication. A summary of information on mammals from these documents, with updated information incorporated, is provided below.

3.6.2.1 Distribution and Occurrence

Wildlife and their habitat in the Phase I development and infrastructure areas were described in detail in the BLM FEIS, EA1, and EA2. Our discussion focuses on mammals that occur in the Phase I development and infrastructure areas that are known eagle prey; may compete with eagles for the same prey; or have the greatest potential to be affected by long-term operation of wind turbines, such as bats. These mammal species are listed in Table 3-14. Subsequent to the publication of the BLM ROD (BLM 2012b), numerous wildlife studies have been conducted. New data obtained during these studies are presented in the sections below.

Table 3-14. Select Mammal Species Potentially Occurring in or near the Phase I Development and Infrastructure Areas for the CCSM Phase I Project in Wyoming

Common Name	Scientific Name	Distribution within the Phase I Development and Infrastructure Areas	Importance to Eagles
Small Game and Furbearers			
Cottontail rabbits	*Sylvilagus audubonii* and *S. nuttallii*	Throughout the Phase I development and infrastructure areas	Potential primary or secondary prey
White-tailed jackrabbits	*Lepus townsendii*	Lower-lying Sage Creek Basin of the Sierra Madre WDA	Potential primary or secondary prey
Pygmy rabbit	*Brachylagus idahoensis*	See Figures 3-8 and 3-9	Potential prey
Wyoming ground squirrel	*Spermophilus elegans*	Throughout the Phase I development and infrastructure areas	Potential primary or secondary prey
White-tailed prairie dog	*Cynomys leucurus*	See Figure 3-10	Potential primary or secondary prey
Black-tailed prairie dog	*Cynomys ludovicianus*	Historically present, but not currently known to occur in Carbon County.	Unlikely prey source due to absence of species from area

Common Name	Scientific Name	Distribution within the Phase I Development and Infrastructure Areas	Importance to Eagles
Wyoming pocket gopher	*Thomomys clusius*	See Figures 3-11 and 3-12	Potential secondary prey
Muskrat	*Ondatra zibethicus*	Riparian areas, lakes, and ponds	Unlikely prey source
Beaver	*Castor canadensis*		
Coyote	*Canis latrans*	Throughout the Phase I development and infrastructure areas	Potential prey; some species, such as coyotes, are also potential competitors for prey
Red fox	*Vulpes vulpes*		
Raccoon	*Procyon lotor*		
Weasels	*Mustela* spp.		
Mink	*Mustela vison*	Riparian areas, lakes, and ponds	Unlikely prey source
Badger	*Taxidea taxus*	Throughout the Phase I development and infrastructure areas	Potential prey; some species are also potential competitors for prey
Striped skunk	*Mephitis mephitis*		
Bobcat	*Lynx rufus*		
Big Game			
Mule deer	*Odocoileus hemionus*	Phase I Chokecherry WDA and infrastructure areas overlap crucial winter range [a], winter-yearlong range [b], and spring-summer-fall range[c] habitat. Phase I Sierra Madre WDA and infrastructure areas overlap spring-summer-fall range[c] habitat. See Figure 3-4 for crucial winter range[a] and suspected migration routes.	Important food source in their winter range[d] as carrion[e]
Elk	*Cervus canadensis*	Phase I Sierra Madre WDA and infrastructure areas overlap winter-yearlong range [b], spring-summer-fall range[c] and a suspected migration corridor. See Figure 3-5 for crucial winter range[a] and suspected migration routes.	Important food source in their winter range[d] as carrion[e]
Pronghorn	*Antilocapra*	Phase I Chokecherry WDA	Important food

Common Name	Scientific Name	Distribution within the Phase I Development and Infrastructure Areas	Importance to Eagles
	americana	and infrastructure areas overlap winter-yearlong range [b], spring-summer-fall range [c], and suspected migration corridors. Phase I Sierra Madre WDA and infrastructure areas overlap spring-summer-fall range[c] and a suspected migration corridor. See Figure 3-6 for crucial winter range[a] and suspected migration routes.	source in their winter range[d] as carrion[e]
Bats[f]			
Big brown bat	*Eptesicus fuscus*	Potentially throughout the Phase I development and infrastructure areas during foraging and migration (see Figure 3-7)	Unlikely prey source
Eastern red bat	*Lasiurus borealis*		
Fringed myotis	*Myotis thysanodes*		
Hoary bat	*Lasiurus cinereus*		
Little brown bat	*M. lucifugus*		
Long-eared myotis	*M. evotis*		
Long-legged myotis	*M. volans*		
Pallid bat	*Antrozous pallidus*		
Silver-haired bat	*Lasionycteris noctivagans*		
Townsend's big-eared bat	*Corynorhinus townsendii*		
Western small-footed myotis	*M. ciliolabrum*		
Yuma myotis	*M. yumanensis*		

Sources: BLM 2012a, 2014, 2016a; Bedrosian 2014 (*for importance to eagles for all species except pygmy rabbit*); Washington Department of Fish and Wildlife 1995 (*for importance to eagles for pygmy rabbit*); Lee 2008 (*for importance to eagles for pygmy rabbit*); Abernethy et al. 2013 and Griscom et al. 2012 (*for bats other than hoary bat*).

Notes:

[a] Crucial winter range = seasonal range that consistently receives high levels of use and is considered a limiting factor in maintaining population objectives for a herd; combine with the definition of winter-yearlong range, below, for crucial winter-yearlong range

[b] Winter-yearlong range = ranges occupied throughout the year, but more heavily used during the winter as resident and migratory animals mix

[c] Spring-summer-fall range = ranges used by animals from May through October

[d] Winter range = ranges where animals congregate during winter months, from November through April

[e] Carrion = dead and decaying flesh of an animal

[f] Identified within a 20-mile buffer of Phase I development and infrastructure areas, except for hoary bat

3.6.2.1.1 Small Game and Furbearers

In accordance with 40 CFR 1502.21, we are incorporating by reference the BLM FEIS, Section 3.14.2.2, found on pages 3.14-5 through 3.14-7, as this information is adequate for our analysis. New information or information not included in these documents is provided below.

Small game and furbearers with special management status are discussed in Section 3.6.2.3. Special status mammals that could occur in the area of the CCSM Phase I Project include the black-footed ferret (*Mustela nigripes*), pygmy rabbit (*Brachylagus idahoensis*), white-tailed prairie dog (*Cynomys leucurus*), and the Wyoming pocket gopher (*Thomomys clusius*).

Cottontail Rabbit

The cottontail rabbit (*Sylvilagus* spp.) is the most harvested small game animal in Wyoming and is found in a wide variety of habitats, including sagebrush basins, grasslands, and agricultural regions (WGFD 2014a). The distributions of both desert cottontail (*Sylvilagus audubonii*) and Nuttall's cottontail (*S. nuttallii*) include most of Wyoming, while eastern cottontails (*S. floridanus*) occupy a small portion of southeastern Wyoming and distant from the Phase I development and infrastructure areas (Reid 2006).

The WGFD has established six management areas for small game, upland game birds, and furbearers in Wyoming. The Phase I development and infrastructure areas are located within Management Area 4. Harvest estimates for cottontail within Management Area 4 are typically the highest of the six management areas (WGFD 2011, 2012a, 2013a, 2014b). While cottontail harvest estimates decreased from 7,976 in 2010 to 3,237 in 2011, they gradually increased to 7,598 in 2013, as shown in Table 3-15 (WGFD 2011, 2012a, 2014b). This harvest increase may indicate a rebound in the cottontail population cycle (Fedy and Doherty 2011).

Table 3-15. 2010-2013 Cottontail Rabbit Harvest Estimates for Management Area 4 in Wyoming

Fiscal Year	Hunters	Days	Management Area 4 Harvest	Statewide Harvest
2010	1,363	5,395	7,976	16,712
2011	1,098	3,942	3,237	11,802
2012	583	1,954	2,958	6,496
2013	1,278	4,978	7,598	16,416

Sources: WGFD 2011, 2012a, 2013a, 2014b.

Cottontails and jackrabbits (*Lepus* spp. [family *Leporidae*]) comprise more than half of all golden eagle prey in the western United States (Bedrosian 2014). Apex predators (that is, predators at the top of the food chain, with no natural predators of their own) such as golden eagles can exert a profound influence on prey species through direct predation or behavioral modification. Conversely, prey abundance and availability can strongly influence golden eagle nesting success (Preston 2013).

During a recent study in northwestern Wyoming, cottontails were the most frequently consumed prey species for golden eagles, accounting for more than 70 percent of all prey animals identified (Preston 2013). Ground squirrels and prairie dogs are an important secondary food source (that is, a food source used when primary food sources are not available) for golden eagles (MacLaren et al. 1988; Bedrosian 2014).

Furbearers

Furbearing species present within the Phase I development and infrastructure areas, listed in Table 3-14, are also potential prey for eagles (Mason 2000; Coonan et al. 2005; Collins and Latta 2009; Bedrosian 2014). Badger (*Taxidea taxus*), bobcat (*Lynx rufus*), long-tailed weasels (*Mustela frenata*), coyote (*Canis latrans*), red fox (*Vulpes vulpes*), and striped skunk (*Mephitis mephitis*) could occur throughout the Phase I development and infrastructure areas. Bobcats, badgers, foxes, and coyotes consume cottontails, jackrabbits, and ground squirrels, which are the primary items in the diet of golden eagles. In addition, both coyotes and golden eagles consume carrion in winter (Bowen 1980). Beaver (*Castor canadensis*), mink (*Mustela vison*), and muskrat (*Ondatra zibethicus*) potentially occur in riparian areas, lakes, or ponds within the Phase I development and infrastructure areas; however, these three species are unlikely eagle prey sources.

3.6.2.1.2 Big Game

We have determined the information adequate for our analysis and in accordance with 40 CFR 1502.21, we are incorporating by reference the BLM FEIS, Section 3.14.2.1, found on pages 3.14-1 and 3.14-2; EA1, Section 3.13.1, found on pages 3-43 through 3-46; and EA2, Section 3.8.1. New information or information not included in these documents is provided below.

Three big game species, all ungulates (that is, hooved mammals), are found within the Phase I development and infrastructure areas: mule deer (*Odocoileus hemionus*), elk (*Cervus canadensis*), and pronghorn (*Antilocapra americana*). Big game species migrate seasonally in response to changes in food availability (Avgar et al. 2014), and recent studies in Wyoming have documented both the existence and importance of migratory corridors (Sawyer et al. 2002, 2005, 2013).

Mortality of big game species has been assessed in this EIS because eagles, particularly golden eagles, feed on mule deer, elk, and pronghorn carcasses, especially during winter months when big game mortality is more prevalent and smaller prey is scarce. Wildlife-vehicle collisions can be a substantial source of mortality for big game species (Olson et al. 2014) and are especially problematic when roads bisect winter range or migration routes, where animal densities are high during certain periods of the year (Sawyer and LeBeau 2011). Wildlife collision mortality data for big-game species within a 5-mile buffer of the Phase I development and infrastructure areas for 2004 through 2014 are provided in Table 3-16. In addition to wildlife collisions, other sources of mortality for big game species within or adjacent to the Phase I development and infrastructure areas include winter mortalities and hunting.

Table 3-16. Wildlife Collision Mortalities for Big Game Species within a 5-mile Buffer of the Phase I Development and Infrastructure Areas for the CCSM Phase I Project in Wyoming

Road Name	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
I-80	2	4	9	10	40	49	74	67	68	23	35
WYO 71	1	2	1	0	0	1	2	2	3	2	3
WYO 76	1	0	0	1	0	0	0	1	0	0	0
WYO 78	0	2	1	0	0	0	2	1	2	1	3
WYO 130/ WYO 230	0	0	0	1	6	2	0	0	0	0	0
WYO 130	1	0	0	1	0	0	1	0	1	0	1
US 30	0	1	0	0	0	0	0	1	0	0	0
Spruce Street	1	0	0	1	0	1	0	1	1	0	1
Savage Ranch Road	0	0	1	0	0	0	0	0	0	0	0
Sage Creek Road	0	2	1	0	0	0	0	0	0	0	0
North Higley Boulevard	0	0	1	0	0	1	0	0	0	0	1
Cedar Street	0	0	0	0	0	0	0	0	0	1	1
County Road 340	0	0	0	0	0	0	0	0	1	0	0

Road Name	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
County Road 401	0	0	0	0	0	0	0	0	0	2	0
Golf Course Road	0	0	0	0	1	1	0	0	0	0	0
Totals	**6**	**11**	**14**	**14**	**48**	**55**	**79**	**73**	**76**	**29**	**45**

Sources: Wyoming Department of Transportation 2015; Colorado Department of Transportation 2015a.

Carcasses of big game species can be an important winter food source for some vertebrates (DeVault et al. 2003), including coyotes and golden eagles (Sánchez-Zapata et al. 2010). Coyotes prey on adult ungulates during winter as coyote pack size increases and prey body condition declines (Beasom 1977; Gese et al. 1988). Coyote predation can be an important source of mortality for mule deer and pronghorn fawns, especially in the absence of wolves (Berger and Conner 2008). Golden eagles have also been documented attacking big game species, including deer (Olendorff 1976; Kerley and Slaght 2013), elk (Collins and Latta 2009), and pronghorn (Tigner 1973; Deblinger and Alldredge 1996; Wagner 2000). While golden eagles generally take young ungulates, they also have been known to kill adults (Deblinger and Alldredge 1996).

Migratory behaviors of big game species in Wyoming are changing in response to changes in the environment. A recent study in south-central Wyoming examined the migratory behavior of mule deer in response to varying levels of development (Sawyer et al. 2013). Mule deer migrated through areas of moderate development without any detectable changes in migratory behavior. However, mule deer exposed to increased levels of development in migration routes detoured from established routes, increased movement rates, and reduced the area of stopover use by individuals, while the overall use and width of migration routes decreased (Sawyer et al. 2013).

Mule Deer

The Phase I development and infrastructure areas occur within WGFD's Platte Valley (Unit #541) and Baggs (Unit #427) Mule Deer Herd Units. The West Sinclair Rail Facility area and Road Rock Quarry area are in the Platte Valley Mule Deer Herd Unit. The estimated numbers of mule deer per unit are presented in the BLM FEIS (BLM 2012a).

While mule deer in the Phase I Sierra Madre WDA are predominantly migratory, the Phase I Chokecherry WDA contains both resident and migratory mule deer. Throughout most of the Platte Valley, mule deer movements to summer habitat occur during April and May, while movements to wintering areas occur in October and November (WGFD 2013b). Recent studies of a non-migratory mule deer herd in the Atlantic Rim area of south central Wyoming indicated that these mule deer have fawns from mid-June to mid-July (Webb et al. 2013). This herd showed no marked migratory patterns except for changes in elevation use (Webb et al. 2013). The availability of space and resources may be more important to non-migratory herds because they have not developed alternate strategies to exploit resources between

disjunct seasonal ranges (that is, areas of habitat that are separated by areas of non-habitat or less favorable habitat) (Fryxell and Sinclair 1988).

Mapped crucial winter range for mule deer is located along the northern and eastern portions of the Phase I Chokecherry WDA and includes portions of the Phase I Haul Road and Facilities, most of the West Sinclair Rail Facility, and all of the Road Rock Quarry areas (WGFD 2013b), as shown in Figure 3-4. Crucial winter range, as defined by the WGFD, is critical to a population's ability to maintain adequate productivity to meet population objectives. However, according to the WGFD, the portion of winter range within the Phase I development and infrastructure areas contains relatively few deer (that is, approximately 200 to 400 along the North Platte River) depending on local conditions.

The WGFD is currently reviewing suspected big game migration routes to determine if they meet new criteria and constitute vital habitat. There are currently no officially designated big game migration corridors in Wyoming. There is one suspected mule deer migration route along the southern boundary of the Phase I Chokecherry WDA. This suspected migration route crosses the proposed electrical transmission line ROW and the Phase I Haul Road and Facilities (see Figure 3-4).

In response to various management concerns related to the Platte Valley herd, the WGFD published the Platte Valley Mule Deer Plan (WGFD 2013b). The WGFD manages the Platte Valley herd within 10 percent of the "post-season" population size of 20,000 mule deer, reflecting the number of deer in the population after the hunting season. Since 2006, the Platte Valley herd has been declining (WGFD 2013b). The Platte Valley Mule Deer Plan provides the following habitat management recommendations:

- Restoration and improvement of all seasonal habitat types for mule deer throughout the Platte Valley.
- Increased monitoring of mule deer habitat.
- Minimization of impacts on Platte Valley mule deer from energy development, including a recommendation for the WGFD to work with the BLM and the U.S. Department of Agriculture, Forest Service to require energy development consistent with WGFD's and the Western Association of Fish and Wildlife Agencies' *Energy Development Guidelines for Mule Deer* (Lutz et al. 2011). These guidelines outline additional mitigation recommendations, including habitat mitigation options for reducing impacts on mule deer.
- Modifying fencing and maintaining or restoring known or suspected migration routes.

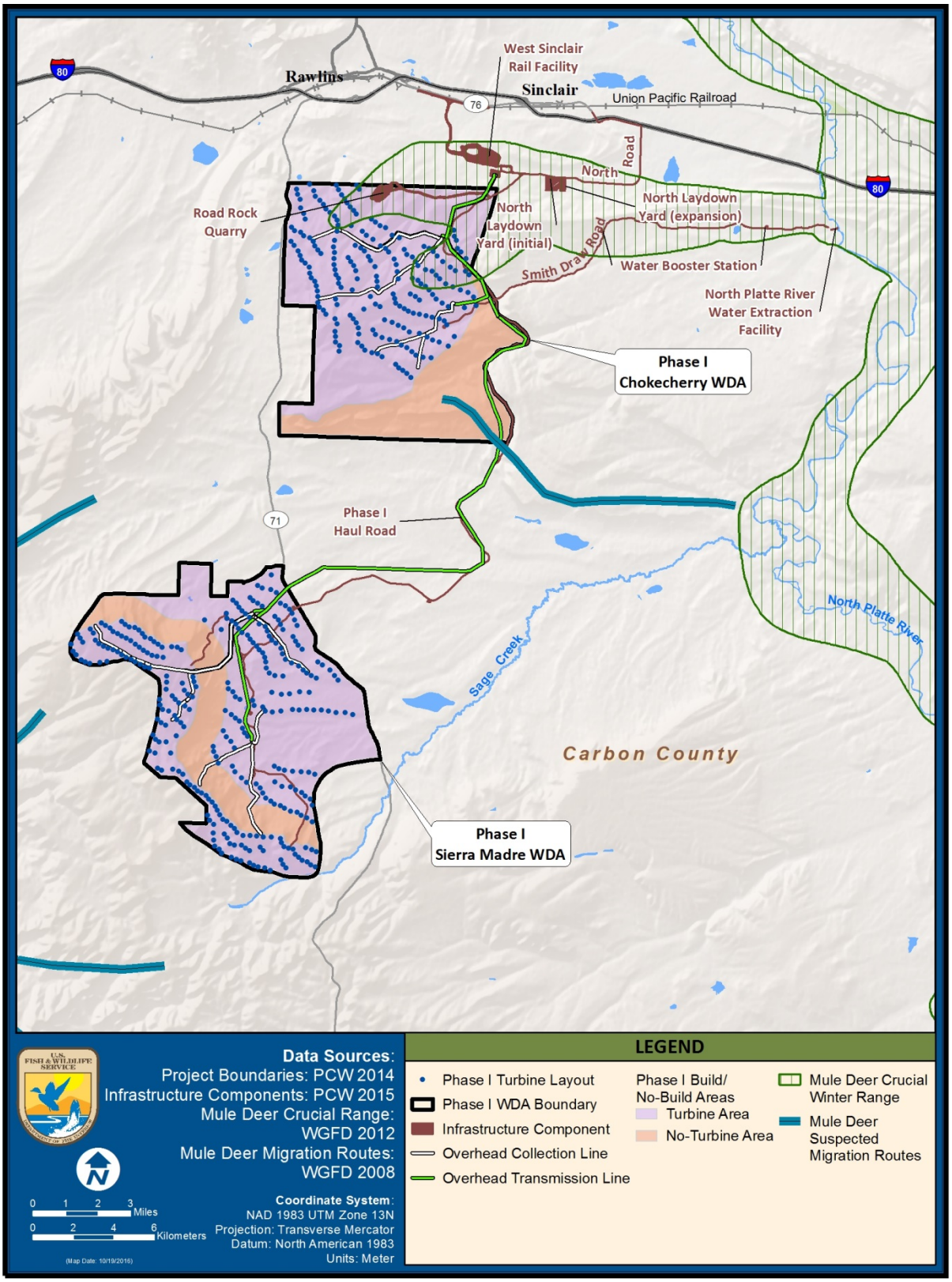

Figure 3-4. Mule Deer Suspected Migration Routes and Crucial Winter Range in and near the Phase I Development and Infrastructure Areas for the CCSM Phase I Project in Wyoming

Elk

The Phase I development and infrastructure areas occur within the Snowy Range (#533) and Sierra Madre (#425) Elk Herd Units, which are managed for populations of 6,000 and 4,200 elk, respectively. Mapped crucial winter range for elk occurs near the northwestern boundary of the Phase I Sierra Madre WDA, as shown in Figure 3-5. No changes to the affected environment for elk have occurred since the publication of the BLM FEIS, EA1, and EA2, and no additional information regarding elk is necessary for our analysis.

Pronghorn

The Phase I development and infrastructure areas occur within the Iron Springs (#630) Pronghorn Herd Unit. No crucial winter range occurs within the Phase I development and infrastructure areas. Mapped crucial winter range for this species does occur about 3 miles (5 kilometers) north of the Phase I Chokecherry WDA. The proposed North Platte River Water Extraction Facility would be at the edge of crucial winter range, as shown in Figure 3-6.

The WGFD is currently reviewing all suspected big game migration routes to determine if they meet the criteria of vital habitat. There are currently no officially designated big game migration corridors in Wyoming. There are at least two suspected pronghorn migration routes overlapped by the Phase I development and infrastructure areas and analyzed in the BLM FEIS (BLM 2012a), as shown in Figure 3-6:

1. Along the northern boundary of the Phase I Chokecherry WDA, the suspected pronghorn migration route crosses the Phase I Haul Road in two locations.
2. In the northeast portion of the Phase I Sierra Madre WDA, the suspected pronghorn migration route crosses the proposed transmission line ROW and where wind turbine development is proposed.

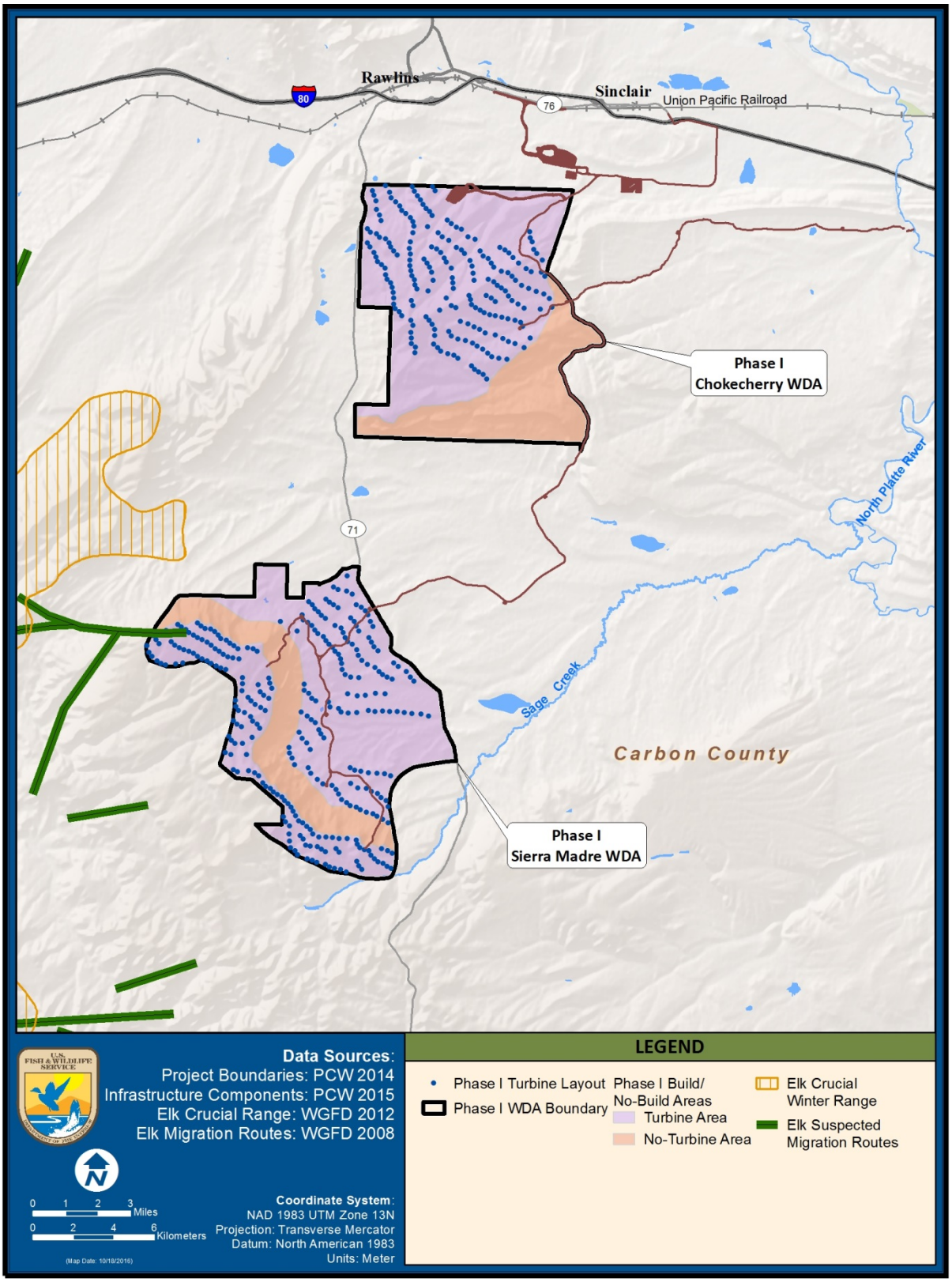

Figure 3-5. Elk Suspected Migration Routes and Crucial Winter Range in and near the Phase I Development and Infrastructure Areas for the CCSM Phase I Project in Wyoming

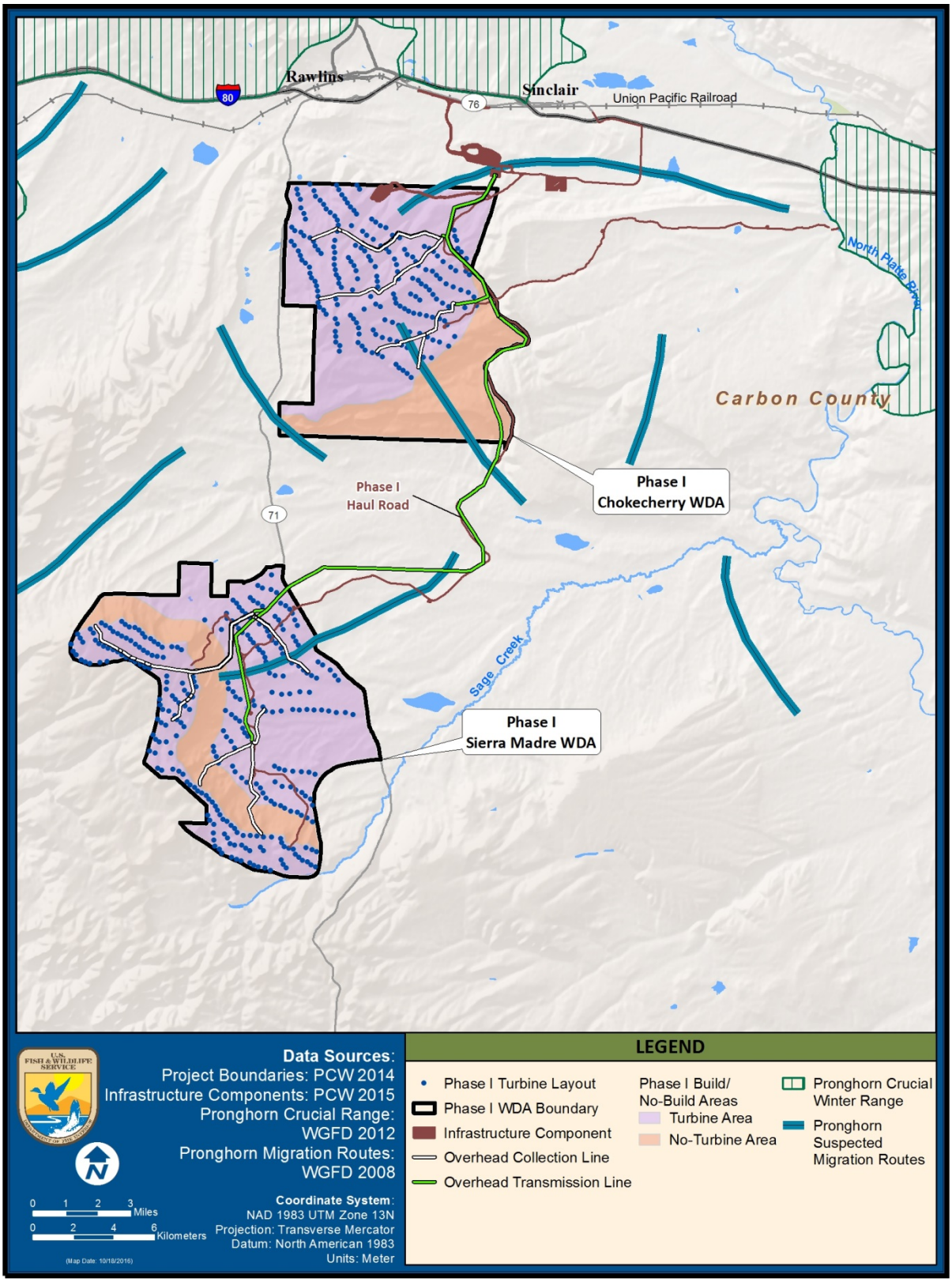

Figure 3-6. Pronghorn Suspected Migration Routes and Crucial Winter Range in and near the Phase I Development and Infrastructure Areas for the CCSM Phase I Project in Wyoming

3.6.2.1.3 Bats

In accordance with 40 CFR 1502.21, we have determined the information is adequate for our analysis and we are incorporating by reference the BLM FEIS, Section 3.14.2.3, found on pages 3.14-7 through 3.14-10. Acoustic studies for bats, following the WGFD Wildlife Protection Recommendations for Wind Energy Development, were conducted by PCW in both the Phase I Chokecherry and Phase I Sierra Madre WDAs to determine temporal and spatial variation of bat use (Solick et al. 2008). Additional acoustic studies for bats, conducted simultaneously with radar surveys for birds and bats were conducted by PCW in 2011 and 2012 (SWCA 2015). It is important to note that these studies focused on the larger Phase I and Phase II WDAs and the results may not be accurate to the Phase I WDAs. The following paragraphs summarize the results of the studies.

Acoustic surveys for bats were conducted from eight AnaBat SD-1 bat detector stations at six locations throughout the survey area from July 13 to October 13, 2008. Two of these locations, one each in the Phase I Chokecherry and Phase I Sierra Madre WDAs, included paired stations with a ground-based detector and one raised on a meteorological tower to a height of 148 feet (Solick et al. 2008).

During the survey, a total of 3,021 bat passes were recorded, with a mean of 4.3 bat passes per detector night for the entire survey period (Solick et al. 2008). Bat activity in the Phase I Chokecherry WDA was similar for three of the ground-based detectors (mean = 3.0 bat passes per detector night), but higher at the fourth ground-based detector, station A3 (20.6 bat passes per detector night), in the southwestern portion of the Phase I Chokecherry WDA. Station A3, placed in proximity to a stock pond and associated riparian vegetation in Hugus Draw, was used to document species composition and relative activity of local bats in the Phase I development and infrastructure areas. However, this location is not representative of probable turbine locations, which are characterized as dry, upland areas (Solick et al. 2008). Bat activity was low and similar between both ground-based units in the Phase I Sierra Madre WDA (mean = 1.1 bat passes per detector night). With the results from station A3 excluded, bat activity at the remaining seven stations was 1.9 bat passes per detector night.

Bat activity was highest from July 13 through August 31 and then tapered off through the remainder of the study. Peaks of activity occurred on July 27 and August 22. Temporal (that is, time-based) patterns were largely consistent among stations, with the exception of station A3, which recorded more passes per night (Solick et al. 2008).

Bat passes were classified as either high frequency calls (≥35 kilohertz) that typically are produced by species of *Myotis* or eastern red bats (*Lasiurus borealis*), or low frequency calls (<35 kilohertz) that are typically produced by big brown (*Eptesicus fuscus*), silver-haired (*Lasionycteris noctivagans*), and hoary bats (*Lasiurus cinereus*). Of the calls recorded, 63 percent were high frequency and 37 percent were low frequency. At the ground-based units, the proportion of high frequency to low frequency bat passes was similar, with the exception of station A3, which recorded three times more high frequency passes than low frequency passes. At the elevated units, low frequency bat passes outnumbered high

frequency bat passes. Hoary bats, the only species that could be reliably identified using the acoustic data, comprised 7 percent of all bat passes (Solick et al. 2008).

Additional acoustic surveys using AnaBat detectors at five ground-based stations collocated with radar survey sites were conducted from June 15 to October 20, 2011, and June 27 to August 29, 2012 (SWCA 2015). During the surveys, a total of 185 and 134 bat passes were recorded in 2011 and 2012, respectively, with a mean of 2.0 bat passes per detector night for the 2011–2012 survey period (SWCA 2015). Bat activity was highest from mid- to late July to mid-August, and then tapered off through the remainder of the survey periods. Peaks of activity occurred on July 24, 2011, and July 12, 2012. The mean of 2.0 bat passes per detector night for the 2011–2012 survey period (SWCA 2015) is similar to the mean of 1.9 bat passes per detector night for 2008 after the exclusion of the outlier station A3 (Solick et al. 2008).

Bat passes were classified as high frequency (≥40 kilohertz), mid-frequency (~30 to 40 kilohertz), or low frequency (≤25 kilohertz) calls. Of the calls recorded during 2011, 84 percent were mid- and high frequency and 16 percent were low frequency. During the 2012 survey, 86 percent of calls were mid- and high frequency and 14 percent were low frequency. Hoary bats, the only species that could be reliably identified using the acoustic data, comprised 4 and 7 percent of all bat passes in 2011 and 2012, respectively (SWCA 2015).

Detecting and identifying bat species with acoustic sampling is bound by two constraints: (1) how easily a bat is detected in the field, and (2) how reliably it can be identified by its call parameters once detected. Detectability depends on call intensity, call frequency, and distance from the detector. In general, species with a low frequency, high intensity call are detected at the greatest distance and, therefore, are more frequently represented in acoustic sampling surveys (Pierson et al. 2001). In addition, the implementation of different recording analysis technologies (that is, zero crossing versus full spectrum) and automated acoustic bat identification software programs may further confound survey results.

To better understand bat distribution and migration patterns in relation to areas of high wind development, the BLM conducted bat surveys from 2011 through 2012 in most of the area served by the Rawlins Field Office, including the Phase I development and infrastructure areas (Abernethy et al. 2013; Griscom et al. 2012). These surveys included mist-net data as well as acoustic data using both Anabat and Song Meter detectors. Acoustic data were analyzed with Sonobat automated analysis software and manual review. The following bat species were captured or recorded within a 20-mile buffer of the Phase I development and infrastructure areas: pallid bat (*Antrozous pallidus*), Townsend's big-eared bat (*Corynorhinus townsendii*), big brown bat, silver-haired bat, eastern red bat, hoary bat, western small-footed myotis (*Myotis ciliolabrum*), long-eared myotis (*M. evotis*), little brown bat (*M. lucifugus*), fringed myotis (*M. thysanodes*), long-legged myotis (*M. volans*), and Yuma myotis (*M. yumanensis*) (Abernethy et al. 2013; Griscom et al. 2012).

Areas predicted for high use by tree-roosting long-distance migratory bat species (hereafter referred to as migratory tree bats), such as silver-haired, hoary, and eastern red bats in Wyoming, include riparian corridors and the foothills of major mountain ranges that have

forest cover and perennial water in proximity. Areas of particular interest in the vicinity of the CCSM Phase I Project include the foothills of the Sierra Madre Range (Abernethy et al. 2013) and the aspen stands and east-running drainages in the Phase I development and infrastructure areas (Griscom et al. 2012).

Acoustic surveys were conducted by PCW in the Phase I development and infrastructure areas. Because it is difficult to differentiate calls of these species, the hoary bat is the only species positively identified during the surveys (Solick et al. 2008; SWCA 2015). During 2011 and 2012, surveys for bats in and near the Phase I development and infrastructure areas conducted by the BLM documented twelve bat species (Abernethy et al. 2013; Griscom et al. 2012). The long-eared myotis was recorded in and southeast of the Phase I Sierra Madre WDA, and the fringed myotis was recorded 1.2 miles (2 kilometers) west of the Phase I Chokecherry WDA. Townsend's big-eared bat was recorded 1.9 miles (3 kilometers) southeast of Phase I Sierra Madre WDA, as shown in Figure 3-7). The long-eared myotis was captured 2.1 miles (3.3 kilometers) southeast of the Phase I Sierra Madre WDA, and the fringed myotis was captured 43.3 miles (69.7 kilometers) southwest of the Phase I Sierra Madre WDA. Townsend's big-eared bat was captured 36.7 miles (59 kilometers) northeast of the Phase I Chokecherry WDA, as shown in Figure 3-7.

White-Nose Syndrome

White-nose syndrome (WNS) is a devastating disease that is estimated to have killed up to 6.7 million cave hibernating bats in the eastern United States and Canada (USFWS 2012d; Reeder and Moore 2013). The causative agent associated with WNS, a fungus named *Pseudogymnoascus destructans*, disrupts physiological processes and leads to mortality through premature depletion of fat reserves during hibernation (Verant et al. 2014). Since it first appeared in New York in 2006, WNS has spread south to South Carolina, Mississippi, and Alabama, west to eastern Nebraska and Oklahoma, north to southern Canada, and was recently detected in west-central Washington (White-Nose Syndrome.org 2016).

Although a scarcity of data exists concerning the winter ecology of western bat species (Knudsen et al. 2013), it was speculated that they may be less susceptible to WNS. Many cave hibernating bats in the eastern United States tend to congregate in large numbers in more humid hibernacula (that is, caves and mines where bats hibernate), making them extremely susceptible to WNS. Western bat species generally hibernate in smaller groups and are more dispersed, which may slow the spread of the disease (Knudsen et al. 2013). In addition, it is assumed that western hibernacula are generally warmer and drier than those in the eastern United States and, therefore, less conducive to the spread of WNS (Knudsen et al. 2013), except for some caves in Colorado (Ingersoll et al. 2010).

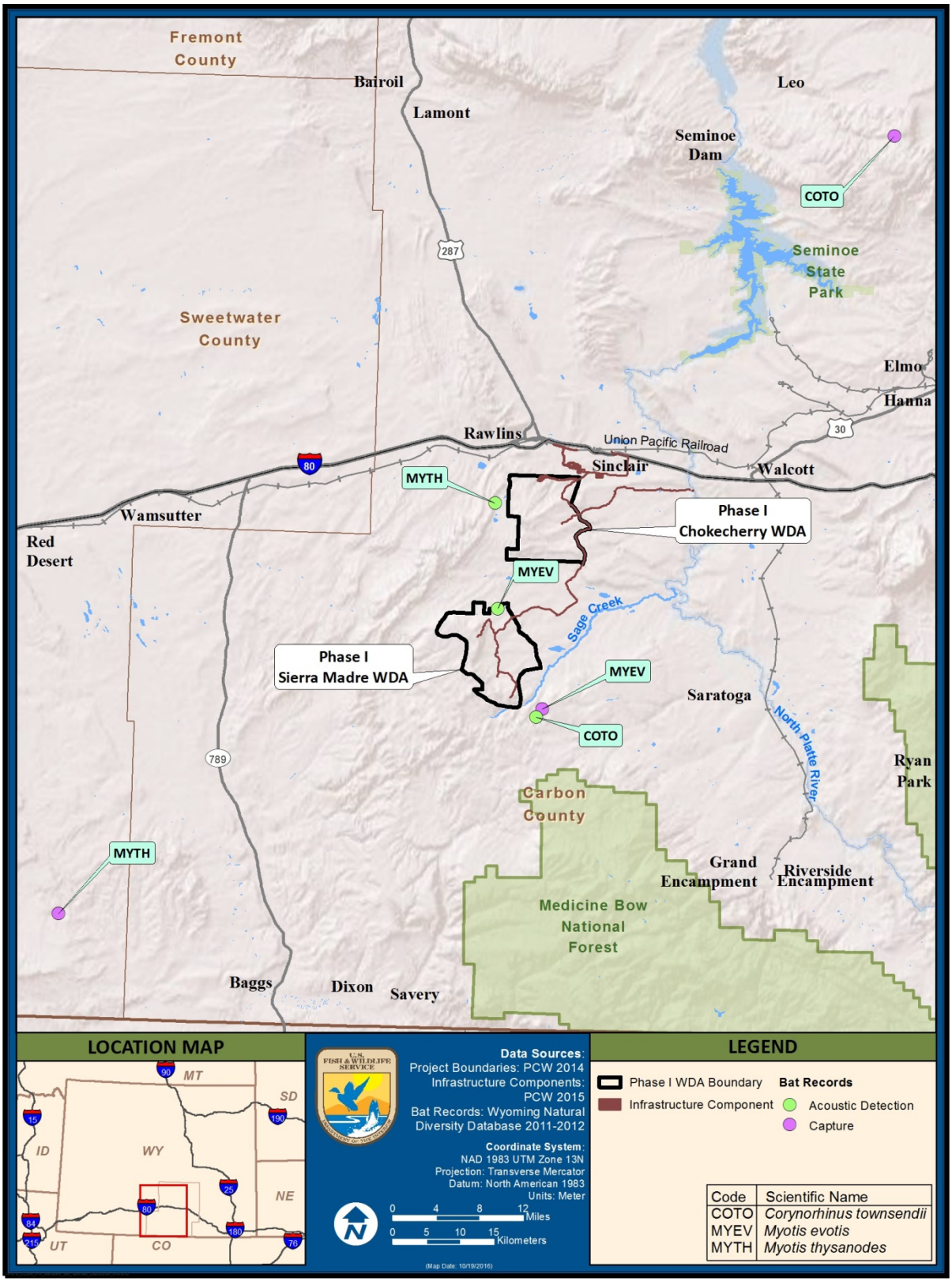

Figure 3-7. Bat Species Distribution in and near the Phase I Development and Infrastructure Areas for the CCSM Phase I Project in Wyoming

Given the continental ranges of little brown and big brown bats, two species currently impacted by WNS, the disease is likely to spread westward into the Rocky Mountain region (Ihlo 2013; Alves et al. 2014). The little brown bat, once the most common species in the northeastern United States, has suffered the greatest losses from WNS (Boyles and Willis 2009; Frick et al. 2010) and may be at great risk of regional extinction (Cohn 2012). Recently, the Government of Canada listed the little brown bat as endangered (Government of Canada 2014), and a petition to federally list the little brown bat in the United States is currently under review (Kunz and Reichard 2010). The spread of WNS westward into regions with higher bat diversity and more extensive hibernacula systems could prove catastrophic for bats and the ecosystem services they provide. Ecosystem services are the benefits obtained from the environment that increase human well-being (Kunz et al. 2011). North American bats provide important ecosystem services by consuming vast quantities of insects, many of which are substantial agricultural or forest pests (Kunz et al. 2011). It is estimated that bats in North America prevent $3.7 billion in agricultural damage each year (Boyles et al. 2011).

To date, WNS appears to have affected only cave hibernating bats (Cryan et al. 2014). Migratory tree bats do not rely on caves for hibernation (Mormann and Robbins 2007; Perry et al. 2010), and hoary bats are assumed to migrate to warmer areas where they remain active throughout the winter (Cryan et al. 2014). Thus, migratory tree bats and hoary bats are not yet known to have contracted WNS (Frick et al. 2010; Langwig et al. 2012).

3.6.2.1.4 Special Status Mammal Species

We have determined the information to be adequate for our analysis and therefore, in accordance with 40 CFR 1502.21, we are incorporating by reference the BLM FEIS, Section 3.15, found on pages 3.15-1 through 3.15-9; EA1, Section 3.14, found on pages 3-47 through 3-54; and EA2, Section 3.9. Surveys for special status species were conducted from 2012 through 2014 in accordance with the wildlife monitoring and protection plan (BLM ROD, Appendix G [BLM 2012b]), and in accordance with proposed mitigation measures (BLM ROD, Appendix D [BLM 2012b]) (SWCA 2014a, 2014b, 2014c, 2014d). Survey results for special status species, where applicable, are presented below.

Black-footed Ferret

Subsequent to publication of the BLM FEIS (BLM 2012a), it was determined that the black-footed ferret, which is federally listed as endangered, is not present in Wyoming outside of known, currently occupied habitats, and the entire state was block-cleared for this species (USFWS 2013d). Block clearance means that activities in specified areas are no longer required to meet our survey guidelines for black-footed ferrets, or to undergo consultation under the ESA.

Pygmy Rabbit

Surveys of the pygmy rabbit (*Brachylagus idahoensis*), a species of concern in Wyoming, were conducted in the Phase I development and infrastructure areas. Thirty-five pygmy rabbit locations (21 active and 14 inactive) were documented within 0.25 mile of the Phase I

development area: 16 (8 active and 8 inactive) within the Phase I Chokecherry WDA and 19 (13 active and 6 inactive) within the Phase I Sierra Madre WDA, as shown in Figures 3-8 and 3-9, respectively (SWCA 2014a). Nine pygmy rabbit locations (7 active and 2 inactive) were documented within 0.25 mile of the Phase I Haul Road and Facilities area, as shown in Figures 3-8 and 3-9 (SWCA 2014b). No pygmy rabbits or signs such as pellets or burrows were observed during surveys of the West Sinclair Rail Facility area or the Road Rock Quarry area (SWCA 2014c, 2014d).

White-Tailed Prairie Dog

In accordance with the wildlife monitoring and protection plan (BLM ROD, Appendix G), surveys for white-tailed prairie dogs (*Cynomys leucurus*), a species of concern in Wyoming, were conducted in and adjacent to the Phase I development and infrastructure areas.

White-tailed prairie dog activity was documented at 234 colonies (140 active and 94 inactive) in the vicinity of the Phase I development and infrastructure areas, as shown in Figure 3-10. Of these colonies, 79 are located within the Phase I development and infrastructure areas plus a 50 foot buffer (62 colonies within 50 feet of Phase I wind development activities and 17 colonies within 50 feet of infrastructure activities). Of the 79 colonies within 50 feet of Phase I development and infrastructure areas, 54 were determined to be active and 25 not active (PCW 2015a).

Black-tailed Prairie Dog

The black-tailed prairie dog (*Cynomys ludovicianus*) is a species of concern in Wyoming that inhabits short- and mixed-grass prairies. While the eastern third of Wyoming was included in the black-tailed prairie dog's historical range, this species is not known to occur in Carbon County (USFWS 2015b).

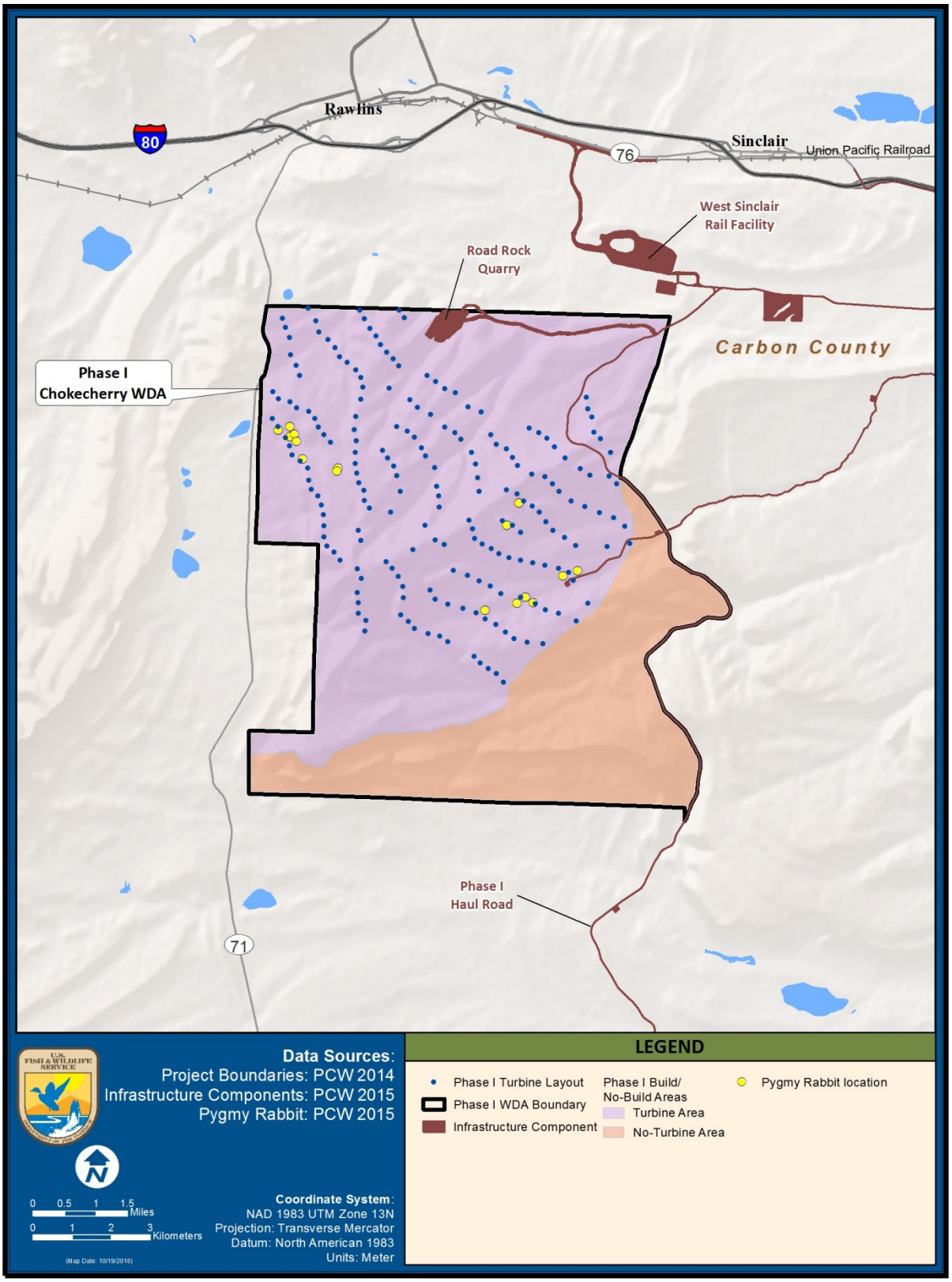

Figure 3-8. Pygmy Rabbit Occurrence in the Phase I Chokecherry Wind Development Area and Infrastructure Areas for the CCSM Phase I Project in Wyoming

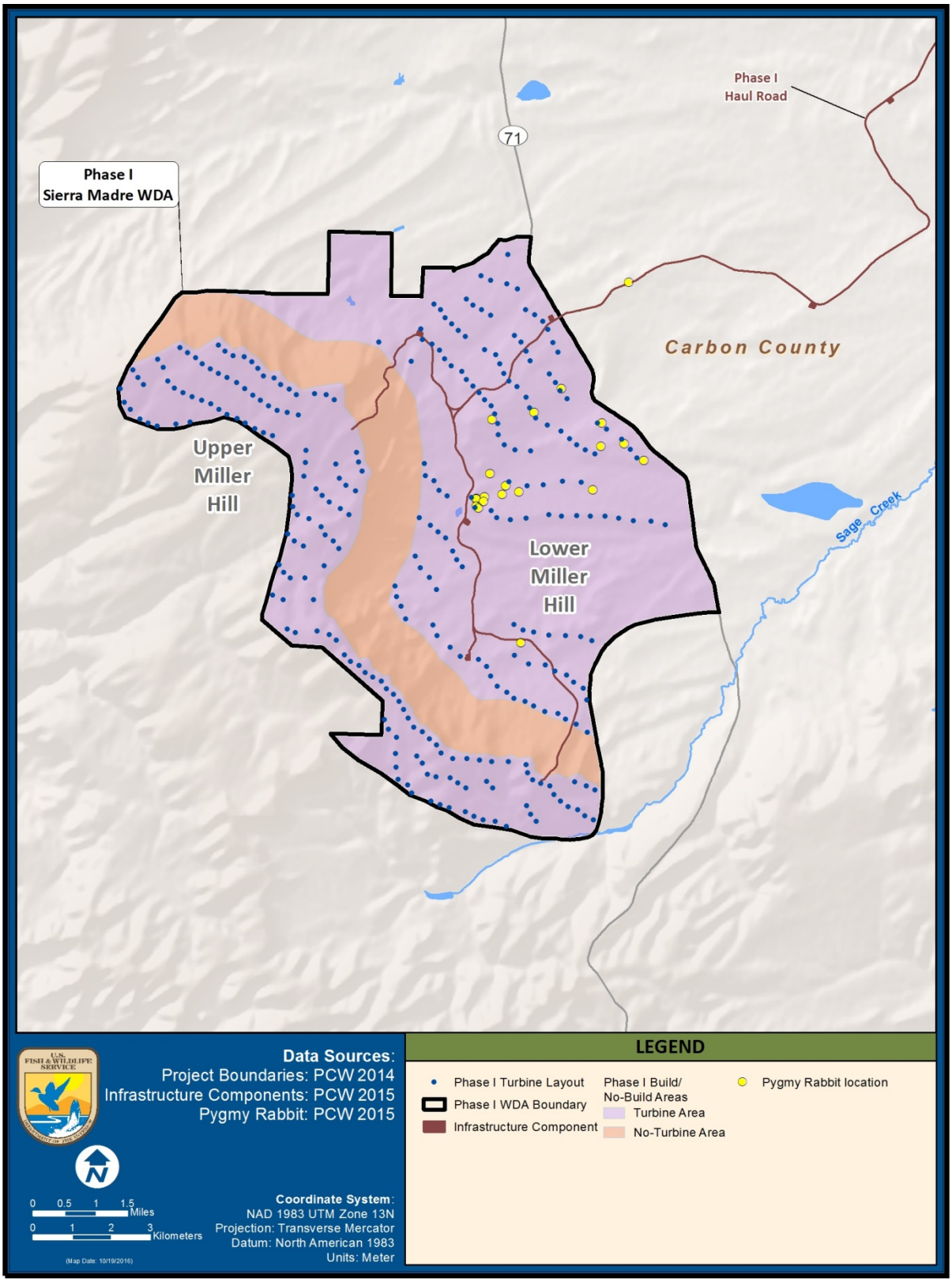

Figure 3-9. Pygmy Rabbit Occurrence in the Phase I Sierra Madre Wind Development Area and Infrastructure Areas for the CCSM Phase I Project in Wyoming

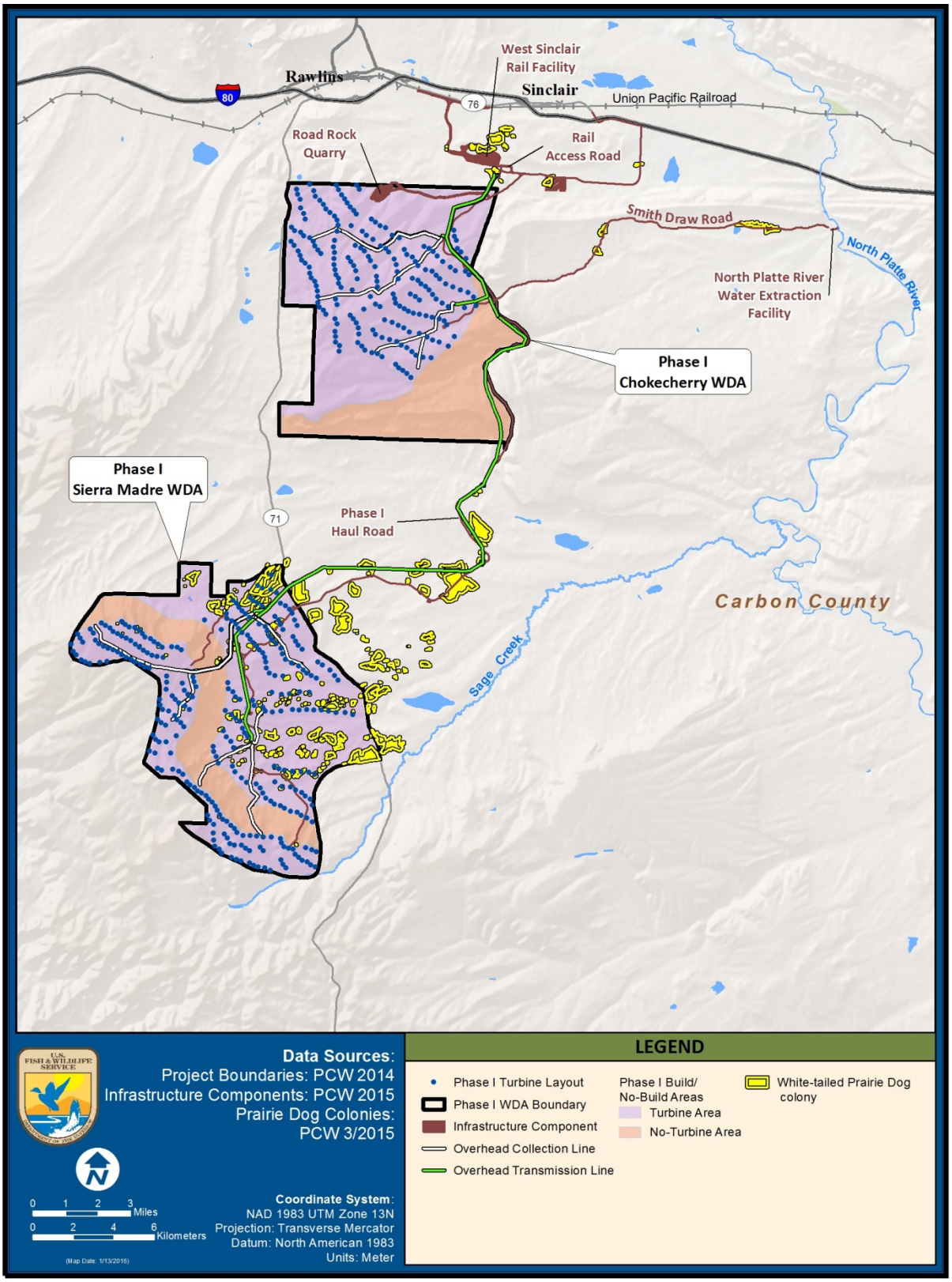

Figure 3-10. Occupied and Unoccupied White-tailed Prairie Dog Colonies in and near the Phase I Development and Infrastructure Areas for the CCSM Phase I Project in Wyoming

Wyoming Pocket Gopher

In accordance with the BLM ROD, Mitigation Measure SSS-2 (BLM 2012b), and the wildlife monitoring and protection plan (BLM ROD, Appendix G), surveys for the Wyoming pocket gopher (*Thomomys clusius*) were conducted in the Phase I development and infrastructure areas (SWCA 2014a, 2014b, 2014c, 2014d). The Wyoming pocket gopher is a species of concern in Wyoming and recently underwent review for listing under the ESA, with a 90-day Finding of "Not Substantial" released on September 14, 2016 (Docket Number FWS-R6-ES-2016-0094). Figures 3-11 and 3-12 show locations of pocket gopher mounds and mound complexes identified within 250 feet (75 meters) of the Phase I development and infrastructure areas, as well as the Wyoming Natural Diversity Database distribution model for the Wyoming pocket gopher (Wyoming Natural Diversity Database 2013; Keinath et al. 2014).

Surveys within 250 feet (75 meters) of the proposed Phase I development and infrastructure areas identified 326 pocket gopher mounds or mound complexes (SWCA 2014a). Burrow systems associated with Wyoming pocket gophers range from approximately 6 to 12 inches below the surface and typically consist of a network of feeding tunnels connected to a smaller and deeper system of chambers that are used for nesting and food storage (Beauvais and Dark-Smiley 2005). Although pocket gopher activity is easy to identify in the field by locating mounds, it is difficult to know which species occupies a particular site. Griscom and Keinath (2010) developed a diagnostic tool to determine pocket gopher species occupancy by using easily measurable field variables. This model predicts if mounds are more likely occupied by Wyoming pocket gopher or the more common northern pocket gopher (*Thomomys talpoides*). The model output provides a probability of the mound being that of a Wyoming pocket gopher, where values greater than 0.3 probability are most likely Wyoming pocket gopher and values less than 0.3 are most likely northern pocket gopher. Using the Griscom and Keinath (2010) model, SWCA (2014a) established arbitrary parameters to identify Wyoming pocket gopher mounds (that is, values greater than 0.8) and northern pocket gopher mounds (that is, values less than 0.2); all other values were characterized as unknown mounds. As such, this method may both underestimate the number of northern pocket gopher mounds and overestimate the number of unknown mounds. Using these criteria, SWCA (2014a) predicted that 50 of the 326 mounds or mound complexes were occupied by Wyoming pocket gopher and 188 by northern pocket gopher. The remaining 88 mounds could not be identified to species (SWCA 2014a) (see Figures 3-11 and 3-12).

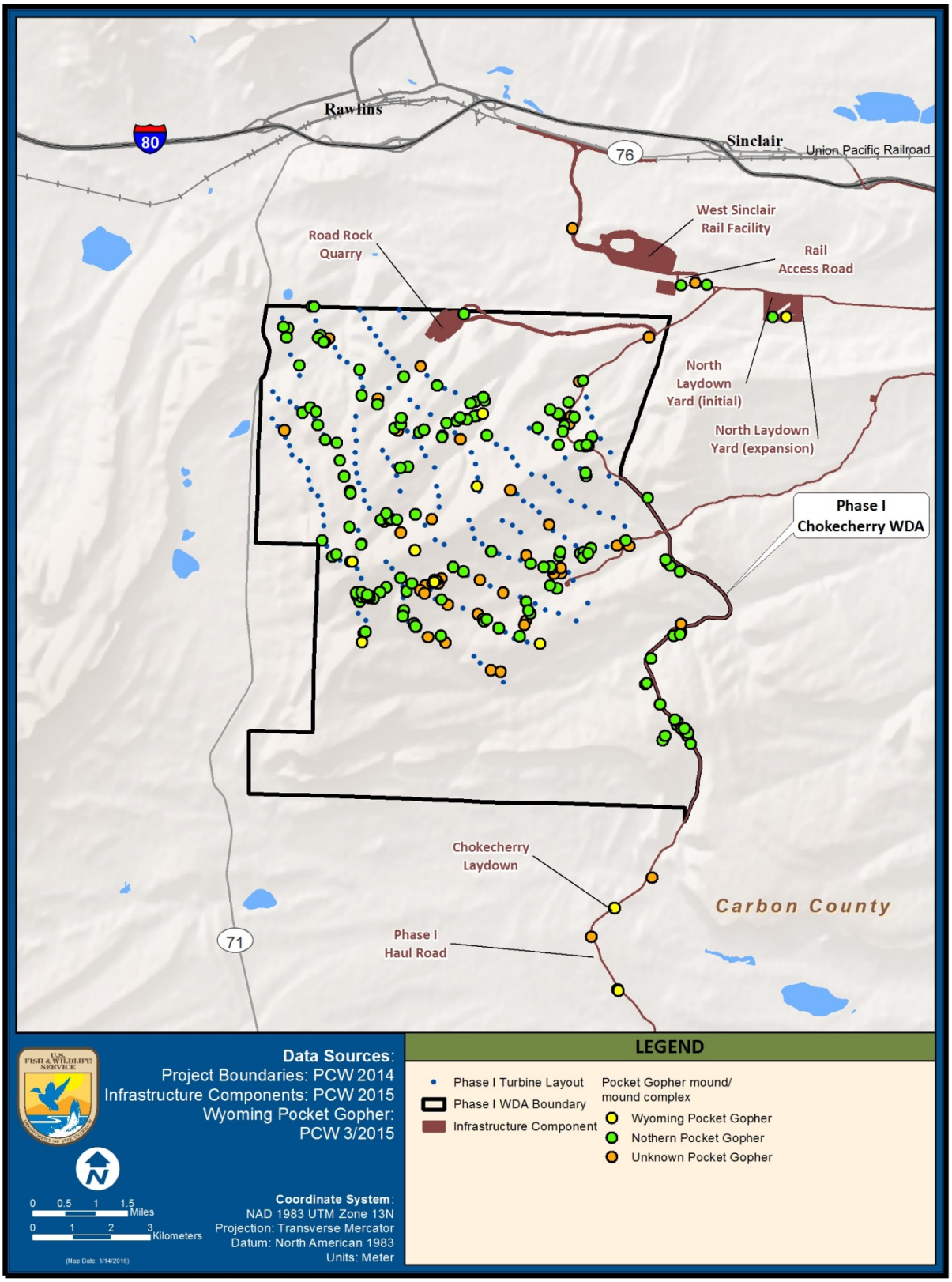

Figure 3-11. Wyoming Pocket Gopher Occurrence in the Phase I Chokecherry Wind Development Area and Infrastructure Areas for the CCSM Phase I Project in Wyoming

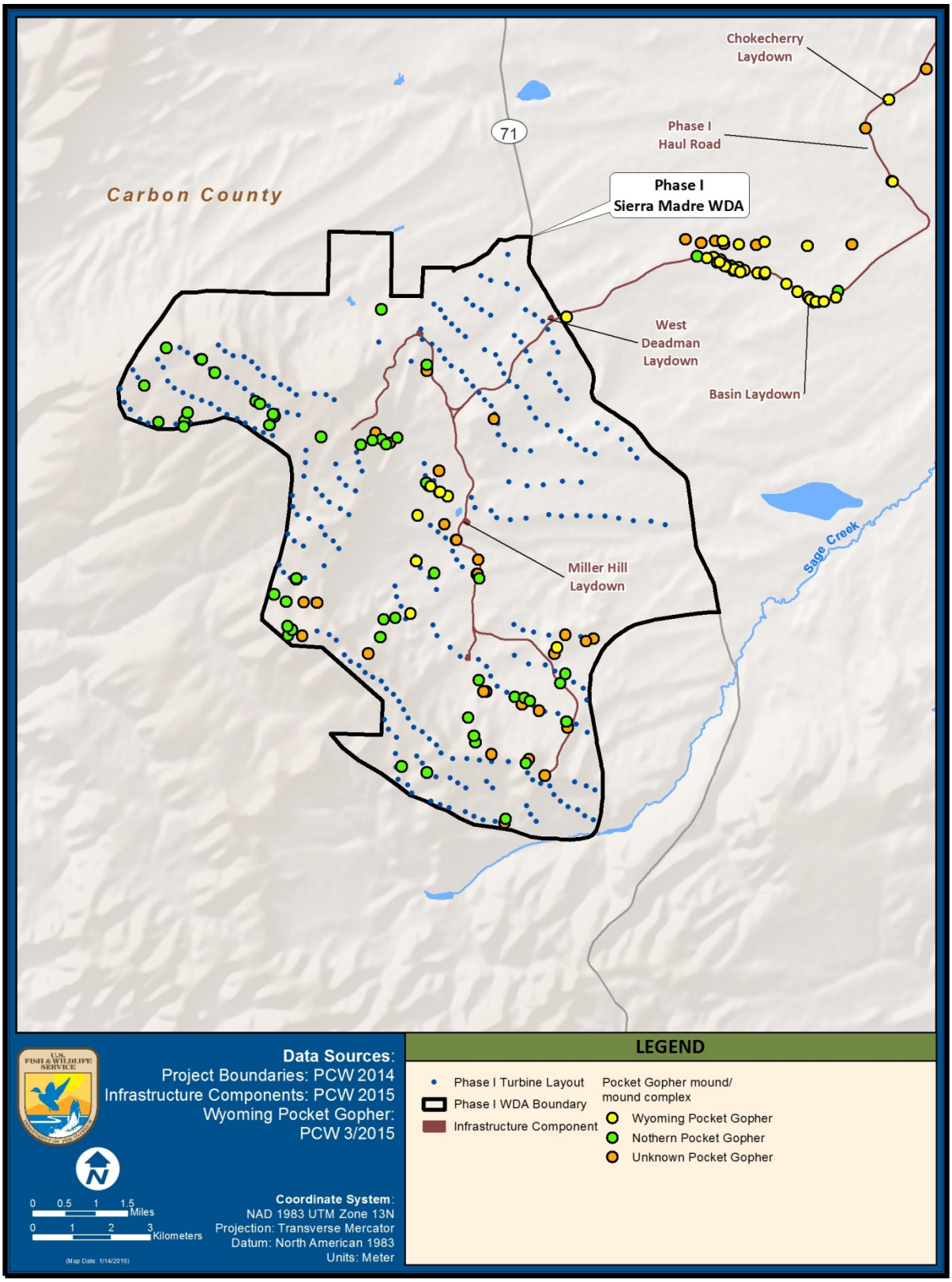

Figure 3-12. Wyoming Pocket Gopher Occurrence in the Phase I Sierra Madre Wind Development Area and Infrastructure Areas for the CCSM Phase I Project in Wyoming

Canada Lynx

The contiguous United States distinct population segment (DPS) of the Canada lynx (*Lynx canadensis*) is listed as threatened under the ESA (65 *Federal Register* [FR] 16052-16086). In Wyoming, lynx occur in low densities and are typically found in subalpine and upper montane forest zones from 8,000 to 12,000 feet (2,440 to 3,660 meters) in elevation (Interagency Lynx Biology Team 2013). Mature forests provide cover and denning sites, while early to mid-successional forest stands provide foraging habitat. The diet of the lynx consists largely of snowshoe hares (*Lepus americanus*) but also includes other small mammals such as red squirrels (*Tamiasciurus hudsonicus*) and ground squirrels (*Spermophilus* spp.). The majority of lynx observations in Wyoming occur in the western part of the state in the Wyoming and Salt River ranges, and north through the Tetons and Absaroka ranges in and around Yellowstone National Park (USFWS 2015c).

Although Canada lynx are known to or believed to occur in Carbon County (USFWS 2016b), suitable habitat for the species is not found in the Phase I development and infrastructure areas. The nearest designated critical habitat for the species is located in and near Grand Teton and Yellowstone National Parks in northwest Wyoming (79 FR 54781-54846). Elevations across the Phase I development and infrastructure areas range from 6,000 to 7,000 feet (1,830 to 2,135 meters) in the basins to about 8,000 feet (2,440 meters) in the mountains, and the forested habitat is limited to relatively small stands of aspen woodland comprising 7,166 acres (2,900 hectares) on north- and east-facing slopes in the Phase I Sierra Madre WDA (BLM 2012a). Snowshoe hares, which serve as prey for Canada lynx, have not been documented in the Phase I development and infrastructure areas (BLM 2012a). Given the lack of suitable habitat for Canada lynx, this species will not be discussed further in this document.

3.6.2.2 Climate Change

Wyoming's 2010 State Wildlife Action Plan identified climate change among the five leading challenges to wildlife conservation (WGFD 2010b). Future projections for the western United States depict an increasingly warm and consequently drier climate (WGFD 2010b). Wyoming, the fifth-driest state in the United States, relies heavily on mountain snowpack as its major water source (WGFD 2010b). Decreasing annual snowpack and runoff may inhibit the recharge of groundwater reservoirs and exacerbate water supply issues.

Mammals generally require several habitat components (for example, food, cover, water, and space) to fulfill various life-history requirements. Because many of these habitats are distinct and may change seasonally, climate change can disrupt mammalian life histories in numerous ways (McKelvey et al. 2013). While climatic changes may be advantageous for highly adaptable generalist species, climate changes projected for Wyoming could lead to declines in abundance and diversity of native wildlife as habitat becomes more limited, fragmented, and affected by disruptions (WGFD 2010b).

Generalist species with a wide niche (for example, deer mice and coyotes) will likely adapt better to changes in habitat conditions and shifts in food sources than specialist species (WGFD 2010b). The occurrence of hotter, drier summers could adversely affect aquatic

systems within the Phase I development and infrastructure areas (for example, riparian areas, lakes, and ponds) and lead to reductions in populations of mammal species closely tied to these systems.

The ecology of big game species is strongly associated with climate, and declines in populations of mule deer (WGFD 2013b), elk (Middleton 2012), and pronghorn (Brown et al. 2006) have all been linked to drought. Climate change impacts summer precipitation, winter snow pack, and plant lifecycle stages, all of which influence animal physiology, demography, habitat selection, and migration patterns. Although research into these issues has commenced, the degree of response to these impacts by big game species remains unclear.

Some species may shift their range to track the physical and biological conditions to which they are already adapted (Root et al. 2003). Climate change may cause species' ranges to expand, contract, or fragment (Joyce et al. 2008; WGFD 2010b). Increasing temperatures are likely to result in a shift of the ranges of big game species to higher elevations and latitudes to meet habitat needs and physiological tolerances (WGFD 2010b).

Although the effects of climate change on bats are unclear, drought conditions have been associated with lower insect availability (Hawkins and Holyoak 1998), lower reproductive success (Adams and Hayes 2008; Adams 2010), and lower annual survival (Frick, Reynolds, and Kunz 2010) in some bat species. Climate changes that alter roost microclimates could force bats to locate and use new or different roosts, and predictions suggest a northward expansion in the ranges of all cave bat species in pursuit of optimal conditions during hibernation (Humphries et al. 2002). Climate change could also play a role in the spread of WNS through changes in the distribution and incidence of infectious diseases, including fungal diseases (Knudsen et al. 2013). Conversely, climate change could potentially slow the spread of WNS, as a prolonged active season due to temperature increases would shorten winter hibernation periods, and bats would not have to survive on fat reserves as long (Czenze 2013).

3.6.3 Environmental Consequences

We are incorporating into this EIS by reference information about impacts on mammals from the following documents, which we have determined to be adequate for our analysis:

- BLM FEIS – Section 4.14, found on pages 4.14-9 through 4.14-31; and Section 4.15, found on pages 4.15-5 through 4.15-19
- EA1 – Section 4.2.13, found on pages 4-45 through 4-51
- EA2 – Section 4.2.8

In addition to the impact analysis in the BLM's NEPA documents, we reviewed the SPODs, ECP, and scoping comments. We also reviewed the Phase I Bird and Bat Conservation Strategy (BBCS), which was prepared by PCW and submitted with the ECP, and is included as Attachment B to this EIS. We provided comments to PCW on the original BBCS, which was submitted with the ECP. PCW then submitted a revised BBCS to us on May 20, 2016, and an amendment to the revision on July 6, 2016, which are included in Attachment B to this EIS. These data form the basis of our analysis in this section, which uses the impact

criteria described in Table 3-17 to evaluate the level of impact of the Proposed Action and alternatives on mammals.

Table 3-17. Impact Criteria for Mammals for the CCSM Phase I Project in Wyoming

Impact Category	Intensity Type	Definition
Magnitude	Major	The action would result in substantial indirect impacts on habitat from disruption, alteration, or irreplaceable loss of vital and high-value habitats, or of a large amount of suitable habitat for mammals. The action would result in substantial direct fatality or injury of mammals. The action would adversely affect special status mammal species with substantial consequence to the individual, population, or habitat.
	Moderate	The action would result in some indirect impacts on habitat from disruption, alteration, or loss of habitat that would be expected to result in measureable but modest impacts on mammals. The action would result in some direct but localized fatality or injury of mammals. The action would have a measureable but modest effect on special status mammal species or their critical habitat.
	Minor	The action would result in some indirect change in the amount or condition of habitat for mammals. The action would result in a limited amount of direct but localized fatality or injury of mammals that would not be expected to have any long-term effects on any populations of mammals. The action would slightly affect habitat for special status mammals.
	No effect	The action would not result in any measureable or observable direct or indirect impacts on mammals or their habitat.
Duration	Long-term	30 years (proposed project duration)
	Medium-term	5 years (permit term)
	Temporary	Lasting for the duration of construction

Impact Category	Intensity Type	Definition
Potential to occur	Probable	More likely than not to occur
	Possible	Potential to occur
	Unlikely	Not reasonably likely to occur
Geographic extent	Extensive	Within the two EMUs and four BCRs
	Regional	Within the 140-mile radius of the local area population for golden eagles
	Local	Within 4 miles of Phase I development and infrastructure areas
	Limited	Within 1 mile of Phase I development and infrastructure areas

Both direct and indirect effects on mammals would occur from the construction and operation of the project, including habitat loss, modification, and fragmentation associated with construction clearing and grading; sedimentation, erosion, and runoff during construction and operation; behavioral modification such as avoidance of and disruption and displacement from habitats; disruption of migratory routes; and mortality and fatality associated with construction clearing and grading, collisions with construction and maintenance vehicles, and collisions with turbines. To assess these impacts, we evaluated the footprint of initial clearing and grading, activity, and long-term modification areas, and buffers coinciding with the geographic extents listed in Table 3-17.

3.6.3.1 Summary Comparison of Alternatives

Based on our analysis of environmental consequences, discussed below, and using the evaluation criteria described in Table 3-17, we identified the following key differentiators for mammals among the alternatives:

- The No Build scenario under Alternative 4 (No Action: Denial of ETPs) would have the least adverse impact on mammals, followed by Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project).
- Although the expected impacts of Alternative 1 (Proposed Action) and Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would have similar intensities, most impacts on mammals would be lower under Alternative 3 than under Alternative 1. However, impacts on crucial winter range for mule deer would occur under both alternatives.
- Alternative 2 (Proposed Action with Different Mitigation) would have impacts on and benefits to mammals that would be similar to Alternative 1 (Proposed Action), but would vary by the compensatory mitigation option selected.
- The Build Without ETPs scenario under Alternative 4 (No Action: Denial of ETPs) would have the greatest impact on mammals because it would not include ETP permit stipulations that would include minimization measures that would benefit mammals.

3.6.3.2 Alternative 1 – Proposed Action: Issue ETPs for Phase I Wind Turbine Development and Infrastructure Components

3.6.3.2.1 Construction

Construction of the CCSM Phase I Project and infrastructure components under Alternative 1 (Proposed Action) would result in temporary to long-term impacts on mammals (see Table 3-17 for definitions of impact criteria). Direct impacts on mammals from construction would be primarily related to loss and degradation of habitat and habitat fragmentation from clearing and grading; behavioral disruption, displacement, and avoidance caused by increased human activity and noise; and injury or fatality caused by vehicles colliding with or crushing mammals.

As described in Section 2.2.1.2.1, surface modification during construction is categorized as initial clearing and grading, short-term cutting or partial cutting in activity areas, or long-term modification. Initial clearing and grading areas adjacent to long-term modification areas would be reclaimed as construction is completed, while long-term modification areas, such as roads and turbine pads, would be used to support operation. Clearing and grading would not occur in activity areas, where workers and vehicles may need access to support the construction of the wind turbines. Within activity areas, vegetation higher than 1 foot could be cut or partially cut to allow for safe vehicle access and to reduce risk of igniting wildfires.

Construction of the CCSM Phase I Project would result in direct temporary to medium-term loss of up to 4,465 acres of mammal habitat (see Table 3-9 for a summary of vegetation community areas directly impacted by the CCSM Phase I Project and Table 3-17 for definitions of impact criteria). This loss would represent about 8 percent of the existing habitat for mammals within the Phase I development and infrastructure areas. We also acknowledge that direct and indirect impacts (including disruption, displacement, and habitat fragmentation) will affect mammal species use and distribution beyond the 4,465 acres of habitat loss. For some mammal species the additional area of indirect impacts from the Project could be quite substantial. However, we cannot quantify the extent of these impacts. Other indirect impacts, such as noise, emissions, dust, and increased human presence, would also occur within an unknown amount of mammal habitat surrounding the Phase I development and infrastructure areas.

In the long-term, PCW would conduct reclamation activities that would reestablish vegetation and habitats to conditions similar to the baseline for all but about 850 acres required for operation of permanent infrastructure, including turbines, roads, and substations. This would include approximately 264 acres of initial clearing and grading and 73 acres of long-term modification within developed areas (see Table 3-9). These areas may provide habitat for mammals, such as loose soils for burrowing mammals or movement corridors for big game. Most surface modification would occur within shrub communities (that is, Wyoming big sagebrush, mountain big sagebrush, black sagebrush, and shadscale saltbush). These vegetation types provide breeding, rearing, foraging, and dispersal habitats for many species of small game and furbearers, as well as foraging and resting habitat for big game. Although these are the most abundant vegetation communities in the Phase I development and infrastructure areas, and as discussed in Section 3.4.3.2.1, the loss would be small

relative to the acreage of these communities available in the region. However, most of these communities have been substantially altered or degraded from pre-settlement conditions and even a relatively small impact may incrementally contribute to this degradation. In addition, the disruption and displacement of mammals due to modification of these areas could extend beyond the Phase I development and infrastructure areas. Other mammal habitat that would be modified includes grasslands, wetlands and riparian zones, and woodlands. Recovery times for the various habitat types range from 5 years for reclaimed grasslands to 15 to 50 years for sagebrush shrublands and wetlands and riparian zones to 20 to 100 years for woodlands.

Construction noise, emissions, dust, and increased human presence could lead to behavioral effects on mammals, including avoidance, disruption, and displacement associated with the Phase I development and infrastructure areas. The shift of individual animals or groups to potentially less suitable habitats, or to areas farther away, may lead to overcrowding, increased inter- and intra-specific competition for resources, increased predation, or lower reproductive rates (Erickson et al. 2005; Sawyer et al. 2006; BLM 2012a). The level of impact from avoidance, disruption, and displacement would depend on the location of project components relative to mammal habitats, amount of human activity associated with construction, and when activities occur during the year relative to mammal presence.

Construction of the Phase I development and infrastructure areas could result in an increase in inadvertent fatalities associated with construction activities and vehicle traffic.

Although nighttime construction is unlikely to occur, it would generally have the same effects as daytime construction activities, including avoidance, disruption, and displacement. However, potential impacts on mammals would be reduced by the applicant-committed avoidance and minimization measures that PCW has committed to in its ECP, Appendix K (see Attachment A).

Specific impacts on small game and furbearers, big game, bats, and special status mammals are described in the following sections.

Small Game and Furbearers

The majority of small game and furbearers occurring within the study area are habitat generalists, or animals that are able to flourish in varied ecological conditions and that could move to adjacent habitat during construction. While consequences from displacement include localized overcrowding, increased competition for resources, increased predation, and ultimately lower carrying capacity and reduced populations, these species would likely recover from this impact quickly following construction. Therefore, impacts from habitat loss, alteration, and fragmentation as well as behavioral disruption and displacement resulting from ground clearing activities would result in probable, minor, and limited impacts on these species (see Table 3-17 for definitions of impact criteria). The impacts from habitat loss, alteration, and fragmentation would be long-term, lasting throughout construction and operation, whereas disruption and displacement would be temporary in duration (see Table 3-17). Special status mammal species, which include a number of burrowing animals, are discussed below.

Small game species that shelter underground, primarily cottontails and ground squirrels, would be susceptible to being crushed by construction equipment during clearing and grading. Burrowing mammals would experience higher levels of fatality during soil manipulation. Individual small game and furbearers would be susceptible to injury or fatality by vehicles on roads. However, potential impacts on small game and furbearer populations would be temporary in duration and minor in magnitude because small game and furbearers are generally widespread species that use multiple habitats and have high reproductive rates, and populations would recover from the loss of individuals quickly. These impacts are probable and would be limited to the Phase I development and infrastructure areas (see Table 3-17 for definitions of impact criteria).

Furbearers such as muskrat and beavers that are associated with wetlands and riparian habitat would be affected; however, only a small fraction of available habitat in the area would be impacted. Additionally, PCW would mitigate for loss of some wetlands and riparian zones as required by its Section 404 permit (see Sections 3.3.3 and 3.4.3). Impacts from loss of wetland and riparian habitat are expected to be probable, minor, medium-term to long-term, and limited in extent (see Table 3-17 for definitions of impact criteria).

Big Game

Suspected big game migration routes and crucial winter ranges of mule deer, elk, and pronghorn are discussed in Section 3.6.2.1.2 and shown in Figures 3-4, 3-5, and 3-6, respectively. Given the migratory behaviors of big game described in Section 3.6.2.1.2, ground clearing activities would result in impacts on seasonal ranges of these species. Snow fences constructed as part of Alternative 1 (Proposed Action) could create barriers and disrupt migration. However, PCW has committed to limiting sections of snow fence to 0.25 mile or less, as well as providing escape openings along roads every 0.25 mile or less, to allow big game animals to exit from snowplowed roads. These measures would reduce impacts on migratory movements (BLM 2012b). Construction fencing would be temporary, but snow fencing may be used in select locations during construction and throughout operation. Impacts of snow fences on the migration of big game species would be minor in magnitude because only portions of the suspected migratory routes would be affected, and would be possible, long-term in duration, and local in extent (see Table 3-17 for definitions of impact criteria).

Grasslands, shrublands, woodlands, and riparian zones that would be affected provide both foraging and resting habitat for big game species. However, a relatively small portion of the overall available area of each of these communities would be affected. Impacts on these vegetation communities are described in Section 3.4.3.2. The probable impact on big game foraging and resting habitat would be minor, relative to the availability of each community type in the region and local in extent. This impact would be temporary to long-term because of the length of time it would take for grasslands, shrublands, and woodlands to recover from clearing and/or restoration activities (see Table 3-17 for definitions of impact criteria).

Construction vehicles could collide with big game, resulting in injuries or fatality. These impacts on elk, mule deer, and pronghorn would be minor, temporary, possible, and limited in extent (see Table 3-17 for definitions of impact criteria).

Human activity and associated noise from construction could result in big game species avoiding the area and restricting their movements. Effects from displacement could include one or more of the following: a loss of connectivity among seasonal habitats, including suspected migration routes, parturition or birthing areas, and important summer foraging areas, all of which comprise essential habitat components to maintain big game populations. These impacts are described below for mule deer, elk, and pronghorn.

Mule Deer

Initial clearing and grading for construction of the Phase I wind turbine development and infrastructure components would impact 1,165 acres of mule deer spring-summer-fall habitat and winter-yearlong habitat. Long-term modification would occur for 850 acres of these habitats. These habitats are comprised of grasslands, shrublands, woodlands, and riparian zones. Impacts on these vegetation communities are described in Section 3.4.3.2 and discussed above. Mule deer habitat loss was minimized by eliminating wind turbine locations from Red Rim-Grizzly Wildlife Habitat Management Area, located west and south of the Miller Hill portion of the Phase I Sierra Madre WDA, which is a known mule deer concentration area (BLM 2012a). Habitat loss impacts on mule deer would be minor, long-term, possible, and limited (see Table 3-17 for definitions of impact criteria).

As shown in Figure 3-4, construction of portions of the Phase I Chokecherry WDA and northern infrastructure areas (including the Road Rock Quarry and Quarry Road, North Road, North laydown yard, North Platte River Water Extraction Facility, and booster pump stations) would impact approximately 426 acres, or 0.2 percent, of the Platte Valley mule deer crucial winter range (based on approximately 227,600 acres of crucial winter range within the range of the Platte Valley herd). This total includes 106 acres of short-term impacts on herbaceous vegetation communities and 320 acres of long-term impacts on shrublands, woodlands, wetlands, and riparian zones.

Based on a 0.6-mile buffer around the proposed project infrastructure, which was used by the BLM to calculate the area of avoidance, disruption, and displacement beyond the footprint of development and infrastructure (BLM 2012a), Alternative 1 (Proposed Action) would result in mule deer displacement or disruption from 8,002 acres, or 3.5 percent, of Platte Valley mule deer crucial winter range. While construction activities could reduce the carrying capacity of the crucial winter range, which is considered a limiting factor in mule deer population growth in the Platte Valley herd (WGFD 2013b; BLM 2012a), a small percentage of the overall crucial winter range would be affected. PCW has agreed to restrict surface modification and disruptive activities in the crucial winter range from November 15 to April 30, which would minimize impacts on mule deer crucial winter range by reducing construction-related human activities and potential disruption of mule deer during the winter. Impacts from construction on mule deer crucial winter range would be temporary, but similar impacts may occur during operation, as described in Section 3.1.1.2.2. Impacts are possible and would be minor and local (see Table 3-17 for definitions of impact criteria).

While mule deer are known to migrate through the area, specific route locations remain largely unknown. One suspected mule deer migratory route runs along the southern boundary

of the Phase I Chokecherry WDA (see Figure 3-4; WGFD 2012b). In addition, some herds in the area are resident and do not appear to migrate.

Elk

Construction in the Phase I development and infrastructure areas would impact elk spring-summer-fall habitat, winter-yearlong habitat, and suspected migratory routes. Impacts on grasslands, shrublands, woodlands, and riparian zones, which provide resting and foraging habitat for big game, are discussed above. One portion of a suspected migratory route in the northwestern corner of the Phase I Sierra Madre WDA would be affected as described above (see Figure 3-5). Construction associated with the Phase I development and infrastructure areas would not impact elk crucial winter range.

Impacts on elk habitat would be possible, occur at a local extent, would be minor in magnitude relative to the available habitat, and long-term in duration because of recovery time for grasslands, shrublands, and woodlands (see Table 3-17 for definitions of impact criteria).

Pronghorn

Construction of the CCSM Phase I Project would impact suspected pronghorn migration routes, winter range, and habitat. Impacts on pronghorn resulting from Alternative 1 (Proposed Action) would largely be related to suspected migratory routes, as presented in Figure 3-6 and as described in Section 3.6.2.1.2 (WGFD 2012b). Three suspected pronghorn migratory routes in the area (Figure 3-6) would be affected by construction, including that which crosses the northern infrastructure areas, the southern portion of the Phase I Chokecherry WDA, and the center of the Phase I Sierra Madre WDA. Herds or individual animals may avoid construction areas during migration or could be disrupted or displaced from preferred migration corridors (Sawyer et al. 2002), which could affect pronghorn distribution during construction. Construction associated with the Phase I development and infrastructure areas would not directly impact pronghorn crucial winter range (BLM 2012a, 2014, 2016a). However, roads, power lines, turbines, buildings, and substations resulting from construction could cause pronghorn to alter their migration routes to or from the crucial winter range. Construction in the Phase I development and infrastructure areas would impact pronghorn spring-summer-fall habitat and winter-yearlong habitat. Impacts on grasslands, shrublands, woodlands, and riparian zones, which provide resting and foraging habitat, are discussed above. Impacts on pronghorn habitat would be minor, possible, long-term, and limited. Disruption or displacement of pronghorn would be moderate in magnitude, possible, long-term, and local (see Table 3-17 for definitions of impact criteria).

Bats

Construction of the Phase I development and infrastructure areas would impact bat roosting and foraging habitat. The impacts would vary for local, non-migratory, and migratory bats depending on the habitats affected and the bat species that use these habitats.

All of the bat species potentially present in the project vicinity (see Table 3-14) could forage within the Phase I development and infrastructure areas, although some species might forage

over a broader suite of habitats than others. The big brown bat and western small-footed myotis, two of the most common species in the project vicinity (Abernethy et al. 2013), could potentially forage over much of the Phase I development and infrastructure areas and would experience loss of available foraging habitat across initial clearing and grading, activity, and long-term modification areas. Long-term impacts on foraging habitat after completion of reclamation would be 485 acres, in addition to the indirect impacts to bat habitat in areas beyond the 485 acres of long-term modification. The amount of vegetation impacted would be small relative to the availability of each community type in the region. Impacts on bat foraging habitat would be minor to moderate, long-term, probable, and limited (see Table 3-17 for definitions of impact criteria).

Throughout North America and elsewhere, bats are often found in riparian and wetland habitats (Seidman and Zabel 2001; Ford et al. 2006; Francl 2008). Construction of the Phase I development and infrastructure areas would result in the loss of approximately 51 acres of wetlands (that is, riparian/mesic lowland vegetation), as shown in Table 3-9. However, PCW would mitigate for loss of some wetlands (about 13 acres) as required by its Section 404 permit (see Sections 3.3.3 and 3.4.3). The remaining 38 acres would become uplands, with 31 acres reclaimed to native vegetation and 7 acres of long-term modification. Types of wetland mitigation may include enhancement, rehabilitation, and preservation of existing wetlands; reestablishment of former wetlands; or creation of new wetlands. Impacts on wetland and riparian bat habitat would be minor because a small area relative to the available habitat would be affected. Impacts would be temporary to long-term, depending on whether the habitat was mitigated, probable, and limited (see Table 3-17 for definitions of impact criteria).

Construction activities that occur at night have the potential to interfere with a bat's ability to locate and find food (Schaub et al. 2008), and bats might avoid areas where construction noise is present (Bunkley et al. 2015). Construction and security lighting have the potential to impact bat behavior, altering commuting routes to foraging habitat (Stone et al. 2009). However, nighttime construction is unlikely to occur as part of the CCSM Phase I Project.

Construction activities could also result in increased erosion and stormwater runoff from freshly cleared and graded sites. Increased sedimentation could result in impacts on aquatic insects that are prey for bats. However, stormwater, erosion, and sedimentation would be controlled during and after construction, thereby minimizing these effects. The potential for impacts on aquatic insect prey during construction would be minor, temporary, possible, and limited (see Table 3-17 for definitions of impact criteria).

Local or non-migratory species typically hibernate in caves or mines from October until April. Although no known bat hibernacula occur in the Phase I development and infrastructure areas, field studies did not specifically search for these sites in the surrounding area. Migratory tree bats (that is, silver-haired, hoary, and eastern red bats) overwinter in warmer climates and would not be impacted by the CCSM Phase I Project during that time. During the remainder of the year, many bats use trees as roosts (for example, silver-haired bats, hoary bats, fringed myotis, and red bats). These species could be disrupted, displaced, injured, or killed by removal of trees used for roosting. Other species roost in rock crevices, which are uncommon within the Phase I development and infrastructure areas (BLM 2012a)

but were present near construction areas. Bats may be disrupted and leave the area to seek alternative roosting sites. Impacts from disruption and displacement would be minor, temporary, probable and local. Construction would result in the clearing and loss of 22 acres of forest. Because this represents a relatively small proportion of the total forested area in the study area, we expect that forest clearing would not appreciably reduce the amount of suitable roosting habitat for bats. However, the removal of forest could result in impacts to potential bat habitat beyond the 22 acres of forested habitat modified. These impacts could include micro-scale changes in temperature or wind profile, disturbance from human activity during operation or other unexpected consequences throughout an unknown number of acres. Impacts on tree-roosting habitat would be minor, long-term, probable, and local (see Table 3-17 for definitions of impact criteria).

In the vicinity of the CCSM Phase I Project, habitats along and east of the North Platte River and south and west of the Phase I Sierra Madre WDA are identified as high quality wildlife habitat. These areas include high quality sagebrush habitat, aspen/mixed conifer woodlands, and mountain shrub communities. The removal of proposed wind turbine locations in these areas benefits all bat species that would use such habitats. PCW worked to further reduce surface modification and habitat fragmentation and to provide flight or movement corridors, or both, for migratory bat species throughout the CCSM Phase I Project by aligning wind turbines into rows. In addition, wind turbines were removed north of the hogback and south of Rasmussen Reservoir to further reduce potential risk to migratory bat species from the CCSM Phase I Project.

In the Phase I Chokecherry WDA, the Bolten Rim and Northern Sage Creek Rim turbine no-build area provides a 0.5- to 2.0-mile-wide setback from the Bolten Rim (see Figure 2-3). The setbacks north of the rim reduce risks to cliff-dwelling and other bat species that use the habitats in this turbine no-build area.

Although the North Platte River is outside the Phase I Chokecherry WDA, PCW has made a commitment not to construct wind turbines within 1 mile of the North Platte River. The forested riparian habitat and cliff habitat within this turbine no-build area provides suitable habitat for tree-roosting bat species and crevice-roosting bat species, and the highest quality foraging habitat for bats in the vicinity of the CCSM Phase I Project.

Although injury or fatality to bats may occur during construction from removal of trees, this is unlikely to occur given the low number of trees to be removed. These impacts would be minor, temporary, and limited (see Table 3-17 for definitions of impact criteria).

The CCSM Phase I Project would avoid and minimize risks to migratory bats consistent with the USFWS Wind Energy Guidelines, the WGFD Wind Energy Recommendations, and the BLM ROD. The Phase I wind turbine layout—when combined with the BMPs, conservation measures, monitoring, and adaptive management described in the Phase I BBCS (see Attachment B)—avoids and minimizes some risks to migratory bats.

Special Status Mammal Species

Potential impacts on pygmy rabbits, white-tailed prairie dogs, and Wyoming pocket gophers from construction under Alternative 1 would be similar to impacts described for small game and furbearers. All three special status mammals shelter underground and would be susceptible to being crushed by construction equipment. Individual animals would be susceptible to fatality by vehicles on roads and at construction sites. PCW has committed to implementing measures, such as speed limits, to reduce vehicle collisions and other inadvertent fatalities from construction activities.

Construction could also result in habitat loss, alteration, and fragmentation in the area of the burrows and colonies for special status species. The loss of burrowing habitat and resources could cause these species to avoid the area, and the degradation of habitat could lower the fitness, survival, and productivity of these species. In addition to the general BMPs aimed at reducing impacts on wildlife, PCW has also committed to conducting site-specific surveys or monitoring for sensitive species during construction. In coordination with BLM and WGFD, we would work with PCW to develop the survey and monitoring approaches and incorporate the outcome of the site-specific surveys to avoid, minimize, or mitigate impacts on the habitat of special status mammal species.

Special status mammal species could be displaced to adjacent habitats by noise and human activity associated with construction, which could lead to overcrowding and increased competition for resources. The loss of habitat may force special status mammal species to use sub-optimal habitats, which could lead to increased predation and lower reproductive rates. The magnitude of the disruption or displacement impacts would depend on the density and location of project components and the amount of human activity associated with the construction. Direct and indirect impacts would depend on the location of each species' habitat relative to roads and the initial clearing and grading, activity, and long-term modification areas. PCW has conducted surveys for each of these species. The results of these surveys are presented in Section 3.6.2.3 in Figures 3-8 through 3-12. Potential impacts based on species-specific surveys are described in detail for each special status mammal species below.

Pygmy Rabbit

A total of 36 pygmy rabbit locations were documented within 0.25 mile of the Phase I development and infrastructure areas. Clearing and grading in the initial clearing and grading areas would impact 4 locations (2 active and 2 inactive) in the Phase I Chokecherry and Phase I Sierra Madre WDAs and 1 location adjacent to the Haul Road. Activity area sagebrush cutting or partial cutting may affect 1 location. Impacts on the pygmy rabbit could include habitat loss and fragmentation, noise disruption, reduction in thermal and protective cover, and fatality. Impacts on some pygmy rabbit locations have been reduced by redesigning portions of the Haul Road, particularly in the Lower Miller Hill area east of Sage Creek Road, where 4 active locations and 1 inactive location were identified. Impacts on the pygmy rabbit locations within 0.25 mile of the Phase I development and infrastructure areas would vary based on the proximity of the location to the proposed initial clearing and grading area. Noise and disturbance from construction activities would be temporary, while habitat

impacts would be medium- to long-term. Disruption and habitat impacts would be minor, probable, and limited (see Table 3-17 for definitions of impact criteria).

White-Tailed Prairie Dog

A total of 79 white-tailed prairie dog colonies (54 active and 25 not active) were documented within 50 feet of the Phase I development and infrastructure areas. Approximately 269 acres of active white-tailed prairie dog colonies and 19 acres of inactive white-tailed prairie dog colonies would be within the initial clearing and grading areas (SWCA 2014a, 2014b, 2014c, 2014d). Impacts on white-tailed prairie dogs could include habitat loss, habitat fragmentation, disruption, displacement, increased stress, and fatality. Additionally, white-tailed prairie dogs would be impacted by soil compaction and destruction of cryptogamic crusts, which are thin crusts made up of mosses, lichens, algae, and bacteria that promote the germination of potential forage plants (Keinath 2004). BMPs and PCW-committed measures to reduce impacts on special status species would help reduce impacts on white-tailed prairie dogs and their habitat. Impacts on white-tailed prairie dog habitat would account for a total of 6 percent of the active and 5 percent of the total (active and inactive) white-tailed prairie dog colonies mapped in the Phase I development and infrastructure areas (BLM 2016a). Direct and indirect impacts on white-tailed prairie dogs are probable, although impacts would be minor, temporary, and limited. However, similar habitat impacts would persist long-term as a result of operations, as described below (see Table 3-17 for definitions of impact criteria).

Wyoming Pocket Gopher

There are 326 known pocket gopher mounds or mound complexes within 250 feet (75 meters) of the Phase I development and infrastructure areas. This includes 50 mounds that have an 80 percent or better probability of being Wyoming pocket gopher and 88 for which the species could not be accurately predicted according to the model by Griscom and Keinath (2010) and interpretation by SWCA (2014a, 2014b). There are 14 Wyoming pocket gopher mounds (or mound complexes) that are in the initial clearing and grading area. Nine of these mounds are on the Haul Road, two are in a laydown area, one is on an access road, and two are located at two different turbine pads (LMH-D-04 and LMH-D-05) in the Phase I Sierra Madre WDA. Construction would impact approximately 4,234 acres of potential pocket gopher habitat, which is approximately 6.2 percent of the species' habitat within the limited extent (1 mile radius) and approximately 2.4 percent of the species' habitat in the local extent (4 mile radius). Impacts from construction could include destruction of burrows, habitat loss and fragmentation, disruption, displacement, or fatality, as described above. Direct and indirect impacts on Wyoming pocket gophers are probable, although impacts would be minor, temporary, and limited. However, similar habitat impacts would persist long-term as a result of operations, as described below (see Table 3-17 for definitions of impact criteria).

Summary of Construction Impacts Under Alternative 1

Under Alternative 1 (Proposed Action), construction of the CCSM Phase I Project would result in the following impacts on mammals (see Table 3-17 for definitions of impact criteria):

- Initial clearing and grading of up to 4,465 acres of mammal habitat, cutting or partial cutting within 440 acres of activity areas, and long-term modification of 850 acres of potential mammal habitat would result in probable, limited, minor, temporary to long-term impacts on habitat for small game and furbearers, big game, bats, and special status mammal species.
- Small game and furbearers would probably be displaced due to construction activities, and their abundance would likely temporarily decrease in the project footprint due to loss of habitat and crushing by construction equipment or vehicles.
- Minor to moderate behavioral disruption and displacement from suspected migration routes and crucial winter range, as well as mortality from vehicle collisions, are possible for big game.
- Injury and fatality are unlikely for bats during construction. Minor impacts on aquatic insects that are prey for bats could occur.
- Minor, temporary impacts on special status mammals are probable, including behavioral disruption, displacement, injury, and fatality.

3.6.3.2.2 Operation

Impacts on mammals associated with the operation of the CCSM Phase I Project that would continue from construction include (1) direct and indirect impacts on habitat (that is, reduction, alteration, and fragmentation), (2) behavioral disruption and other associated impacts, and (3) injury or fatality due to collisions with vehicles and turbines during operation. Operation would not result in additional habitat loss or alteration beyond areas modified during construction. A total of 850 acres of long-term modification to potential mammal habitat would continue throughout operation. Disruption impacts on mammals during operation and maintenance would be similar to impacts described for construction, but the potential annual extent of impacts would be less because fewer workers, vehicles, and equipment would be needed during operation than during construction.

Wind turbine operation could cause displacement, increase stress, and reduce fitness of mammals due to avoidance behavior and increased noise and light (Sawyer et al. 2006, 2009). Roads may make animals more vulnerable to predation because predators often use roads to seek prey or because prey species crossing roads are exposed and vulnerable to predators. The risk of mammal mortality and fatality from vehicle collisions and maintenance equipment during operation is expected to be lower than during construction because the amount of traffic would be less. Collisions with wind turbines could cause injury or fatality to bats as further described below. These impacts would be minimized because of applicant-committed measures identified in the ECP, Appendix K (see Attachment A) to reduce impacts on wildlife.

Small Game and Furbearers

Habitat loss, alteration, and fragmentation that occurred during construction would continue during operation. Initial clearing and grading areas would continue to function as habitat loss until reclaimed. Impacts would be probable, minor, long-term, and limited (see Table 3-17 for definitions of impact criteria).

Local displacement of small game and furbearers could occur due to turbine noise and operation and maintenance activities. The effects of wind turbine noise, although not fully understood, could affect small game and furbearers by masking communication, impeding detection of predators, and increasing vigilance behavior (Barber et al. 2010). Rabin et al. (2006) measured the ecological disruption caused by wind turbine noise by monitoring anti-predator behavior in California ground squirrels (*Spermophilus beecheyi*), a species that uses vocalizations to communicate predator danger. California ground squirrels showed a higher level of alert behavior at turbine sites than at control sites. Wind turbine noise could cause some mammals to avoid the Phase I development areas and experience higher levels of stress. The exact impacts on small game and furbearers within the Phase I development and infrastructure areas are not known and would depend on the species and the distance from the wind turbine noise and operation activities. However, displacement and disruption of small mammal species would be probable, minor, long-term, and limited (see Table 3-17 for definitions of impact criteria).

Vehicles traveling within the Phase I development and infrastructure areas could injure or kill small game and furbearers during operation. However, the likelihood of collision would be minor because traffic levels would be considerably lower compared to during construction, and would primarily consist of light-duty vehicles. While individuals might be affected, population impacts on small game and furbearers are not expected, and although injury or fatality are possible throughout operation (that is, long-term in duration), those impacts would be minor in magnitude and limited in duration (see Table 3-17 for definitions of impact criteria).

Big Game

Habitat fragmentation that occurred during construction would continue throughout operation. Habitat fragmentation would result in a decrease in the quality and attractiveness of remaining patches of habitat in areas adjacent to infrastructure (Berger et al. 2006). PCW is currently working with the WGFD and the BLM to better understand big game species use of habitat in and around the CCSM Phase I Project. These efforts may be used to inform the development of adaptive management options and future conservation measures.

The potential impacts of wind development on big game species are largely unknown. However, studies of oil and gas developments suggest that big game species avoid areas surrounding infrastructure, creating indirect habitat loss that is considerably larger than direct habitat loss (Sawyer et al. 2006, 2009). However, preliminary studies at wind facilities suggest that big game continue to use habitats within wind energy facility boundaries. At the Foote Creek Rim wind project in Wyoming, studies showed no displacement effects on pronghorn, and their use of the wind energy facility area has not declined since construction (Johnson, Young, et al. 2000). At another wind energy facility in Washington, week-old mule deer fawns were observed on eight occasions during post-construction surveys, indicating that mule deer calving occurred in proximity to turbines (NWC 2007, as cited in BLM 2010). Lutz et al. (2011) indicated that roads can be a predominant concern with oil and gas development. Roads contribute to noise and increased human presence, especially if access is not restricted. Disruption from vehicles, post-construction avian monitoring, and turbine operation could divert time and energy from critical activities, such as foraging and resting,

and result in physiological stress of big game, which would be compounded during the winter when stress is generally higher (Lutz et al. 2011). Required post-construction bird and bat fatality monitoring as described in the ECP (Attachment A) and revised BBCS (Attachment B) would result in almost daily human presence and vehicular activity within the Phase I development areas during at least the first 24 months of operation, including during winter. This activity would contribute to disruption and could displace big game year-round, with greater consequences during the winter months.

Similar to the impacts described under construction, the presence of roads in the study area could lead to an increase in human disruption; however, this would not be expected because of conservation measures designed to prevent unauthorized vehicle access. While operation of the CCSM Phase I Project could still result in vehicle collisions with big game, the number of collisions is expected to be lower than during construction because fewer vehicles would be needed during operation and maintenance activities. Impacts would be minor, long-term, possible, and local (see Table 3-17 for definitions of impact criteria).

Specific impacts on mule deer, elk, and pronghorn are described below.

Mule Deer

Operation of the CCSM Phase I Project would result in approximately 850 acres of spring-summer-fall habitat loss and winter-yearlong mule deer habitat loss. Long-term modification associated with the Phase I Chokecherry WDA, Phase I Haul Road and Facilities, West Sinclair Rail Facility, Road Rock Quarry, and Smith Draw Road would occur on approximately 256 acres of mule deer crucial winter range. Operation could also affect suspected mule deer migration along the southern boundary of the Phase I Chokecherry WDA (see Figure 3-4), and other movements through the Phase I Chokecherry and Phase I Sierra Madre WDAs may be affected by fragmentation in that the presence of wind turbines, roads, and other infrastructure could inhibit mule deer movements between important daily or seasonal habitats, including crucial winter range. This could eventually result in the abandonment of some habitats. Impacts on habitat would be moderate, long-term, possible, and limited (see Table 3-17 for definitions of impact criteria).

Less displacement and disruption would occur during operation than construction because fewer vehicles and humans would be present. Little research has been conducted on the effects of wind energy on mule deer, and it is not known if mule deer can acclimate to large-scale wind development. In a 7-year study in western Wyoming, mule deer did not appear to acclimate to natural gas development; it was noted that avoidance was primarily related to traffic levels and could be reduced by limiting vehicle traffic (Sawyer, Kauffman, and Nielson 2009). Traffic levels associated with wind energy facilities are generally lower than those in oil and gas developments. However, post-construction bird and bat fatality monitoring would increase vehicle traffic and human presence throughout the Phase I development areas for at least the first 24 months of operation. Avoidance of roads and traffic can lead to displacement, which can make mule deer more vulnerable to harassment from recreational activities, such as off-highway vehicles. Impacts on mule deer from displacement and disruption would be minor to moderate, long-term, possible, and local (see Table 3-17 for definitions of impact criteria).

Elk

Operation of the CCSM Phase I Project would result in direct and indirect long-term impacts on elk spring-summer-fall habitat, winter-yearlong habitat, and suspected migratory corridors. The direct impact on elk habitat would be minor, relative to the availability of each affected vegetation community in the region. One portion of a suspected migratory route in the northwestern corner of the Phase I Sierra Madre WDA would be affected (see Figure 3-5). Operation would not directly impact elk crucial winter range, though migration to or from this range may be affected.

Elk are known to avoid roads (Cole et al. 1997; Rowland et al. 2000), and this impact is greater in areas with forest cover (Sawyer et al. 2007). Elk are also known to experience higher levels of stress and increased movement rates when exposed to increased road density and traffic (Millspaugh et al. 2001). The energetic costs associated with these increased movements could be substantial (Cole et al. 1997). Little is known concerning the effects of wind development on elk behavior. At Elkhorn Valley in Oregon, elk remained approximately 4,350 feet from the location of proposed turbine strings during pre-construction surveys compared to 11,473 feet during post-construction (Oregon Department of Fish and Wildlife 2011). Post-construction bird and bat fatality monitoring would result in higher than normal human and vehicular activity year-round for at least the first 24 months of operation. With the implementation of measures to avoid and minimize impacts, direct and indirect impacts on elk (including habitat impacts and disruption and displacement) would be minor, long-term, possible, and local (see Table 3-17 for definitions of impact criteria).

Pronghorn

Operation of the CCSM Phase I Project would result in direct and indirect impacts on pronghorn spring-summer-fall habitat, winter-yearlong habitat, and suspected migration routes. Operation would not impact pronghorn crucial winter range (BLM 2012a, 2014, 2016a). However, migration to and from crucial winter range may be impeded by roads, turbines, or other infrastructure associated with operation. Post-construction bird and bat fatality monitoring would result in higher than normal human and vehicular activity during at least the first 24 months of operation. Impacts on pronghorn resulting from Alternative 1 (Proposed Action) would largely be limited to indirect impacts on the suspected migration routes presented in Figure 3-6 (WGFD 2012b).

In a recent study, exposure to wind energy development was not found to be an informative predictor of pronghorn winter survival on crucial winter range elsewhere in Carbon County, Wyoming (Taylor et al. 2016). Instead, survival increased with distance to major roads, decreased with increased terrain ruggedness, and decreased with greater time spent in sagebrush habitats (Taylor et al. 2016), all of which could be affected by the construction and operation of the CCSM Phase I Project. With the implementation of measures to avoid and minimize impacts, specifically measures to use wildlife-compatible design standards for fencing and limit snow fencing to 0.25-mile segments, effects on pronghorn (including habitat alteration, and disruption and displacement) would be minor, long-term, possible, and local (see Table 3-17 for definitions of impact criteria).

Bats

Operating wind facilities have been found to affect many species of bat (Arnett et al. 2008; Hein and Schirmacher 2016). Bat injuries and fatalities may occur from direct collisions with turbines or from barotrauma, which is the severe damage or rupture of lungs due to the rapid reduction in air-pressure near moving turbine blades. Other impacts on bats from wind energy development include habitat loss and degradation, habitat fragmentation, and displacement of individuals.

Bats in the Phase I development and infrastructure areas would continue to experience detrimental impacts from a reduced quantity of available habitat and fragmentation of available habitat from construction of the CCSM Phase I Project. The initial habitat-based impacts from construction would be reduced as reclamation progresses during operation and some habitat becomes available again. Impacts on bats from sustained habitat degradation, including disruption and displacement from habitat during operation of the CCSM Phase I Project would be minor to moderate, long-term, probable, and local (see Table 3-17 for definitions of impact criteria).

Bat collisions and associated fatalities at wind facilities are well-documented in the United States (Kunz et al. 2007; Arnett et al. 2008; Horn et al. 2008; Hayes 2013). Of the 45 bat species found in the United States, 11 have been documented during fatality searches at wind facilities (Arnett et al. 2008). The primary bat species affected by wind facilities are migratory tree bats. Eastern red bats, hoary bats, and silver-haired bats comprise most of the bat fatalities in the midwestern and eastern United States, while the latter two species are most commonly observed in the western United States (Arnett and Baerwald 2013). Hoary bats have constituted the highest proportions of fatalities at most facilities, ranging from 9 to 88 percent of all bat fatalities (Arnett et al. 2008). Among 2,285 bat fatalities reported from facilities in western North America, hoary bats and silver-haired bats comprised 56 and 33 percent of all fatalities, respectively. Western long-eared myotis, fringed myotis, and Townsend's big-eared bat would be at low risk, given that they have never been documented among the 2,285 bat fatalities recorded from 21 wind energy facilities in the western United States (BLM 2012a; Gruver and Bishop-Boros 2015), however,, their ranges overlap most of the facilities. The single documented fatality of a western long-eared myotis occurred at a Canadian wind energy facility (Arnett and Baerwald 2013).

Turbine collision risks to bats are expected to be greatest during late summer and early fall during migration and foraging activities, when 90 percent of fatalities have been shown to occur (Johnson et al. 2004; Arnett and Baerwald 2013). While little is known about bat migratory routes across North America, some evidence exists that bats travel northward during spring and southward during fall (Cryan 2003; Baerwald et al. 2014). Migratory bats moving through the Phase I development area during migration would be at risk of colliding with wind turbines. At most wind facilities, fatalities during spring migration and maternity season are much lower. However, Piorkowski (2006) documented relatively high numbers of Brazilian free-tailed bat (*Tadarida brasiliensis*) fatalities, including pregnant females, from May through July at a wind energy facility in Oklahoma. No risk to bats exists from late fall through early spring because of the lack of activity during hibernation.

In its 2012 FEIS, the BLM predicted annual bat fatality from operation of the CCSM Project to be 2.1 bats per megawatt (MW) based on a meta-analysis of post-construction mortality studies at 21 wind facilities throughout the western United States, as compiled by Johnson and Stephens (2011). Since publication of the BLM FEIS, Hein et al. (2013) completed a meta-analysis of 15 wind facilities located throughout the Great Plains and found an average of 3.07 bat fatalities per MW of wind energy per year based on the exposure of bats to wind turbine rotor-swept zones. Based on these published estimates of mean bat fatalities, we estimate that operation of the CCSM Phase I Project could result in a range of between 3,150 and 4,605 bat fatalities per year (2.1 and 3.07 bat fatalities per MW multiplied by 1,500 MW). However, this represents a very rough estimate of fatalities and is not based on use of a bat fatality prediction model. Also, we cannot provide any confidence interval around these estimates. There are several limitations with the Johnson and Stephens (2011) and Hein et al. (2013) results, including (1) a limited number of existing wind energy facilities with publically available bat mortality data (most United States wind energy facilities do not monitor and report bat mortalities post-construction); (2) inconsistency in monitoring survey protocols used for wind facilities that do report bat mortality data and make it available; (3) probable lack of statistical rigor in the design of such studies or the failure to incorporate appropriate bias trials to adjust the fatality estimates; and (4) inappropriate comparisons made across different wind facilities with different habitat types and environmental conditions. Also both Johnson and Stephens (2011) and Hein et al (2013) include in their estimates results from bat fatality studies conducted at wind energy facilities located across a broad area of both the western and midwestern United States encompassing a wide variety of habitat types, elevation gradients, and precipitation regimes, that in many cases are not representative of conditions at the CCSM Phase I Project. In the case of the Johnson and Stephens (2011) analysis, only one of the fatality studies was conducted at a wind energy facility located in Wyoming. Still, when considered together, the results of these studies represent our best available estimates of bat mortality associated with North American wind energy facilities at this time from a geographic area that overlaps with the CCSM Project area. Therefore, lacking a peer-reviewed scientific model to predict general bat mortalities for wind energy facilities or any other suitable, peer-reviewed scientific literature, we choose to use those estimates in this EIS to derive rough estimates of bat mortality for the CCSM Phase I Project, and we acknowledge the multiple deficiencies associated with those estimates. The CCSM Phase I BBCS developed by PCW adopts the larger estimate of 4,605 bat fatalities per year based on Hein et al. (2013) data.

During surveys of the Phase I development and infrastructure areas, a total of 3,340 bat passes were recorded over 3 acoustic survey years (826 total detector nights), with a mean of 4.04 bat passes per detector night for the entire survey period. Bat activity within the Phase I development and infrastructure areas was comparable to levels reported from other studies in the region. Bat activity estimates from 24 sites located throughout the Great Plains averaged 4.19 bat passes per detector night (Hein et al. 2013). The Great Plains appears to have relatively low and consistent activity, and fatalities, across projects (Hein et al. 2013). However, pre-construction bat surveys are poor predictors of actual bat fatalities once a wind energy facility is in operation (Hein et al. 2013).

It has been speculated that windy conditions on site would deter bat activity, and fatalities would be minimal. However, this is typically not the case, and bat fatalities have been

recorded at wind facilities worldwide (Kunz et al. 2007; Kuvlesky et al. 2007; Arnett et al. 2008; Hein and Schirmacher 2016). Most bat fatalities occur during low wind conditions (Arnett and Baerwald 2013). Winds typically die down at night, and bats become more active. In addition, migrating bats would pass through the area of the CCSM Phase I Project during spring and fall, and are especially susceptible to fatality during this period.

Based on observed bat fatalities from other studies at wind energy facilities, we would expect that bat fatalities at the CCSM Phase I Project would likely be spread among two species (hoary and silver-haired bats) and would likely be concentrated during the fall migration period (late summer and early fall). Hoary bats were identified during each acoustic survey conducted at Phase I development and infrastructure areas, and represented 7 percent of detections recorded in 2008 (Solick et al. 2008). At the Foote Creek Rim wind project in southern Wyoming, hoary bats represented 8 percent of acoustic recordings but comprised almost 80 percent of fatalities at turbines (Young, Erickson, et al., "Avian and Bat," 2003).

All bats are long-lived species with low reproductive rates (Wilkinson and South 2002). The biological significance of up to several thousand migratory tree bat fatalities per year is uncertain. Little information is available concerning the population estimates of migratory tree bats to determine the significance of these impacts. Because migratory tree bats are primarily solitary tree dwellers and cannot be sampled at large roosting colonies (Carter et al. 2003), extraordinary mark-recapture efforts would need to be made annually to document severe declines in these species (Schorr et al. 2014).

PCW would conduct post-construction fatality monitoring for bats for the CCSM Phase I Project (see Phase I BBCS, Attachment B). The primary objectives of the CCSM Phase I Project's fatality monitoring are to (1) determine whether any patterns of fatalities exist within Phase I development areas such that factors associated with fatalities can be identified and addressed, and (2) evaluate the effectiveness of the Phase I BBCS conservation measures.

The intent of the CCSM Phase I adaptive management process is to provide a frequent opportunity during post-construction monitoring to evaluate and minimize the uncertainty related to the factors that influence the risk to bats from the CCSM Phase I Project. While the intended purpose of the Phase I BBCS is to avoid bat fatalities, the avoidance and mitigation measures described are currently insufficient to substantially avoid bat fatalities from operation of the CCSM Phase I Project. Despite application of the Phase I BBCS, we would still expect that bat fatalities could occur at the magnitude and extent described above. The CCSM Phase I adaptive management process is intended to proactively adjust post-construction monitoring protocols, conservation measures, and BMPs when warranted.

Overall, it is probable that bat fatalities from operation of the CCSM Phase I Project would result in a major impact on the regional and local bat populations that could be detectable across an extensive area and for a long-term duration, but would mostly be expected to impact a limited number of bat species (see Table 3-17 for definitions of impact criteria).

Special Status Mammal Species

Operation of the CCSM Phase I Project would result in impacts on special status mammal species similar to impacts described for small game and furbearers. Operation impacts could include injury or fatality from collision or crushing from vehicles; disruption or displacement due to the operation of wind turbines and continued human activities; and the continued effects of habitat loss, alteration, and fragmentation carried over from construction. PCW has committed to implementing measures to reduce direct and indirect impacts on habitat, impacts related to disruption, and impacts from vehicles, as described above. Specific impacts on special status mammal species are described in more detail below.

Pygmy Rabbit

Operation of the CCSM Phase I Project has the potential to affect 28 pygmy rabbit locations within 0.25 mile of the Phase I development and infrastructure areas. Research has demonstrated that roads can act as a barrier to pygmy rabbit movement, resulting in indirect impacts such as an increase in predation by coyotes or isolation of populations (Lawes 2009). The area of pygmy rabbit habitat that would be impacted during operation of the CCSM Phase I Project is small relative to available habitat. With the implementation of measures to avoid and minimize impacts, impacts on pygmy rabbits would be further reduced. Vehicle collisions and crushing of burrows (that is, injuries or fatalities) are possible, while habitat loss and disruption or displacement would be probable. Impacts on pygmy rabbits from operation would be minor, long-term, and limited (see Table 3-17 for definitions of impact criteria).

White-Tailed Prairie Dog

Operation of the CCSM Phase I Project has the potential to affect 90 white-tailed prairie dog colonies within 0.25 mile, but outside of the Phase I development and infrastructure areas. White-tailed prairie dogs are known to disperse readily to other areas due to human activity (Keinath 2004), and dispersal appears to be important for colony recovery (Anderson and Williams 1997; Tileston and Lechleitner 1966). However, depending on the population level, a greater land area would be required to maintain a viable colony (Keinath 2004).

The species favors open habitats, including previously altered areas (Keinath 2004). Vehicle collisions and crushing of burrows is possible, while habitat loss and disruption or displacement would be probable. Impacts on white-tailed prairie dogs would be minor, long-term, and limited (see Table 3-17 for definitions of impact criteria).

Wyoming Pocket Gopher

Operation of the CCSM Phase I Project has the potential to directly and indirectly affect 49 Wyoming pocket gopher mounds or mound complexes, and 99 mounds or mound complexes for unknown species of pocket gophers within approximately 250 feet of the limits of surface modification in the Phase I development and infrastructure areas. PCW has committed to implementing measures to reduce direct and indirect impacts on habitat, impacts related to disruption, and impacts from vehicles, as described under the general impacts of operation. Impacts on the Wyoming pocket gopher would be minor, long-term,

and limited. Vehicle collisions are possible, while impacts on habitat and disruption or displacement are probable (see Table 3-17 for definitions of impact criteria).

Compensatory Mitigation

Under Alternative 1 (Proposed Action), PCW has proposed to retrofit high-risk power poles to offset predicted fatalities of golden eagles associated with operation of the CCSM Phase I Project. As described in Section 2.2.1.4.5, power pole retrofits could occur anywhere throughout the four BCRs (see Figure 2-2). This compensatory mitigation would be intended to prevent future electrocution of golden eagles at high-risk power poles, which could result in small, localized increases in golden eagle abundance at some locations throughout the four BCRs. As a consequence, golden eagle predation on mammalian prey may increase. These impacts could be greatest in common golden eagle prey species, such as rabbits, pocket gophers, and prairie dogs. Because the golden eagle population across the four BCRs would not increase, the impacts on mammals as a result of compensatory mitigation would likely be negligible.

The most likely impact on mammals from power pole retrofits would be disruption and displacement during retrofitting activities. The impact would be minor, possible, and temporary, but occur over an extensive area (see Table 3-17 for definitions of impact criteria).

Summary of Operation Impacts Under Alternative 1

Under Alternative 1 (Proposed Action), operation of the CCSM Phase I Project could result in the following impacts on mammals (see Table 3-17 for definitions of impact criteria):

- Major, long-term impacts on bats are probable due to fatalities resulting from collision with wind turbines.
- Injury or fatality of small game and furbearers, and big game is possible due to collision with vehicles during operation.
- Moderate, long-term impacts are possible from surface modification in mule deer crucial winter range and from disruption of suspected migration routes for mule deer, elk, and pronghorn.
- Continued impacts due to the loss, alteration, and fragmentation of habitat range from possible to probable, including changes in foraging areas or emigration to adjacent habitats that may be less suitable.
- Displacement or disruption of mammals ranges from possible to probable due to operation of turbines or human activity, which could result in increased stress levels or reduced fitness.

3.6.3.3 Alternative 2 – Proposed Action with Different Mitigation

3.6.3.3.1 Construction

Under Alternative 2 (Proposed Action with Different Mitigation), the Phase I Chokecherry and Phase I Sierra Madre WDAs would be developed as proposed by PCW, but the

compensatory mitigation for eagle take would be different from that described in PCW's ETP applications. Construction impacts on mammals would be consistent with impacts described under Alternative 1 (Proposed Action) in Section 3.6.3.1.1.

3.6.3.3.2 Operation

Under Alternative 2 (Proposed Action with Different Mitigation), the predicted take of golden eagles due to operation of the CCSM Phase I Project would be offset by one or more alternative compensatory mitigation measures, instead of power pole retrofits as proposed under Alternative 1 (Proposed Action). Each of the potential alternative compensatory mitigation strategies is described in Section 2.2.2.4.

To be selected as compensatory mitigation for eagle take, a mitigation measure would need to result in no-net-loss to the golden eagle population within the four BCRs, which could subsequently result in local increases in predation on mammals by eagles elsewhere. Although this could have a localized, negative impact on individual mammals, overall impacts on the regional mammal community would be negligible. Each alternative mitigation option could result in benefits to one or more species of mammal, except for the rehabilitation of injured eagles, which, like the proposed mitigation of retrofitting power poles, would be unlikely to benefit any mammal species.

Mitigation of Existing Wind Facilities

The mitigation of existing wind facilities by curtailing operations, upgrading equipment, or decommissioning turbines could benefit bats. The magnitude of the benefit from this mitigation measure would be dependent on the location and number of turbines mitigated and the quality of bat habitat or migration routes at the selected location. Beneficial impacts on bats (Arnett and May 2016) are probable, and would be moderate, long-term, and extensive (see Table 3-17 for definitions of impact criteria). Other mammals may benefit from the removal of wind turbines, which cause noise pollution and human disruption. Beneficial impacts on mammals (other than bats) from the mitigation of existing wind facilities would be possible, but minor, long-term, and extensive (see Table 3-17).

Lead Abatement and Carcass Removal

Efforts to reduce the use of lead shot (ammunition) could generally benefit scavenging mammals in the region because lead negatively affects reproductive rates and intelligence in mammals (Rogers 2010). Lead core and solid lead bullets are commonly used by hunters for big game mammals, and lead fragments often remain in gut piles discarded after dressing. In addition, up to 21 percent of big game animals shot are killed but not recovered by hunters (Smith and Anderson 1998). Non-game animals such as ground squirrels, prairie dogs, cottontails, upland game birds, and coyotes that are shot with lead ammunition and unrecovered are also a potential source of lead exposure. However, hunter resistance to voluntarily switch from lead ammunition may limit the effectiveness of this type of mitigation. Beneficial impacts of lead abatement on mammalian scavengers are possible, minor, long-term, and regional. Removal of carcasses from roads could benefit mammals that are known to scavenge (Ruth et al. 2003; Wilmers et al. 2003; Haroldson et al. 2004).

Carcass removal would benefit these animals by reducing the potential for vehicle collisions. Beneficial impacts from the abatement of lead shot on mammals (other than bats) are possible, and would be minor, long-term, and regional (see Table 3-17 for definitions of impact criteria).

Carcass Avoidance

Carcass avoidance would benefit mammals through the construction of crossing structures. Wildlife crossing structures would reduce mammal-vehicle collision fatalities and mortality. Wildlife crossing structures could be used to help maintain suspected migratory routes. The strategic placement of wildlife crossings would allow big game species the opportunity to travel unrestricted through seasonally important habitats, while minimizing their exposure to vehicle collisions. For instance, underpasses combined with game-proof fencing have reduced deer-vehicle collisions by 81 percent at Nugget Canyon, Wyoming (Sawyer and LeBeau 2011). Wildlife crossing structures are used by a variety of wildlife, including bears, mountain lions, elk, moose, coyote, bobcat, ground squirrels, rabbits, and jackrabbits, among others (Sawyer and LeBeau 2011). A study of underpasses and bridges in Wyoming recorded passes by mule deer, but found that elk rarely used either type of structure (Cramer 2012). Beneficial impacts on mammals (other than bats) from the implementation of carcass avoidance measures are probable, and would be moderate, long-term, and regional (see Table 3-17 for definitions of impact criteria).

Wind Conservation Easement

Establishing a wind conservation easement could prevent future potential injuries and fatalities of bats and other mammals caused by operation of wind turbines. An easement could prevent other impacts associated with wind facilities, including habitat loss, alteration, and fragmentation, as well as displacement and disruption. However, wind conservation easements would not necessarily protect mammals from other land uses. The exact location of the easement and amount of suitable habitat for mammals in that area would determine the extent to which the easement would prevent future impacts. Beneficial impacts from a wind conservation easement on mammals are probable, and would be moderate, long-term, and regional (see Table 3-17 for definitions of impact criteria).

Habitat Enhancement

Habitat enhancements and modifications designed to improve eagle habitat and increase prey availability would also indirectly benefit mammals. Conservation easements, increases in prey availability, and sagebrush vegetation improvements, including prevention and removal of noxious or invasive weeds, could maintain or enhance mammal habitat quality. In particular, improvements to sagebrush-steppe habitat could benefit mammals such as pygmy rabbits that are sagebrush-obligate (that is, they are dependent on the sagebrush steppe ecosystem for forage and nesting habitat). Beneficial impacts on mammals from habitat enhancements are probable, and would be moderate, long-term, and extensive. Beneficial impacts on bats would be possible, minor, long-term, and extensive (see Table 3-17 for definitions of impact criteria).

Summary of Construction and Operation Impacts Under Alternative 2

Alternative 2 (Proposed Action with Different Mitigation) would have the same impacts as described under Alternative 1 (Proposed Action) in Sections 3.4.3.2.1 and 3.4.3.2.2. However, the compensatory mitigation required under the ETP would be different and could result in the following benefits to mammals (see Table 3-17 for definitions of impact criteria):

- The mitigation of existing wind facilities would have probable, minor, long-term, and extensive impacts on some mammals. Benefits to bats would be moderate in magnitude.
- Lead abatement would have possible, minor, long-term, and regional benefits to mammals, particularly mammalian scavengers. However, there would be no effect on bats and herbivores.
- Carcass removal would have possible, minor, long-term and regional benefits to mammals, particularly mammalian scavengers. However, there would be no effect on bats and herbivores.
- Carcass avoidance measures, a wind conservation easement, and habitat enhancements would have probable, moderate, long-term, and regional benefits to mammals; habitat enhancements could occur over an extensive area.
- The rehabilitation of injured eagles would have no effect on mammals.

3.6.3.4 Alternative 3 – Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project

3.6.3.4.1 Construction

Under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), only the Phase I Sierra Madre WDA and the infrastructure components would be developed as proposed by PCW. Construction under Alternative 3 would result in impacts on mammals as described under Alternative 1 (Proposed Action) in Section 3.6.3.2.1, except impacts associated with construction of the Phase I Chokecherry WDA would not occur. Under Alternative 3, initial surface clearing and grading areas would total about 3,262 acres, about 1,203 acres less than under Alternative 1. Long-term modification would total about 658 acres, about 191 acres less than under Alternative 1. Alternative 3 would include about 288 acres of activity areas, about 152 acres less than under Alternative 1. Construction under Alternative 3 would have the same impacts on mammals as construction under Alternative 1, except that the magnitude of direct and indirect habitat impacts would be reduced.

Small Game and Furbearers

Because of the reduction in acres developed and construction activities under this alternative, a corresponding reduction would result in habitat impacts, noise impacts, injury and fatality from construction activities, and vehicle collisions. Impacts on small game and furbearers due to construction under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would be probable, minor, temporary, and limited, although habitat

loss, alteration, and fragmentation would be long-term (see Table 3-17 for definitions of impact criteria).

Big Game

A reduction in construction activities and acres modified under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would correspond to a reduction in habitat loss and fragmentation, avoidance and disruption impacts, and injury and fatality from construction activities and vehicle collisions, as each relates to big game species. As described for Alternative 1 (Proposed Action), snow fences constructed as part of Alternative 3 could create barriers and disrupt migration, except impacts associated with construction of the Phase I Chokecherry WDA would not occur. Impacts of snow fences on the migration of big game species would be minor in magnitude because only portions of the suspected migratory routes would be affected, and would be possible, long-term in duration, and local in extent (see Table 3-17 for definitions of impact criteria).

Initial clearing and grading associated with construction under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would directly and indirectly impact spring-summer-fall habitat and winter-yearlong habitat for mule deer. Impacts on mule deer habitat and modification from construction would be less than described under Alternative 1 (Proposed Action). Although the Phase I Chokecherry WDA turbines would not be constructed, habitat loss within the Platte Valley mule deer herd crucial winter range would still occur as a result of construction of Phase I infrastructure areas.

Construction under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would directly and indirectly impact elk spring-summer-fall habitat, winter-yearlong habitat, and suspected migratory corridors. Impacts on elk seasonal habitat would be reduced, but the same suspected migratory route would still be affected under this alternative as under Alternative 1 (Proposed Action) (see Figure 3-5).

Construction under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would directly and indirectly impact pronghorn spring-summer-fall habitat, winter-yearlong habitat, and suspected migratory routes. All three of the suspected pronghorn migratory routes that would be affected under Alternative 1 (Proposed Action) would also be impacted under Alternative 3 (see Figure 3-6).

Under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), impacts on big game foraging and resting habitat would be probable, minor, temporary to long-term, and local for all species. Disruption and displacement impacts on big game would be possible, minor, temporary, and local for mule deer and elk, and would be possible, moderate, temporary and local for pronghorn (see Table 3-17 for definitions of impact criteria).

Bats

Overall, impacts on bats during construction would be similar to impacts described under Alternative 1 (Proposed Action), but would be about 27 percent less under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) because there would be

27 percent less habitat modification from initial clearing and grading. As described for Alternative 1, most types of impacts on bats would be probable, minor to moderate, temporary, and limited, although impacts on bat tree-roosting habitat would be long-term as they would persist throughout operation (see Table 3-17 for definitions of impact criteria). Minor temporary displacement and disturbance of bats would probably occur on a local extent and injury or fatality of bats would remain unlikely during construction of Alternative 3.

Special Status Species

Construction under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would have impacts similar to impacts described under Alternative 1 (Proposed Action); however, less habitat would be affected under this alternative.

A total of 20 pygmy rabbit locations were documented within 0.25 mile of the Phase I Sierra Madre WDA, which is 16 fewer occurrences than under Alternative 1 (Proposed Action). Disturbance impacts would be temporary. Disruption and habitat impacts would be minor, probable, medium- to long-term, and limited (see Table 3-17 for definitions of impact criteria). However, because pygmy rabbit locations in the Chokecherry WDA would not be affected under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), impacts on pygmy rabbits would be much less than under Alternative 1. Because the number and extent of construction activities would be reduced under Alternative 3, fewer pygmy rabbits would be injured or killed than under Alternative 1.

A total of 79 white-tailed prairie dog colonies were documented within the Phase I Sierra Madre WDA, the same as under Alternative 1. Therefore, impacts on white-tailed prairie dogs would be similar to those predicted under Alternative 1. Impacts to white-tailed prairie dogs from disruption, displacement, and loss of habitat would be probable, minor, temporary to long-term, and limited in extent. Injuries and fatalities from vehicle collisions during the construction period would be possible, minor, and limited in geographic extent (see Table 3-17 for definitions of impact criteria) but reduced from Alternative 1 because of the reduction in construction activities.

For Wyoming pocket gopher, a total of 92 occurrences of predicted Wyoming pocket gopher or unknown species were identified within about 250 feet of the Phase I Sierra Madre WDA, which is 46 fewer occurrences than under Alternative 1. Direct and indirect impacts of disruption, displacement, and habitat loss and alteration to Wyoming pocket gophers are probable, although impacts would be minor, temporary, and limited. However, under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), impacts on Wyoming pocket gophers would be approximately half of those predicted under Alternative 1. Fewer individuals would be killed or injured by the reduction in construction activities under Alternative 3.

Summary of Construction Impacts Under Alternative 3

Construction under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would result in the following impacts on mammals (see Table 3-17 for definitions of impact criteria):

- Initial clearing and grading of 3,262 acres of potential mammal habitat, vegetation cutting or partial cutting in 288 acres of activity areas, and long-term modification of 658 acres in the Phase I Sierra Madre WDA and associated infrastructure areas, resulting in probable, limited, minor, temporary to long-term impacts on mammals.
- Displacement and disruption of mammals due to construction activities that would range from possible to probable and be minor to moderate in magnitude, temporary to long-term in duration, and limited to local in extent.
- Potential injury or fatality of mammals from collisions with construction equipment and construction vehicles that would be minor in magnitude, temporary in duration, and limited in extent. This is probable for small mammals, special status mammals, and burrowing mammals. This is possible for big game and unlikely for bats.

3.6.3.4.2 Operation

While the types of direct and indirect impacts on mammals that could occur during operation under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would not differ from operation under Alternative 1 (Proposed Action), the magnitude of the impacts would be less. The 658 acres of long-term modification created during construction would persist throughout operation. As compared to Alternative 1, this would be 191 fewer acres. Under Alternative 3, the 298 turbines in the Phase I Sierra Madre WDA would be developed and the 202 turbines in the Phase I Chokecherry WDA would not be developed, resulting in a 40 percent reduction in the number of turbines. A corresponding reduction in disruption impacts, injury and fatality from operational activities, and vehicle collisions would occur as a result of a reduction in the number of turbines.

Small Game and Furbearers

As described above, operation under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would have the same impacts on small game and furbearers as Alternative 1 (Proposed Action), except that the magnitude of direct and indirect habitat impacts would be reduced. Impacts on small game and furbearers from operation under Alternative 3 would be probable, minor, long-term, and limited (see Table 3-17 for definitions of impact criteria).

Big Game

As described above, operation under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would have the same impacts on big game as operation under Alternative 1 (Proposed Action), except that the magnitude of direct and indirect habitat impacts would be reduced. Operation under Alternative 3 would directly and indirectly impact spring-summer-fall habitat and winter-yearlong habitat and suspected migratory corridors for all three big game species in the areas that would be maintained after construction, including the wind turbine sites, roads, and pads. However, because fewer wind turbines would be developed, these impacts would be less than those described under Alternative 1. Approximately 222 acres of long-term modification would occur within mule deer crucial winter range and the suspected migratory route through the Phase I Chokecherry WDA would still be impeded by the Phase I Haul Road (see Figure 3-4), and vehicle activity

on this road would be approximately the same as under Alternative 1. Impacts on elk seasonal habitat would be reduced, but the same suspected migratory route would be affected under this alternative as under Alternative 1. All three of the suspected pronghorn migratory routes that would be affected under Alternative 1 would be impacted under Alternative 3. Habitat loss impacts on big game would be possible, minor, long-term, and limited (see Table 3-17 for definitions of impact criteria). The behavioral disruption and displacement impacts on big game would be possible, minor to moderate, long-term, and local, while injury and fatality impacts would be possible, minor, long-term, and local (see Table 3-17).

Bats

The potential for bat collisions with turbines under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would be approximately 40 percent less than under Alternative 1 (Proposed Action) because there would be about 40 percent fewer turbines to potentially impact bats. For the purposes of this analysis, we assumed that bat fatality levels would be consistent across both WDAs. However, this is unlikely the case, but we currently lack the necessary data to predict how bat use varies across the entire Phase I development and infrastructure areas. Using the range of bat fatality rates presented in Section 3.6.3.2.2 (2.1 to 3.07 bats per MW per year), between 1,890 and 2,763 bat fatalities could occur each year as a result of operation under Alternative 3. This fatality estimate includes all the caveats and limitations described in Section 3.6.3.2.2. As under Alternative 1, it is unknown how the loss of between 1,890 and 2,763 bats each year would affect regional bat populations. Project redesign efforts and avoidance and minimization measures designed to reduce or avoid impacts on bats as outlined in the Phase I BBCS (see Attachment B), may reduce bat fatality levels for the CCSM Phase I Project below the estimates we provide. Injury and fatality of bats would be probable and would result in major, long-term impacts to local and regional bat populations that would be detectable across an extensive area (see Table 3-17 for definitions of impact criteria). Impacts on bat habitat, including disruption and displacement of bats, would be probable, minor to moderate, long-term, and local (see Table 3-17).

Special Status Mammal Species

Operation under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would have the same impacts on the three species of special status mammals as described under Alternative 1 (Proposed Action); however, under this alternative, less habitat would be impacted in the long-term. The numbers of pygmy rabbit locations, white-tailed prairie dog colonies, and Wyoming pocket gopher mounds or mound complexes impacted by Alternative 3 are described above. Habitat alteration, disruption and displacement impacts on special status mammals as a result of Alternative 3 would be probable, minor, long-term, and limited, while injury and fatality impacts would be possible, minor, long-term, and limited (see Table 3-17 for definitions of impact criteria).

Summary of Operation Impacts Under Alternative 3

Under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), operation of Phase I of the Sierra Madre WDA would result in the following impacts on mammals (see Table 3-17 for definitions of impact criteria):

- The long-term modification of 658 acres carried over from construction would persist throughout operation. This could continue the impacts of habitat loss and fragmentation from roads, power lines, turbine pads, buildings and other infrastructure. Continued habitat impacts would result in probable, minor to moderate, long-term, and limited impacts on mammals.
- The operation of turbines and maintenance activities could cause the disruption or displacement of mammals from the Phase I development and infrastructure areas. Impacts of this nature would generally be possible to probable, minor to moderate, long-term and local.
- The operation of 298 wind turbines within the Phase I Sierra Madre WDA could result in between 1,878 and 2,745 bat fatalities due to collision or interaction with turbines. It is probable that this would be a moderate, long-term, and extensive impact on bats.

3.6.3.5 Alternative 4 – No Action: Denial of ETPs

Under Alternative 4 (No Action: Denial of ETPs), standard and programmatic ETPs would not be issued because the permits would be denied or because the permit applications would be withdrawn. If no ETPs are issued for the CCSM Phase I Project, PCW may decide not to build the project or may decide to move forward with their proposed project without ETPs.

3.6.3.5.1 No Build

If PCW decides not to build the CCSM Phase I Project, no direct or indirect impacts on mammals would result from construction or operation of the CCSM Phase I Project. Currently existing impacts on mammals would continue.

3.6.3.5.2 Build without ETP

If PCW decides to move forward with the CCSM Phase I Project without ETPs, we assume PCW would construct and operate the project as outlined in its SPODs and as permitted by the BLM. However, we assume that none of the measures described in the ETP application and the ECP and as outlined in Section 2.2.1.4 would be implemented, including EACPs, monitoring, adaptive management, and compensatory mitigation. In addition, stipulations we would include with the ETPs would not be implemented. Constructing and operating the CCSM Phase I Project without standard and programmatic ETPs would result in all of the adverse impacts described under Alternative 1 (Proposed Action) in Section 3.6.3.2.2. Several BMPs, avoidance and minimization measures, and conservation measures as described in section 2.2.1.3 that would reduce impacts on mammals would still be implemented, so impacts on mammals would be similar to impacts described under Alternative 1 (Proposed Action). These habitat enhancement and revegetation projects would

likely also provide moderate to major, regional, long-term benefits for mammals, but the extent of these effects would likely be less than those under Alternative 1 (Proposed Action) because additional conservation measures associated with an ETP would not be incorporated.

Overall, building the CCSM Phase I Project without ETPs would result in impacts on mammals ranging in magnitude from minor to major, depending on the type of impact and the species considered (see Table 3-17 for definitions of impact criteria). This alternative would result in impacts similar to impacts described under Alternative 1 (Proposed Action), but potentially at a greater magnitude, depending on the mammal group.

3.6.3.6 Summary of Impacts under Each Alternative

Impacts on mammals from construction and operation of the CCSM Phase I Project would be as follows:

- **Alternative 1 (Proposed Action)** – Mammals would be impacted by habitat loss and degradation, behavioral disruption and displacement, and injury and fatality. Small game and furbearers, including special status species, could be crushed by construction activities or displaced from habitats. Big game species could be displaced from suspected migration routes and crucial winter range, particularly during construction. Bat fatalities from collisions with wind turbines are probable.
- **Alternative 2 (Proposed Action with Different Mitigation)** – Impacts would be similar to those under Alternative 1 (Proposed Action). Compensatory mitigation would be different under Alternative 2, which would result in different levels of impacts and benefits for mammals, depending on the compensatory mitigation option selected (see Table 3-18).
- **Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project)** – Impacts would be similar to those under Alternatives 1 (Proposed Action) and 2 (Proposed Action with Different Mitigation), but most impacts would be reduced under Alternative 3 because the number of wind turbines would be reduced.
- **Alternative 4 (No Action: Denial of ETPs)**
    - The No Build scenario would result in no impacts on mammals.
    - The Build Without ETPs scenario would result in impacts similar to but possibly greater than those under Alternatives 1 (Proposed Action), 2 (Proposed Action with Different Mitigation), and 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) if PCW decides to move forward with the proposed project without ETPs.

Table 3-18 compares potential compensatory mitigation under Alternative 1 (Proposed Action) and Alternative 2 (Proposed Action with Different Mitigation); see Table 3-17 for definitions of impact criteria.

Table 3-18. Comparison of Compensatory Mitigation Measures for Mammals for the CCSM Phase I Project in Wyoming

Compensatory Mitigation Measure	Effects on Mammals
Power pole retrofits	Small, localized increases in golden eagle populations within the four BCRs could impact golden eagle prey species such as rabbits, pocket gophers, and prairie dogs. The impact would be negligible because the overall golden eagle population would remain the same.
Mitigation of existing wind facilities	Benefits to some mammals would be minor, long-term, possible, and extensive. Probable benefits to bats would be moderate in magnitude.
Lead abatement	Minor, long-term, possible, and regional benefits to scavenging mammals. No effect on bats and herbivores.
Carcass removal	Minor, long-term, possible, and regional benefits to scavenging mammals. No effect on bats and herbivores.
Carcass avoidance	Moderate, long-term, probable, and regional benefits to most mammals.
Wind conservation easement	Moderate, long-term, probable, and regional benefits to mammals.
Habitat enhancement	Moderate, long-term, probable, and extensive benefits to most mammals. Minor, long-term, possible, and extensive beneficial impacts on bats.
Rehabilitation of injured eagles	No effect on mammals.

3.7 Birds (Other than Eagles)

3.7.1 Approach

Birds (other than eagles) that occur within the Phase I development and infrastructure areas are discussed because we have statutory authority and responsibility for implementing, administering, and enforcing the MBTA and ESA. This section includes birds listed as endangered or threatened under the ESA and birds protected under the MBTA, which includes most native bird species in the United States. Special status species discussed in this section include USFWS Birds of Conservation Concern (BCC), WGFD Species of Greatest Conservation Need (SGCN), and game bird species managed by the WGFD. The study area for birds encompasses the areas within and immediately adjacent to the Phase I development and infrastructure areas.

For our analysis of birds (other than eagles), we have reviewed the BLM FEIS and ROD, EA1, EA2, and the SPODs for the Phase I development and infrastructure areas. New information about birds gathered since the publication of these documents that is relevant to our consideration of issuing standard and programmatic ETPs was included in the resource description and subsequent environmental impact analysis. Public, agency, and tribal input regarding avian resources received during the scoping process and tribal consultation was included in the analysis of this resource.

3.7.2 Affected Environment

Except to the extent that new information or analysis provided herein updates the previous discussions, we are incorporating into this EIS by reference the information about birds that we have found to be adequate for our analysis from the following documents:

- BLM FEIS – Section 3.14, found on pages 3.14-1 through 3.14-28; Section 3.15, found on pages 3.15-1 through 3.15-20; and Appendix G, which includes a table of all wildlife species documented in the Phase I development and infrastructure areas.
- EA1 – Section 3.13, found on pages 3-42 through 3-45; and Section 3.14, found on pages 3-46 through 3-63
- EA2 – Section 3.8 and Section 3.9

In the BLM FEIS, Section 3.14.2.3 describes bird species observed in the Phase I development and infrastructure areas, and the results of fixed-point count bird use surveys and raptor nest surveys in the Phase I development and infrastructure areas. Since publication of the BLM FEIS, additional information is available from recent baseline avian studies, and this information is presented below. The following sections describe species composition and use of the Phase I development and infrastructure areas by resident and migratory birds, including raptors (birds of prey) other than eagles.

3.7.2.1 Landscape Setting and Habitats

Vegetation communities in the Phase I development and infrastructure areas that serve as habitat for birds include rolling sagebrush steppe, salt desert shrub basins, riparian/mesic lowland, and foothill shrublands, as described in Section 3.3, Vegetation and Wetlands, and in the BLM FEIS (BLM 2012a). The Phase I Chokecherry WDA is dominated by sagebrush steppe and mixed grass prairie. Topography in the area is rolling hills and becomes more varied in the southern portion. A distinct rim with a steep cliff face, known as Bolten Rim, dominates the southern boundary of the Phase I Chokecherry WDA. The Phase I Sierra Madre WDA is dominated by sagebrush steppe with quaking aspen inclusions. Topography ranges from gently rolling plains in the northern portion to rolling hills in the southern portion. The escarpment of Miller Hill dominates the northern boundary of the Phase I Sierra Madre WDA. Drainages in the southern portion are dominated by willow (BLM 2012a). Figures 3-2 and 3-3 illustrate the various habitats within the Phase I Chokecherry and Phase I Sierra Madre WDAs.

The Phase I development and infrastructure areas lie within the Central Flyway, an administrative unit used by USFWS in concert with state fish and wildlife agencies to

manage populations of migratory bird species. The Central Flyway includes the grasslands of the Great Plains and the eastern portion of the Rocky Mountains, and extends from North Dakota south to the Gulf Coast (Johnsgard 2012).

3.7.2.2 Site Use and Occurrence

The Phase I development and infrastructure areas provide habitat for year-round residents, over-wintering birds, summer residents, and migratory birds (see Attachment D). A variety of birds occur within the study area and they are most abundant during the breeding season. For Wyoming, we identify migratory bird nesting periods as occurring generally from January 1 to August 31 for species protected by the MBTA. Passerines (perching birds/songbirds) were the most abundant bird type observed during surveys in the Phase I development and infrastructure areas during all seasons with the exception of winter (Johnson et al. 2008, 2009; SWCA 2012a; PCW 2012). Raptors were the next most common bird group observed (Johnson et al. 2008, 2009; SWCA 2012a).

Since publication of the BLM FEIS, ongoing bird surveys have been conducted at the Phase I development and infrastructure areas with emphasis on surveying raptors and special status bird species. Site use by raptors and other migratory birds was documented in numerous surveys conducted since 2008, as shown in Table 3-19 below.

It should be noted that these bird survey efforts, summarized in Table 3-19, were conducted using protocols and methods that varied from one another and also that differed in the degree to which they were consistent with current USFWS recommendations for pre-construction bird surveys. However, these surveys were planned in cooperation with the USFWS and were generally consistent with survey recommendations at the time. Ultimately we relied largely upon results from these bird surveys to make our recommendations for avoidance and minimization of bird take for the Phase I development and infrastructure areas. Throughout this section where any conclusions are provided relative to any pre-construction bird surveys, and the surveys upon which the conclusions are based were not consistent with current USFWS pre-construction survey recommendations, we include all applicable caveats or qualifiers with any such conclusory statements so that this work can be placed in its proper context. Furthermore, these surveys were completed specifically for the CCSM Project and have not been peer-reviewed, but are generally the best available data for the CCSM Phase I Project.

Table 3-19. Bird Surveys Conducted in or Near the CCSM **Phase I Development and** Infrastructure Areas for the CCSM Phase I Project in Wyoming

Survey Type	Dates of Survey	Bird Species Surveyed	Purpose of Survey
Fixed-point count bird use surveys (Baseline avian use surveys)	June 2008 to June 2009	All avian species	Fixed-point count surveys were conducted biweekly (monthly during the winter) to document bird use and behavior by vegetation community and season. These surveys are also referred to as baseline avian use surveys.
Long-watch raptor use and migration surveys	April 2011 to July 2012	Raptors	Long-watch surveys were conducted to identify areas of high eagle use for the purposes of micrositing turbines and other CCSM Project facilities to avoid and minimize impacts on eagles and other raptors.
2,625-foot (800-meter) raptor count surveys	August 2012 to August 2013	Raptors	2,625-foot (800-meter) raptor count surveys were conducted to identify areas of high raptor use for the purposes of micrositing turbines and other CCSM Project facilities to avoid and minimize impacts on eagles and other raptors.
Avian radar studies	March 2011 to March 2013	All avian species and bats	Radar was used to map avian use at nine different locations across the Phase I development and infrastructure areas.
Raptor nest surveys and productivity monitoring	May 2008, May–July 2011, April–July 2012, April–July 2013, and April–July 2014	Raptors	Helicopter and ground-based surveys were conducted in suitable nesting habitats within the Phase I development and infrastructure areas and a 5-mile buffer to document occupied and unoccupied raptor nests.
Breeding bird grid surveys	June 2011	All avian species	Breeding bird grid surveys were similar to the migratory bird count data.

Survey Type	Dates of Survey	Bird Species Surveyed	Purpose of Survey
Greater sage-grouse brood and lek surveys	April–May (lek) and August – September 2008 (brood)	Greater sage-grouse	Aerial transect surveys for leks and ground-based brood surveys within the CCSM Project.
Greater sage-grouse monitoring surveys – lek surveys	2010–2014	Greater sage-grouse	Monitored greater sage-grouse movement patterns and hen survival and productivity, and conducted annual leks counts.
Greater sage-grouse telemetry surveys	2010–Present	Greater sage-grouse	Surveys tracked movements of male and female greater sage-grouse across the Phase I development and infrastructure areas and documented habitat use

The surveys summarized in Table 3-19 and by SWCA (2014e, 2014f, 2014g, 2014h) were conducted to further characterize how avian species use the Phase I development and infrastructure areas and aided in development of a bird species list (see Attachment D). Incidental observations of migratory birds, sagebrush-obligate bird species (an obligate species is dependent on a specific habitat for all or a portion of its lifecycle), and other birds were made during general avian and eagle use surveys conducted from 2008 through 2014.

Baseline avian use surveys for the Phase I development and infrastructure areas were conducted in 2008 by using 19 fixed-point counts to estimate the seasonal, spatial, and temporal use of the Phase I development and infrastructure areas by birds, particularly raptors. The fixed-point count survey involved recording the species and numbers of birds observed by sight and sound within a specified radius, for a 20-minute duration at a fixed location within the study area. The surveys were designed to sample representative habitats and topography within the Phase I development and infrastructure areas. All avian species observed were recorded, and incidental observations were noted separately (Johnson et al. 2008, 2009).

Fixed-point count surveys were conducted at 19 different survey plots, and a total of 433 20-minute surveys were completed from June 2008 to June 2009 in the CCSM Project area. A total of 2,005 individual birds within 1,301 separate groups and 50 different species were recorded (Johnson et al. 2009). In the BLM FEIS, Table 3.14-3 (BLM 2012a) describes the total number of individuals observed for each species, by season and overall, during the fixed-point count bird use surveys in the CCSM Project from 2008 to 2009. Some of the fixed-point count locations from these early surveys do not align with the currently proposed project footprint; as such, the results of these surveys may not accurately describe the avian community within the Phase I development and infrastructure areas.

Breeding bird grid surveys were conducted in June 2011 at 15 grids, each with 16 point-count stations separated by 820 feet (250 meters). Each survey station was visited once in June 2011. These surveys recorded all birds seen or heard at each station, for a total of 1,944 individuals or 63 species (SWCA 2012a). Other pre-construction avian surveys listed in Table 3-19 were focused on eagles, other raptors, and potential eagle prey sources. The results of these surveys are described within the following sections or within Section 3.8 (Eagles), as appropriate.

The following sections describe the general site use and occurrence of selected species groups, including: waterbirds, waterfowl, and shorebirds; passerines; raptors; ESA-listed migratory birds; and other special status bird species. These sections are not intended to describe every species known to or likely to occur in the Phase I development and infrastructure areas (see Attachment D).

3.7.2.2.1 Waterbirds, Waterfowl, and Shorebirds

Waterbirds (loons, grebes, herons, egrets, pelicans, cranes, rails, coots, and gulls), waterfowl (ducks, geese, and swans) and shorebirds can be seasonal prey for bald and golden eagles at the four reservoirs (Kindt, Rasmussen, Sage Creek, and Teton) in the vicinity of the Phase I development and infrastructure areas. Waterbirds, waterfowl, and shorebirds using the North Platte River can also serve as prey for eagles nesting or foraging along this riparian corridor. This food source is available from early spring through late fall in periods when the reservoirs and the river are ice-free; however, the highest concentration of these species occurs during the fall when nesting is completed and adults and juveniles of many species gather on the reservoirs before southerly migration (PCW 2015b).

Waterbird, waterfowl, and shorebird surveys were conducted in 2011 during spring, summer, and fall at each of the four reservoirs in the vicinity of the Phase I development and infrastructure areas. During surveys for these species in 2011 the following were counted: 1,415 individuals of 35 species in the spring; 1,708 individuals of 29 species in the summer; and 11,473 individuals of 29 species in the fall (SWCA 2012a). The most common species observed in the spring were American coot (*Fulica americana*), scaup (*Aythya* spp.), and western grebe (*Aechmophorus occidentalis*). The most common species observed in the summer were redhead (*Aythya americana*), scaup, and mallard (*Anas platyrhynchos*). In the fall, the most common species were American coot, American wigeon (*Anas americana*), and gadwall (*Anas strepera*). Kindt Reservoir (located outside the Phase I development and infrastructure areas) had the highest species richness and abundance during spring and fall surveys. During summer surveys, Rasumussen Reservoir had the highest abundance and Sage Creek had the highest species richness (SWCA 2012a). A detailed account of the methodology used in these surveys is lacking from the survey reports; therefore, we cannot make accurate conclusions about the adequacy of the waterbird surveys. However, it is apparent that the scope and duration of these surveys was insufficient to accurately document the distribution and abundance of waterbirds, waterfowl, and shorebirds at reservoirs near the CCSM Phase I Project area.

3.7.2.2.2 Passerines

Passerines are the largest order of birds, making up more than half of all bird species. This order includes all songbirds, as well as corvids (ravens, crows, jays, and magpies) and swallows. Passerines are the most abundant bird type in the Phase I development and infrastructure areas, and the most commonly observed passerine species are horned lark (*Eremophila alpestris*), vesper sparrow (*Pooecetes gramineus*), Brewer's sparrow (*Spizella breweri*), western meadowlark (*Sturnella neglecta*), and sage thrasher (*Oreoscoptes montanus*) (BLM 2012a; Johnson et al. 2009). The fixed-point count surveys (baseline avian use surveys) and breeding bird grid surveys, described above, documented passerine use of the CCSM Project area.

Common ravens (*Corvus corax*) occupy an ecological niche more similar to raptors than passerines. They are generalist omnivores that are highly associated with carrion (Boarman and Heinrich 1999) and human activity. Their nesting habits are highly variable and opportunistic, and their nests resemble nests of some raptor species in size and location. In fact, ravens and raptors are known to annually interchange nest sites (see Section 3.7.2.2.4). Common ravens are known to harass larger raptors, particularly eagles, and there is indication of interspecific competition for nest sites or space with eagles (see Section 3.8.3.2). Studies have suggested possible avoidance of golden eagle nesting sites by common ravens. In addition, the remains of common ravens have been found in golden eagle nests, indicating that golden eagles prey on common ravens (Kochert et al. 2002). The common raven was the most abundant large bird observed during fixed-point count surveys (175 individuals observed in 2008 and 2009), was most common in the fall, and had the highest collision exposure index of all species (Johnson et al. 2009). In 2011 breeding bird grid surveys, they were the second most common large bird observed behind American crow (SWCA 2012a), but it is likely that many ravens were misidentified as crows.

3.7.2.2.3 Raptors

Raptor species (other than eagles) that are known or likely to occur as residents or migrants within the Phase I development and infrastructure areas include red-tailed hawk (*Buteo jamaicensis*), Swainson's hawk (*B. swainsoni*), ferruginous hawk (*B. regalis*), rough-legged hawk (*B. lagopus*), prairie falcon (*Falco mexicanus*), American kestrel (*F. sparverius*), Cooper's hawk (*Accipter cooperii*), sharp-shinned hawk (*A. striatus*), great-horned owl (*Bubo virginianus*), burrowing owl (*Athene cunicularia*), long-eared owl (*Asio otus*), short-eared owl (*A. flammeus*), northern harrier (*Circus cyaneus*), osprey (*Pandion haliaetus*), and turkey vulture (*Cathartes aura*) (see Attachment D). Two types of raptor-specific surveys were conducted in the Phase I development and infrastructure areas: aerial and ground nest surveys and long-watch surveys. The aerial and ground nest surveys documented raptor nests, and long-watch surveys documented raptor species occurrence and their movement patterns (Johnson, Rintz, and Strickland 2008a; SWCA 2011, 2012a, 2013a, 2014i). In addition, fixed-point count bird surveys and breeding bird grid surveys were conducted to document general bird use, which includes raptors (Johnson et al. 2009; SWCA 2012a).

Fixed-point count bird surveys identified 158 different non-eagle raptors from 10 different species. The most common non-eagle raptor species were American kestrel and northern

harrier. Raptor abundance was highest in the fall, during seasonal migration. American kestrels, however, were also common during the spring and summer (Johnson et al. 2009). In June 2011, 15 breeding bird survey grids were established, with each grid containing 16 point count locations spaced approximately 820 feet (250 meters). American kestrels were the most common non-eagle raptor observed followed by northern harriers (SWCA 2012a).

Long-watch raptor surveys were initially conducted biweekly between April 2011 and November 2011, then monthly between December 2011 and March 2012. There were a total of 15, 4,000-meter-radius plots distributed across the Chokecherry and Sierra Madre WDAs. Due to access constraints, the number of plots dropped to 14 between April 2012 and July 2012. In total, 430 surveys were conducted for a total of almost 2,448 hours, including over 1,233 hours in the Phase I development areas (SWCA 2012a; PCW 2015b). Twelve different non-eagle raptors were observed during these surveys. The most commonly observed non-eagle raptor species were red-tailed hawk and American kestrel (SWCA 2012a).

Between August 2012 and August 2013, 1,626 hours of long-watch raptor surveys were completed across 60, 2,625-foot (800-meter) plots within the Chokecherry and Sierra Madre WDAs. However, only 40 plots were surveyed between August 20 and November 9, 2012. Of these surveys, 866 hours were conducted at 33 survey locations in the Phase I development and infrastructure areas. A total of 104 non-eagle raptors were observed during these surveys. The highest activity was reported during fall 2012 and the lowest activity was in winter 2012–2013. The most common non-eagle raptors observed were American kestrel, Swainson's hawk, northern harrier, and red-tailed hawk (see Attachment B, page 4-35).

Aerial surveys were conducted in 2008 and from 2011 through 2014 to locate and map occupied and unoccupied raptor nests. In 2008, the surveys included a 1-mile buffer of the WDAs. From 2011 to 2014, the surveys included a 5-mile buffer surrounding the WDAs (approximately 700 square miles; Johnson et al. 2008; SWCA 2011, 2012a, 2013a, 2014i). No surveys were conducted for raptors in 2009 and 2010. Aerial surveys for raptor nests were conducted using a helicopter during the nesting season to document nest locations and species. Both aerial and ground-based survey techniques were used to determine presence or absence of incubating adult birds and productivity (when possible).

Nests were identified as either occupied or unoccupied. Occupied nests are those that are used for breeding in the current year by a pair of raptors. Unoccupied nests are those not selected by raptors for use in the current nesting season. A lack of nesting activity at a nest site or territory in a given year does not necessarily mean it was permanently abandoned, because raptor pairs associated with nest territories do not breed every year. Therefore, these nest sites are often used for nesting in future years either by the same species or another species. Aerial surveys documented many other unoccupied nests during the survey period; however, in these cases, the raptor species that last used these nests could not be determined (SWCA 2014e, 2014f, 2014g, and 2014h). When a raptor nest is identified outside of the nesting season, or when no birds are present, it often is not possible to determine the species that uses the nest. Such nest occurrence data are still valuable and are included in figures and analysis as unknown raptor species.

Some raptor species are known to use nests for multiple years; however, the species using a particular nest may vary annually. For example, great-horned owls do not construct their own nests; they use nests constructed previously by other raptors or ravens. Red-tailed hawks and great-horned owls are known to alternate use of nests over years. Non-raptor species, such as common ravens, also use raptor nests, and vice versa (Artuso et al. 2014).

In the Phase I development and infrastructure areas and a 5-mile buffer, 51 occupied raptor nests and 114 unoccupied raptor nests were identified during aerial raptor nest surveys in 2008, and in 2011 through 2014. Occupied raptor nests included 28 red-tailed hawk, 10 prairie falcon, 2 American kestrel, 8 great-horned owl, 1 Swainson's hawk, and 2 nests of an unidentified raptor species, based on species of most recent nest occupant (see Table 3-20; Johnson, Rintz, and Strickland 2008a; SWCA 2011, 2012a, 2013a, 2014i). There were no occupied ferruginous hawk nests in the Phase I development and infrastructure areas. Table 3-20 and Figures 3-13 and 3-14 show all occupied and unoccupied non-eagle raptor nests documented within 5 miles of the Phase I development and infrastructure areas in 2008, and in 2011 through 2014. Species information shown in the figures is based on the species of the most recent nest occupant.

Table 3-20. Occupied and Unoccupied Raptor (non-eagle) Nests by Year and Species within 5 miles of the Phase I Development and Infrastructure Areas, for 2008 and 2011 to 2014

Species	2008[a]	2011		2012		2013		2014	
	Occupied	Occupied	Unoccupied	Occupied	Unoccupied	Occupied	Unoccupied	Occupied	Unoccupied
American kestrel	0	1	0	0	0	1	0	0	2
Cooper's hawk	0	0	0	0	0	0	1	0	1
Ferruginous hawk	0	0	17	0	17	0	17	0	17
Great-horned owl	4	0	2	1	1	3	2	3	5
Prairie falcon	5	2	2	3	2	3	3	3	9
Red-tailed hawk	11	4	5	9	4	5	10	9	18
Swainson's hawk	0	0	0	0	0	0	0	1	0
Unknown	0	2	41	0	67	0	76	0	91
Total	**20**	**9**	**67**	**13**	**91**	**12**	**109**	**16**	**143**

Sources: Johnson, Rintz, and Strickland 2008a; SWCA 2011, 2012a, 2013a, 2014i.

Notes:

[a] 2008 raptor nest surveys did not record unoccupied (inactive) nest sites.

Species identification at unoccupied nest sites is based on the previous year's occupant or BLM historical nest database. Disagreements between the text and table are due to changes in species or occupancy, or both, at nest sites between years.

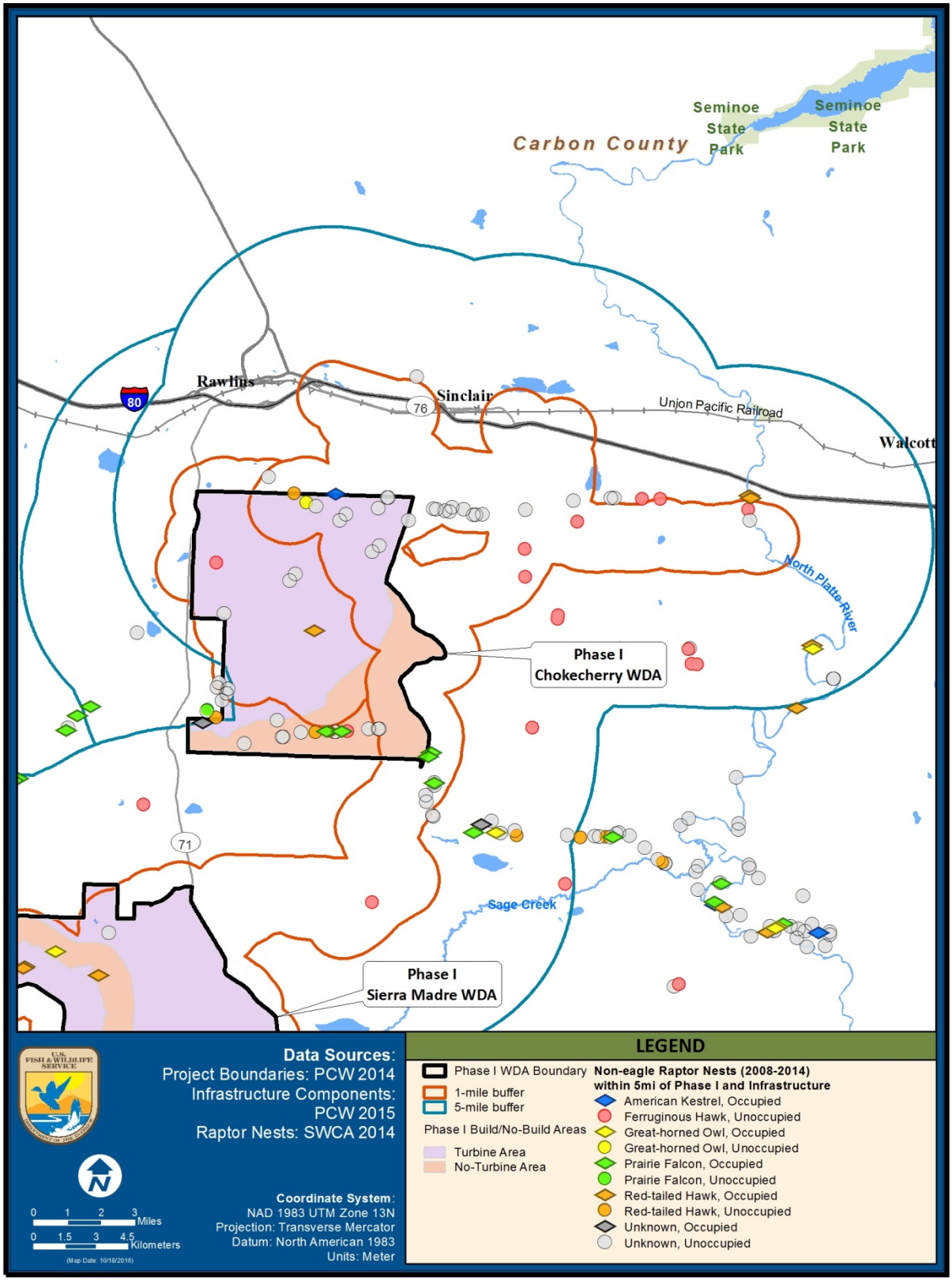

Figure 3-13. Non-Eagle Raptor Nests within 5 miles of the Phase I Chokecherry Wind Development Area and Infrastructure Areas for the CCSM Phase I Project in Wyoming, based on surveys from 2008 and 2011 to 2014

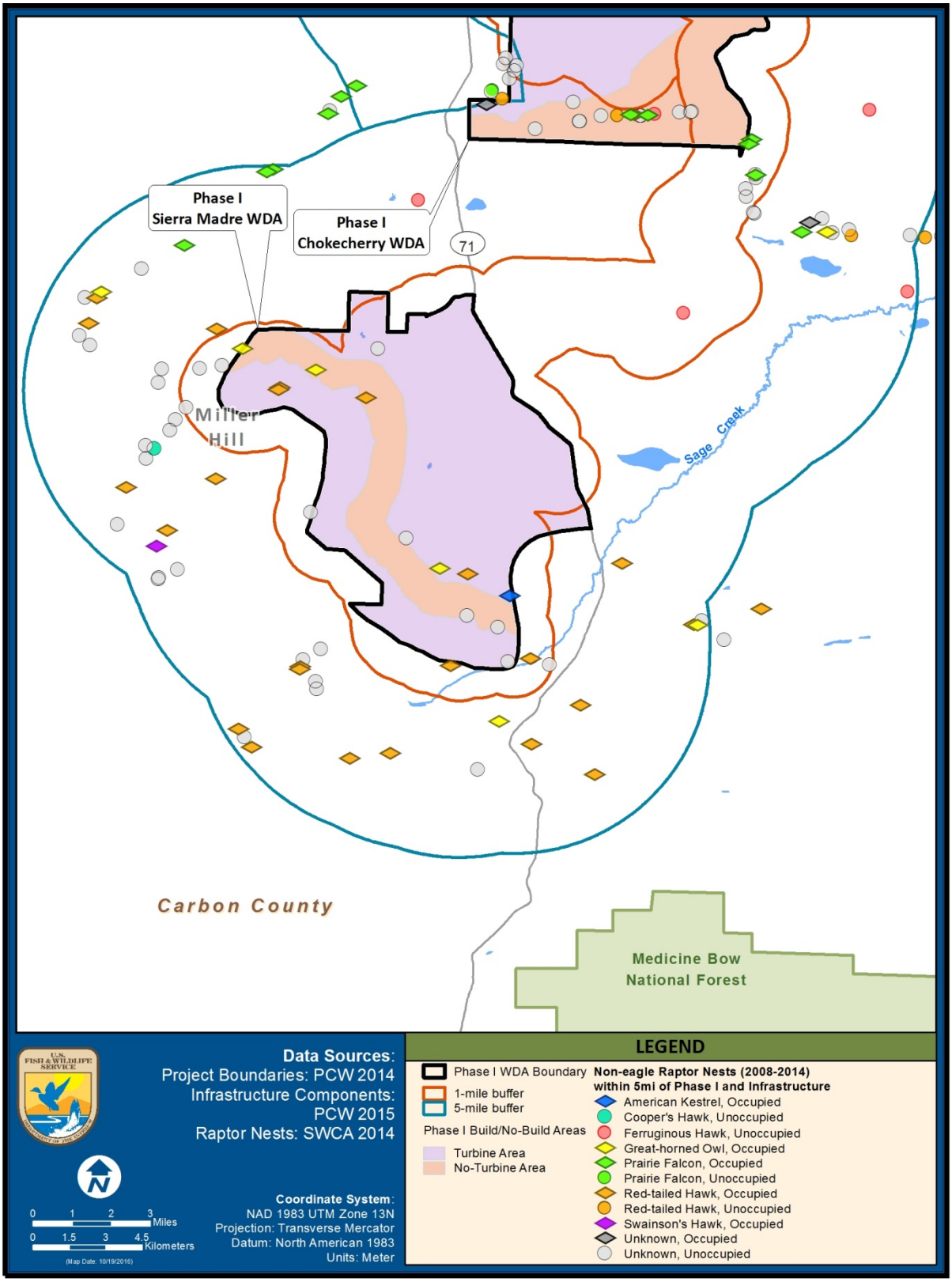

Figure 3-14. Non-Eagle Raptor Nests within 5 miles of the Phase I Sierra Madre Wind Development Area and Infrastructure Areas for the CCSM Phase I Project in Wyoming, based on surveys from 2008 and 2011 to 2014

Preferred nesting habitats in the Phase I development and infrastructure areas include cliffs and the tops of tall, isolated trees on the southern portion of the Phase I Chokecherry WDA known as the Bolten Rim. Most of the occupied and unoccupied raptor nests surveyed in the Phase I Chokecherry WDA were located along the extreme southern portion along the Bolten Rim, although several occurred throughout other parts of the Phase I Chokecherry WDA and along a ridgeline that runs east-west through the northern end of the Phase I Chokecherry WDA. The Miller Hill area in the western portion of the Phase I Sierra Madre WDA provides topographic features capable of supporting promontories used by raptors for perching, roosting, or nesting, and aspen stands in the southern portion of the Phase I Sierra Madre WDA provide potential raptor nesting habitat. Most of the nests surveyed in the Phase I Sierra Madre WDA were located adjacent to the Miller Hill Rim, as shown in Figure 3-14. Additional raptor nesting habitat is located along the Chokecherry Plateau at the northern boundary and east of the Phase I development and infrastructure areas, where ridges and rolling hills drain toward the North Platte River to the northeast (Johnson et al. 2008; SWCA 2011, 2012a, 2013a, 2014i).

3.7.2.2.4 ESA Listed Migratory Bird Species

Three federally listed migratory bird species are associated with the Platte River system and, although they do not occur in the Phase I development and infrastructure areas, could be indirectly affected by water depletions from the Platte River system. The migratory bird species associated with the Platte River system include the whooping crane (endangered), interior least tern (endangered), and piping plover (threatened). On September 5, 2012, we stated in the BO for the Chokecherry and Sierra Madre Wind Energy Project (USFWS 2012c) that the effects of the project or any cumulative effects would not likely jeopardize the continued existence of these three species. This BO also did not authorize take of listed species. Furthermore, we determined that the CCSM Project is not likely to destroy or adversely modify designated critical habitat for the whooping crane. As such, we have determined that it is not necessary to include further discussion of the whooping crane, interior least tern, or piping plover in this EIS.

As provided in 50 CFR 402.16, re-initiation of formal consultation is required if (1) the amount or extent of incidental take is exceeded (that is, if any take associated with the CCSM Phase I Project occurs), (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in the final BO, (3) the agency action is subsequently modified in a manner that causes an effect on the listed species or critical habitat not considered in the final BO, or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, the specific action(s) causing such take shall be subject to immediate re-initiation of consultation.

Subsequent to publication of the BLM FEIS, the DPS of the yellow-billed cuckoo west of the Continental Divide was listed as a threatened species under the ESA in October 2014 (79 FR 59992-60038). The listing status, habitat, and general distribution of all four federally listed species are summarized in Table 3-21, and the western DPS of the yellow-billed cuckoo is summarized in the following section.

Table 3-21. ESA Listed Migratory Bird Species Potentially Associated with or Located In or Near the CCSM Phase I Project

Common Name	Scientific Name	Status[a]	Habitat Requirements	Occurrence or Habitat in Phase I Development and Infrastructure Areas
Whooping crane	*Grus americana*	FE	Coastal marshes and estuaries, inland marshes, lakes, ponds, wet meadows and rivers, and agricultural fields.	Whooping cranes do not occur in or near the Phase I development and infrastructure areas, but could occur along the central Platte River system in Nebraska during migration.
Piping plover	*Charadrius melodus*	FT	Bare sand and gravel bars along rivers and waste sand piles from Canada south to Nebraska.	Piping plovers do not occur in or near the Phase I development and infrastructure areas but may occur along the central and lower Platte River system in Nebraska.
Least tern (Interior population)	*Sterna antillarum*	FE	Nests along sand and gravel bars within braided streams and rivers; also known to nest on man-made structures. Bare sand and gravel bars along rivers and waste sand piles along several rivers in Nebraska, Colorado, and Montana.	Least terns (interior population) do not occur in or near the Phase I development and infrastructure areas but may occur along the central and lower Platte River system in Nebraska.
Yellow-billed cuckoo (western DPS)	*Coccyzus americanus*	FT, SGCN	Cottonwood riparian areas west of Continental Divide and below 7,000 feet.	No suitable habitat for yellow-billed cuckoo.

Sources: USFWS 2008b, 2015d; BLM 2012a.

Note:

[a] FE = federally listed as endangered (ESA)
FT = federally listed as threatened (ESA)
SGCN = species of greatest conservation need (WGFD)

Yellow-Billed Cuckoo

Yellow-billed cuckoos of the western DPS prefer open woodlands with ample edge habitat, such as near streams, rivers, and lakes (Hughes 2015). There is no proposed designated critical habitat for the western DPS of yellow-billed cuckoos in the Phase I development and infrastructure areas (79 FR 48548-48652). The closest documented occurrence of western DPS yellow-billed cuckoo to the Phase I development and infrastructure areas is within the Medicine Bow National Forest, about 10 miles south of the Phase I development and infrastructure areas. Field reconnaissance surveys conducted during preparation of the BLM FEIS determined that there is suitable habitat within the Phase I development and infrastructure areas for this species, but no cuckoo surveys were completed (Rintz et al. 2008). However, we do not find there to be any suitable yellow-billed cuckoo habitat within or near the Phase I development and infrastructure areas. As such, the western DPS of yellow-billed cuckoo is not discussed further in this document.

3.7.2.2.5 Special Status Bird Species

In addition to managing birds protected under the ESA and MBTA, USFWS also maintains a list of BCCs (USFWS 2008b). BCCs include species, subspecies, and populations of all migratory non-game birds that, without additional conservation actions, are likely to become candidates for listing under the ESA (USFWS 2008b). We have also reviewed the list of WGFD SGCN from the Wyoming State Wildlife Action Plan (WGFD 2010b), whose conservation status warrants increased management, funding, and consideration in conservation, land use, and development planning. BLM sensitive bird species are adequately addressed in the BLM FEIS, and we will not discuss them in this EIS. USFWS Region 6 BCC-listed species (USFWS 2008b) and WGFD SGCN (WGFD 2010b) species that are known or likely to occur in the Phase I development and infrastructure areas (or nearby waterbodies; as determined by inclusion in Attachment D) based on habitat preferences and range are listed in Table 3-22 and discussed in the sections that follow.

Table 3-22. Special Status Bird Species Documented or Likely to Occur **in or near the Phase I** Development and Infrastructure Areas for the CCSM Phase I Project in Wyoming

Common Name	Scientific Name	Status[a]	Habitat Requirements	Occurrence or Habitat in Phase I Development and Infrastructure Areas
Common loon	*Gavia immer*	SGCN	Freshwater lakes	Documented in reservoirs near the CCSM Phase I Project area.
Clark's grebe	*Aechmophorus clarkii*	SGCN	Freshwater lakes and marshes	Documented in reservoirs near the CCSM Phase I Project area.
Horned grebe	*Podiceps auritus*	BCC	Freshwater lakes and marshes	Documented in reservoirs near the CCSM Phase I Project area.
Redhead	*Aythya americana*	SGCN	Wetlands, marshes, lakes, and ponds	Documented in reservoirs near the CCSM Phase I Project area.
Lesser scaup	*Aythya affinis*	SGCN	Wetlands and lakes with emergent vegetation	Documented in reservoirs near the CCSM Phase I Project area.
Northern pintail	*Anas acuta*	SGCN	Wetlands, marshes, lakes, and ponds	Documented in reservoirs near the CCSM Phase I Project area.
Canvasback	*Aythya valisineria*	SGCN	Wetlands, marshes, lakes, and ponds	Documented in reservoirs near the CCSM Phase I Project area.
Marbled godwit	*Limosa fedoa*	BCC	Wetlands, mudflats, sandflats, and beaches	Documented at reservoirs and wetlands near the CCSM Phase I Project area.

Common Name	Scientific Name	Status[a]	Habitat Requirements	Occurrence or Habitat in Phase I Development and Infrastructure Areas
White-faced ibis	*Plegadis chihi*	SGCN	Wetlands, lakes, marshes, and mudflats	Documented in reservoirs and wetlands near the CCSM Phase I Project area.
Virginia rail	*Rallus limicola*	SGCN	Wetlands, lakes, marshes, and mudflats	Virginia rail were not reported during baseline surveys; however, they could occur in wetlands and marshes in the vicinity.
Black-crowned night heron	*Nycticorax nycticorax*	SGCN	Wetlands, lakes, marshes, and mudflats	Documented in reservoirs and wetlands near the CCSM Phase I Project area.
Snowy egret	*Egretta thula*	SGCN	Wetlands, lakes, marshes, and rivers	Documented in wetlands and riparian areas near the CCSM Phase I Project area.
Mountain plover	*Charadrius montanus*	BCC, SGCN	Shortgrass prairie and shrub-steppe	Mountain plover have been documented in the CCSM Phase I Project area.
Swainson's hawk	*Buteo swainsoni*	SGCN	Grasslands, plains, and basin or riparian areas	Swainson's hawks were documented foraging and nesting in the CCSM Phase I Project area.
Ferruginous hawk	*Buteo regalis*	BCC, SGCN	Basin-prairie shrub, grasslands, and rock outcrops	Ferruginous hawks have been documented in the CCSM Phase I Project area.
Northern goshawk	*Accipiter gentilis*	SGCN	Coniferous forests	A single northern goshawk was observed in the CCSM Phase Project area during surveys in 2012.

Common Name	Scientific Name	Status[a]	Habitat Requirements	Occurrence or Habitat in Phase I Development and Infrastructure Areas
Bald eagle	*Haliaeetus leucocephalus*	BCC, SGCN	Riparian areas, lakes, rivers, and streams	Detailed discussion of bald eagle habitat and occurrence is in Section 3.8.
Golden eagle	*Aquila chrysaetos*	BCC	Grasslands, shrublands, riparian, and cliffs or rock outcrops	Detailed discussion of golden eagle habitat and occurrence is in Section 3.8.
Prairie falcon	*Falco mexicanus*	BCC	Open deserts, grasslands, and agricultural land	Prairie falcons have been documented nesting in the CCSM Phase I Project area.
Merlin	*Falco columbarius*	SGCN	Open forests, grasslands, and along rivers	Merlin have been documented on two occasions in the CCSM Phase I Project area during spring and fall migration.
Peregrine falcon	*Falco peregrinus*	BCC, SGCN	Open areas, especially near water	Peregrine falcons have been observed in the CCSM Phase I Project area, although suitable nesting habitat is not present.
Columbian sharp-tailed grouse	*Tympanuchus phasianellus columbianus*	SGCN	Grasslands and mountain-foothill shrub	Suitable habitat is present in the CCSM Phase I Project area; however, no Columbian sharp-tailed grouse have been identified.
Greater sage-grouse	*Centrocercus urophasianus*	SGCN	Sagebrush-grassland or juniper sagebrush-grassland communities	Greater sage-grouse have been documented year-round throughout much of the Phase I development and infrastructure areas.

Common Name	Scientific Name	Status[a]	Habitat Requirements	Occurrence or Habitat in Phase I Development and Infrastructure Areas
Short-eared owl	*Asio flammeus*	BCC, SGCN	Shortgrass prairie and meadows	No site-specific survey data are available for the Phase I development and infrastructure areas; however, suitable habitat for short-eared owls is present.
Burrowing owl	*Athene cunicularia*	BCC, SGCN	Grasslands and basin-prairie shrub	Burrowing owls have been documented in the CCSM Phase I Project area and nesting activity is suspected.
Loggerhead shrike	*Lanius ludovicianus*	BCC	Open pastures and prairies with scattered trees, shrubs, or fencelines	Loggerhead shrikes were documented in the CCSM Phase I Project area.
Bewick's wren	*Thryomanes bewickii*	BCC	Shrublands, grasslands, and woodlands	Bewick's wrens were documented in the CCSM Phase I Project area.
Sage thrasher	*Oreoscoptes montanus*	BCC, SGCN	Basin-prairie shrub and mountain-foothill shrub	Sage thrashers were documented in the CCSM Phase I Project area.
Sagebrush sparrow	*Amphispiza belli*	BCC, SGCN	Basin-prairie shrub and mountain-foothill shrub	Sagebrush sparrows were documented in the CCSM Phase I Project area.
Brewer's sparrow	*Spizella breweri*	SGCN	Basin-prairie shrub	Brewer's sparrows were documented in the CCSM Phase I Project area.
Grasshopper sparrow	*Ammodramus savannarum*	BCC, SGCN	Basin-prairie shrub and grassland	Grasshopper sparrows were documented in the CCSM Phase I Project area.

Common Name	Scientific Name	Status[a]	Habitat Requirements	Occurrence or Habitat in Phase I Development and Infrastructure Areas
McCown's longspur	*Calcarius mccownii*	BCC, SGCN	Dry, shortgrass prairie	McCown's longspur were not reported during baselines surveys; however, they could occur in grassland habitats in or near the CCSM Phase I Project area.
Lark bunting	*Calamospiza melanocorys*	SGCN	Grasslands, shrub-steppe, and agricultural areas	Lark buntings were documented in the CCSM Phase I Project area.

Sources: USFWS 2008b; WGFD 2010b; Rodewald 2015; Attachment D.

Note:

[a] BCC = bird of conservation concern (USFWS)
SGCN = species of greatest conservation need (WGFD)

Birds of Conservation Concern

There are 16 BCC species that are known or likely to occur in the Phase I development and infrastructure areas, including horned grebe, marbled godwit, mountain plover, ferruginous hawk, bald eagle, golden eagle, prairie falcon, peregrine falcon, short-eared owl, burrowing owl, loggerhead shrike, Bewick's wren, sage thrasher, sagebrush sparrow, grasshopper sparrow, and McCown's longspur (see Table 3-22). Bald and golden eagles are discussed separately in Section 3.8. Those species that are on both BCC and SGCN lists will be discussed only here to limit duplication of analysis. Surveys for some of the BCC species were conducted in the Phase I development and infrastructure areas. Incidental observations of BCCs were also recorded during wildlife surveys from 2008 to 2014. The BCC species that are known or likely to occur in the Phase I development and infrastructure areas are discussed below in their respective species groups: waterbirds, waterfowl, and shorebirds; passerines; and raptors.

Waterbirds, Waterfowl, and Shorebirds

The BCC species that are known or likely to occur within the Phase I development and infrastructure areas, or nearby waterbodies, are horned grebe (a waterbird), marbled godwit, and mountain plover (shorebirds). Horned grebe habitat is restricted to ponds, lakes, and reservoirs (Stedman 2000) while marbled godwits may be found in upland areas consisting of grasslands with dense sedge and grass cover (Gratto-Trevor 2000). Suitable mountain plover habitat was mapped in the Phase I development and infrastructure areas and consists of flat to

gentle slopes with low vegetation structure dominated by salt desert shrub with extensive bare ground and relatively low herbaceous height. These communities were identified primarily in areas north of the Phase I Chokecherry WDA, along Smith Draw Road, and in portions of the Sage Creek basin and the Lower Miller Hill areas of the Phase I Sierra Madre WDA (SWCA 2014e, 2014f, 2014g, 2014h). The infrastructure areas intersect with approximately 251 acres of suitable mountain plover habitat (SWCA 2014f, 2014g, 2014h). Suitable habitat within the Road Rock Quarry area is limited to approximately 2 acres of patchily distributed salt desert shrub and sparsely vegetated communities (SWCA 2014h).

Horned grebes and marbled godwit were observed on nearby reservoirs, but could also occur in the Phase I development and infrastructure areas during migration or during transit between waterbodies. Horned grebes were primarily observed during fall migration at Kindt and Rasmussen reservoirs (SWCA 2012a). Eight marbled godwit were observed on Kindt and Rasumussen reservoirs during spring waterbird, waterfowl, and shorebird surveys in 2011 (SWCA 2012a). It is important to note that these surveys were conducted only within a single year and may not adequately represent actual horned grebe or marbled godwit abundance and distribution.

Surveys for mountain plovers were conducted in 2008 (Johnson et al. 2008) and between 2012 and 2014 (SWCA 2014e). The survey reports from 2012 to 2014 did not describe the methodology used and we are thus unable to determine if the surveys were of sufficient quality. In 2008, 37 mountain plovers were identified at 25 different locations generally east and northeast of the Phase I Chokecherry WDAs. No mountain plovers were identified within the Phase I development areas. According to EA2 (BLM 2016a), surveys between 2012 and 2014 recorded a total of six mountain plovers. Four mountain plovers were observed within or near the Phase I Haul Road and Facilities area, and two mountain plovers were recorded in the Sage Creek basin approximately 2 miles east of the Phase I Sierra Madre WDA (BLM 2016a). No mountain plovers were observed in the Road Rock Quarry area or the Phase I Chokecherry or Phase I Sierra Madre WDAs (SWCA 2014h, 2014e). No surveys have been conducted for long-billed curlew, and they were not observed during waterbird surveys at nearby reservoirs or during any other avian studies conducted in association with the CCSM Phase I Project. However, in the Phase I BBCS (see Attachment B), Appendix B lists the long-billed curlew as having been observed in the CCSM Project site, which is inaccurate. Long-billed curlews were observed outside and east of the Phase I development and infrastructure areas.

Passerines

The BCC passerines discussed here include loggerhead shrike, Bewick’s wren, sage thrasher, sagebrush sparrow, grasshopper sparrow, and McCown’s longspur. McCown’s longspur have not been observed in the Phase I development and infrastructure areas, but suitable breeding habitat does exist. This species prefers open habitat with sparse and low vegetation. Its habitat preferences are similar to those of the horned lark and grasshopper sparrow (With 2010). Loggerhead shrikes prefer open areas such as pastures and fields with fencerows, tall shrubs, or open woodlands for perching (Yosef 1996). Bewick’s wrens inhabit brushy areas, scrub, and thickets in open country (Kennedy and White 2013). The sage thrasher and sagebrush sparrow are both sagebrush-obligates.

Sagebrush-obligates are endemic to the sagebrush habitat of the intermountain west and rely heavily on the sagebrush ecosystem for protection from predators, shelter from the elements, and forage (USFWS 2014a). Sage thrasher and sagebrush sparrow were the second and third most abundant special status species observed during fixed-point count bird use surveys. Sage thrashers comprised 27 percent of all observations (Johnson et al. 2009).These species were also recorded regularly during the breeding bird grid surveys (SWCA 2012a). In sharp contrast to these studies, the Avian Resource Report for the Phase I development areas did not record any sagebrush-obligates (SWCA 2014e), which suggests possible limitations in the methodology used for the latter surveys. Surveys of the Phase I Haul Road and Facilities did result in observations of sagebrush sparrow and sage thrasher, though no indication of relative abundance or distribution is provided (SWCA 2014f). Grasshopper sparrows were observed on only four occasions during fixed-point count bird use surveys, and both observations occurred during spring (Johnson et al. 2009). No observations of grasshopper sparrows were made in any subsequent surveys (SWCA 2014e, 2014f, 2014g, 2014h), although they are assumed to be present in low numbers.

Raptors

The five BCC-listed raptor species discussed here include ferruginous hawk, prairie falcon, peregrine falcon, short-eared owl, and burrowing owl. Ferruginous hawks, prairie falcons, short-eared owls, and peregrine falcons prefer open areas such as grasslands, shrublands, and pastures with isolated trees or cliffs for perching and nesting (White et al. 2002). Burrowing owls are highly associated with small mammal burrows where they both hunt and nest (Poulin et al. 2011).

BLM historic nest records indicate that 25 occupied ferruginous hawk nests occurred at one time or another within 1 mile of the Phase I Chokecherry and Phase I Sierra Madre WDAs over a 28-year period starting in 1980 (Johnson, Rintz, and Strickland 2008a). In 2011, 40 ferruginous hawk nest sites in the BLM database that were within 5 miles of the Phase I development and infrastructure areas were resurveyed; only 15 of these sites were found to still contain nest structures, and none of the remaining nests were occupied (SWCA 2011). No evidence of active ferruginous hawk nesting was found at any sites in the Phase I development and infrastructure areas during 2012, 2013, or 2014 raptor nest surveys (SWCA 2012a, 2013a, 2014i). A total of 13 ferruginous hawks were observed during avian baseline studies between 2008 and 2009, including 5 during fixed-point count bird use surveys and 8 incidental observations (Johnson et al. 2009). Twelve ferruginous hawks were documented during long-watch raptor surveys in 2011 and 2012(PCW 2015b; SWCA 2012a.

Prairie falcons are known to occur within the Phase I development and infrastructure areas. They were observed on six occasions during fixed-point count surveys and on eight occasions incidentally during that study (Johnson et al. 2009). However, it is unclear if these observations were in the Phase I development and infrastructure areas. They were also regularly observed flying in the Phase I development and infrastructure areas between March and October during long-watch raptor surveys (SWCA 2012a). Raptor nest surveys in 2008 and in 2011 through 2014 documented nine occupied and one unoccupied nest within 5 miles of the Phase I development and infrastructure areas, as shown in Figures 3-13 and 3-14 (Johnson, Rintz, and Strickland 2008a; SWCA 2011, 2012a, 2013a, 2014i).

Peregrine falcons are rare in the Phase I development and infrastructure areas. They were observed on only three occasions during long-watch surveys, twice in July and once in September (SWCA 2012a). Nesting habitat does not exist within the Phase I development and infrastructure areas, but there may be suitable cliff or bank habitat located along waterbodies or rivers in the vicinity. Peregrine falcons may also be present during waterfowl and waterbird migrations because these species are an important prey source (White et al. 2002).

Short-eared owls have not been identified in the Phase I development and infrastructure areas during any avian or wildlife surveys (Johnson et al. 2009; SWCA 2014e, 2014f). However, specific surveys for short-eared owls have not been completed, and their ground nests can be difficult to identify during aerial surveys, suggesting that it may be possible that short-eared owls do nest in or near the Phase I development and infrastructure areas. Suitable habitat for short-eared owl nests is ubiquitous within the Phase I development and infrastructure areas (Wiggins et al. 2006).

Burrowing owl surveys in the Phase I development and infrastructure areas between 2009 and 2014 were completed secondarily to white-tailed prairie dog surveys. Areas of potentially suitable burrowing owl habitat within mapped white-tailed prairie dog colonies were surveyed for burrowing owls (SWCA 2014e, 2014f, 2014g, 2014h). Two burrowing owls were observed in the Chokecherry WDA during raptor nest surveys in 2008, although it is not clear from the report in what portion of the WDA they were observed. Nesting activity was assumed based on this observation, although no nests were identified (Johnson, Rintz, and Strickland 2008a). One individual burrowing owl was observed during baseline avian studies between 2008 and 2009, but again, no indication of its location was provided (Johnson et al. 2009). Surveys in the Phase I development area identified one burrowing owl in the northwest corner of the Phase I Sierra Madre WDA. Surveys within the Phase I Haul Road and Facilities recorded two burrowing owls in inactive prairie dog colonies, one north of the Phase I Chokecherry WDA and the other near Sage Creek. Surveys did not identify nesting activity, and it was concluded that these individuals were transient visitors. Potential habitat, such as white-tailed prairie dog colonies, was documented during surveys, but no additional burrowing owls or signs of activity were observed (SWCA 2014e, 2014f, 2014g, 2014h).

Species of Greatest Conservation Need

There are 27 WGFD SGCN bird species that are known or likely to occur in the Phase I development and infrastructure areas, including four waterbirds, four waterfowl, three shorebirds, six passerines, six raptors, and two upland game birds (see Table 3-22). Ten species that are also listed as BCC species were discussed above and will not be discussed here. The remaining species discussed here have been organized by their respective species groups: waterbirds, waterfowl, and shorebirds; passerines; upland game birds; and raptors.

Waterbirds, Waterfowl, and Shorebirds

Habitat for the common loon, Clark’s grebe, redhead, lesser scaup, northern pintail, canvasback, and white-faced ibis is restricted to nearby reservoirs. The Virginia rail, black-

crowned night heron, and snowy egret are known to occur at nearby reservoirs or at wetlands and riparian areas in or near the Phase I development and infrastructure areas. All 10 of these species may occur in the Phase I development and infrastructure areas during transit between suitable habitats or during migration. All of these species were documented during baseline avian studies, particularly waterbird surveys, except for the Virginia rail. However, given inadequacies in the survey methods, it is possible that Virginia rail do occur in the Phase I development and infrastructure areas.

Passerines

The Brewer's sparrow and lark bunting are SGCN passerine species that occur in the Phase I development and infrastructure areas. Brewer's sparrows were among the most common small passerines observed during fixed-point count surveys in 2008 and 2009 (Johnson et al. 2009). Lark buntings were observed on four occasions and totaled only 15 individuals during fixed-point count bird use surveys in 2008 and 2009 (Johnson et al. 2009). No observations of lark buntings were made in any subsequent surveys (SWCA 2014e, 2014f, 2014g, 2014h), although they are assumed to be present in low numbers.

Upland Game Birds

Two upland game bird species may occur within the Phase I development and infrastructure areas: greater sage-grouse and Columbian sharp-tailed grouse. To our knowledge, no surveys have been completed specifically for Columbian sharp-tailed grouse. Although suitable habitat is present, Columbian sharp-tailed grouse have not been identified in the Phase I development and infrastructure areas during any avian or wildlife studies for the CCSM Phase I Project (Johnson et al. 2009; SWCA 2014e, 2014f). If this species were present, the impacts would be similar to impacts on greater sage-grouse. However, because this species has not been identified in the Phase I development and infrastructure areas, we have elected to exclude the Columbian sharp-tailed grouse from further detailed discussion in this EIS.

On September 21, 2015, following a status review, we found that the greater sage-grouse was "not warranted" for listing under the ESA (80 FR 59857-59942, October 2, 2015). We also found that this species remains fairly abundant across the species' range and does not face the risk of extinction now or in the near future (80 FR 59857-59942, October 2, 2015). Our decision was based on a conservation partnership effort across the western United States that has reduced some threats to the greater sage-grouse. In 2010, the State of Wyoming, through executive order, established greater sage-grouse core population areas to protect high-quality remaining habitat for greater sage-grouse in Wyoming (State of Wyoming 2015). In 2015, the BLM released an Approved Resource Management Plan Amendment for six field offices in Wyoming with substantial greater sage-grouse habitat (BLM 2015a). The Phase I development and infrastructure areas do not contain any areas defined as greater sage-grouse core population areas, as shown in Figure 3-15 (WGFD 2010b). However, core population areas are located adjacent to the Phase I Chokecherry and Phase I Sierra Madre WDAs in all directions, and immediately adjacent to three sides of the Sierra Madre WDA. The Phase I development and infrastructure areas are located within General Habitat Management Areas and immediately adjacent to Priority Habitat Management Areas (coincident with the State of Wyoming core population areas) as designated by the BLM (BLM 2015a).

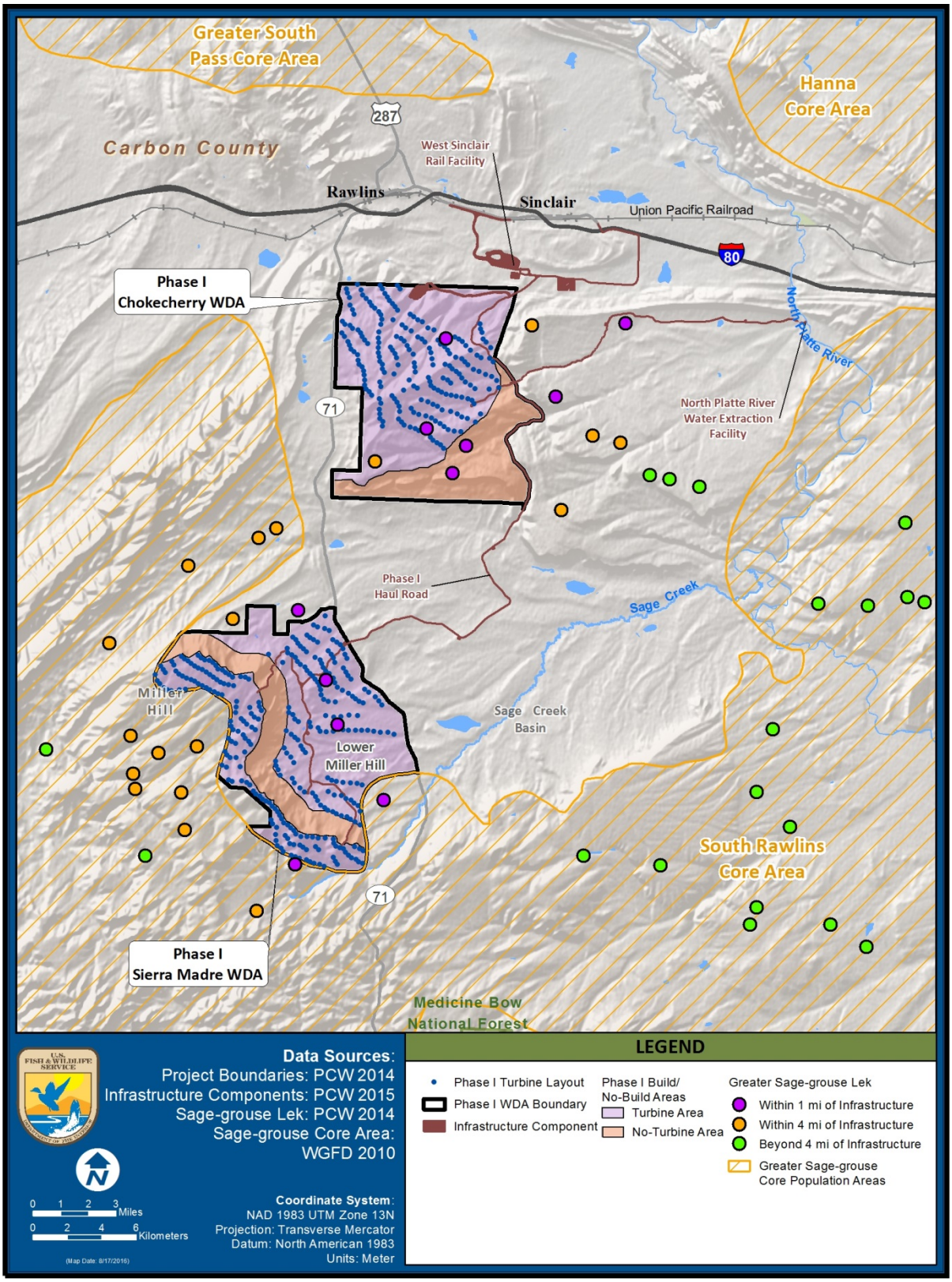

Figure 3-15. Greater Sage-Grouse Leks within 1 and 4 miles of the Phase I Development and Infrastructure Areas for the CCSM Phase I Project in Wyoming, 2010-2014

PCW initially conducted baseline studies within the Phase I development and infrastructure areas in 2008 to locate and document brood-rearing habitats for greater sage-grouse and leks (that is, areas where birds gather during the breeding season for community courtship displays to attract mates) within 4 miles of the WDAs (Johnson, Rintz, and Strickland 2008b, 2008c). PCW also monitored greater sage-grouse leks, movement patterns, hen survival, and productivity from 2010 to 2014 (SWCA 2014e, 2014f, 2014g, 2014h). These surveys have resulted in additional observations of greater sage-grouse and additional information about potential suitable habitat. These surveys are summarized below.

PCW developed a sage-grouse conservation plan to implement science-based conservation measures for greater sage-grouse and other selected species (PCW 2012). The sage-grouse conservation plan specifies annual surveys to monitor greater sage-grouse populations in the Phase I development and infrastructure areas and the surrounding area before construction, during construction, and for 5 years post-construction. The objectives of these surveys, known as lek counts, are to determine the activity at historic leks and to locate, map, and determine activity at new leks. To date, lek counts have identified 11 leks within 1 mile and an additional 18 leks within 4 miles of the Phase I development and infrastructure areas (see Figure 3-15). It is important to note that we have used different buffer distances (1 and 4 miles versus 2 miles) than the BLM FEIS and EAs (BLM 2012a, 2014, 2016a).

In addition to lek counts, PCW began a satellite telemetry monitoring study of greater sage-grouse in 2010. A total of 143 greater sage-grouse were captured and fitted with GPS transmitters to study the distribution, range, and movement patterns of greater sage-grouse within the Phase I development and infrastructure areas. These transmitters record approximate location, altitude, heading, and speed of individual greater sage-grouse, which helps identify demographic trends, habitat use, and seasonal use areas (SWCA 2012b). This effort has led to several publications on greater sage-grouse biology, including: microhabitat selection of nests and brood-rearing sites (Schreiber et al. 2015; Hansen et al. 2016); net nest productivity and survival rate of chicks (Schrieber et al. 2016); and male detectability on leks (Fremgen et al. 2016). Lek counts and telemetry monitoring would continue through construction and post-construction for the CCSM Phase I Project (PCW 2015b).

PCW's sage-grouse monitoring program indicates that greater sage-grouse are most abundant during late brood-rearing periods (3 weeks post hatch) in core population areas outside the Phase I development and infrastructure areas (SWCA 2012b). In addition, late brood-rearing periods are potentially important for eagle foraging (PCW 2015b). Greater sage-grouse are a documented prey item of eagles in the vicinity of the Phase I development and infrastructure areas (SWCA 2012c).

Additional survey efforts between 2012 and 2014 confirmed that greater sage-grouse habitat occurs throughout much of the Phase I development and infrastructure areas and Road Rock Quarry (SWCA 2014e, 2014f, 2014h). However, no greater sage-grouse were identified, and habitat conditions were marginal for the species in the West Sinclair Rail Facility area and immediate vicinity (SWCA 2014g).

The Phase I Chokecherry WDA is used year-round by greater sage-grouse for lekking, nesting, brood-rearing, and winter use. Four leks are located within the boundary of the

Phase I Chokecherry WDA (see Figure 3-15). Use within the Phase I Chokecherry WDA is generally lower than that observed in surrounding greater sage-grouse core population area habitats. Typically, brood rearing hens and males leave the Phase I Chokecherry WDA and move to more mesic areas in surrounding greater sage-grouse core population area habitats during mid- to late summer months (SWCA 2014e).

The Phase I Sierra Madre WDA is used for lekking, nesting, and brood-rearing activities, with highest use during early spring. There are two leks located within the boundaries of the Phase I Sierra Madre WDA, and an additional three within 1 mile of proposed turbines (see Figure 3-15). Greater sage-grouse use east of Miller Hill varies seasonally. During summer, most individuals move to surrounding greater sage-grouse core population areas. Winter use in areas east of Miller Hill is generally low and dispersed (SWCA 2014e).

The areas around the Phase I Haul Road and access road to the North Platte River Water Extraction Facility are used for nesting, brood-rearing, and wintering. Winter use of these areas appears to be limited, although some seasonal use of the sagebrush draws in the Sage Creek basin occurs as greater sage-grouse transition from nesting to summer range and from summer to winter range (SWCA 2014f).

Raptors

Swainson's hawk, northern goshawk, and merlin are the only SGCN and non-BCC raptor species known to occur in the Phase I development and infrastructure areas. Swainson's hawk foraging habitat consists of open grasslands, shrublands, and open woodlands, as well as agricultural fields. They nest in trees of open woodlands adjacent to high-quality foraging habitat (Bechard et al. 2010). A total of 19 Swainson's hawks were observed during baseline avian surveys in 2008 and 2009, including 9 observations during fixed-point count surveys and 10 incidental observations (Johnson et al. 2009). However, it is unclear if these observations were in the Phase I development and infrastructure areas. Swainson's hawks were observed on 34 different occasions between April and September during long-watch raptor surveys in 2011 (SWCA 2012a). One occupied Swainson's hawk nest was located southwest of the Phase I Sierra Madre WDA during 2014 raptor nest surveys (SWCA 2014i), within 5 miles of the Phase I development and infrastructure areas (see Figure 3-14). A single northern goshawk was observed during spring 2012 long-watch raptor surveys in the Phase I Sierra Madre WDA (see Attachment B). Due to a lack of suitable habitat, it can be assumed that this individual was migrating through the area and their presence is very uncommon. Five merlin have been observed in the CCSM Phase I WDAs, including three observations in the Phase I Sierra Madre WDA: once each in 2011, 2012, and 2013. Two merlin were observed in the Phase I Chokecherry WDA in fall 2011 (see Attachment B). As all observations were during migratory periods, and due to a lack of suitable nesting habitat, merlin are only expected to be present in the Phase I development and infrastructure areas during migration.

3.7.2.3 Climate Change

Climate change has the potential to alter species' fundamental interactions with other species, organisms, and the physical environment, which could lead to a cascade of impacts

throughout the entire ecosystem (The National Academies 2009). Changes in climate may lead to shifts in the lifecycle trends of some bird species, impacting breeding and migration patterns for birds and the timing of plant germination or flowering (Parmesan 2006; Root et al. 2003). Long-term climate change could result in shorter seasonal migrations for many mid- to high-latitude breeding birds. Audubon Christmas Bird Count data indicate that some bird populations have shifted significantly northward, resulting in generally shorter migrations (and longer breeding seasons) (Johnsgard 2012). This could be beneficial for some bird species, but shifting plant and animal life cycles may have undesirable long-term consequences on breeding success for other species (Johnsgard 2012).

Some migratory bird species may begin arriving at seasonal staging grounds earlier and leaving later in reaction to climate change, or continue arriving and leaving on time even though climate has altered the seasonal processes of stop-over and breeding grounds (Visser and Both 2005). Climate change may also impact genetic diversity and species' morphology (Root et al. 2003). Some species may shift their range to track the physical and biological conditions to which they are already adapted (Root et al. 2003). Climate change may cause species' ranges to expand, contract, or fragment (McKelvey et al. 2013; Joyce et al. 2008). Climate change is one factor among many that may influence the frequency and severity of wildfires that could lead to major habitat changes. Frequent fires discourage the recovery of shrublands; therefore, some of the sagebrush habitat that special status bird species depend on could be permanently converted to grassland or become susceptible to non-native invasion (USFWS 2014a). In addition, climate change may alter the range of invasive plants, potentially reducing native sage-brush habitat. Climate change has the potential to intensify periodic drought, which could have severe effects on wetlands and riparian areas. These areas could become increasingly sparse and less connected, or may dry up completely (USFWS 2014a). Many bird species use wetlands and riparian areas either daily or seasonally as part of their lifecycle, and many of Wyoming's bird species are wetland or riparian obligates (Nicholoff 2003; Copeland et al. 2010).

3.7.3 Environmental Consequences

Except to the extent that new information or new analysis provided herein updates the previous discussions, we are incorporating into this EIS by reference the information that we have determined is adequate for our analysis regarding direct and indirect impacts on birds (other than eagles) from the following documents and sections:

- BLM FEIS – Section 4.14, found on pages 4.14-9 through 4.14-31; and Section 4.15, found on pages 4.15-1 through 4.15-34
- EA1 – Section 4.2.14.2, found on pages 4-51 through 4-56
- EA2 – Section 4.2.9.2

In addition to the impact analysis in the BLM's NEPA documents, we reviewed comments we received during scoping, PCW's SPODs, and other PCW-supplied documents. PCW has committed to numerous conservation measures, as outlined in Section 2.2.1.4.2 and in the ECP, Appendix K (see Attachment A). PCW has prepared an ECP for the CCSM Phase I Project, which is designed to avoid and minimize impacts on golden and bald eagles. However, these measures would generally also have the benefit of reducing impacts on other

raptor and bird species addressed in this section. PCW's sage-grouse conservation plan may also benefit a number of other bird species. Additionally, the Phase I BBCS (see Attachment B) was developed to further reduce impacts on all birds and bats. Finally, we compared several different compensatory mitigation measures as proposed under Alternative 1 (Proposed Action) and Alternative 2 (Proposed Action with Different Mitigation) that are designed to compensate eagle take predicted for the CCSM Phase I Project, but could also benefit other birds. The analysis completed in the BLM FEIS and ROD, EA1, and EA2, as well as the conservation and mitigation measures that PCW has committed to through the aforementioned documents, plus additional analysis provided herein, form the basis of our analysis in this section, which uses the impact criteria described in Table 3-23 to evaluate the level of impact of the Proposed Action and alternatives on birds (other than eagles).

Table 3-23. Impact Criteria for Birds (Other than Eagles) for the CCSM Phase I Project in Wyoming

Impact Category	Intensity Type	Definition
Magnitude	Major	The action would result in substantial indirect impacts on habitat from a large reduction or alteration of habitat, resulting in a substantial reduction in use by birds for nesting, foraging, wintering, or other life history activities. The action could result in direct injury or fatality of birds, including special status species, resulting in a local population-level effect on a bird species.
	Moderate	The action would result in some indirect impacts on habitat from loss of habitat or alterations that are expected to result in a measureable but moderate change in bird use, including localized reductions in reproductive success or survival. The action could result in some direct injury or fatality of birds, including special status species, but would not result in population-level effects.
	Minor	The action would result in some indirect change in the amount or condition of habitat for birds. The action would result in a limited amount of direct but localized fatality or injury of birds that would not be expected to have any long-term effects on any populations of birds.
	No effect	The action would not result in any measureable or observable direct or indirect impacts on birds or their habitat and would have no consequence.
Duration	Long-term	30 years (proposed project duration)
	Medium-term	5 years (permit term)

Impact Category	Intensity Type	Definition
	Temporary	Lasting for the duration of construction
Potential to occur	Probable	More likely than not to occur
	Possible	Potential to occur
	Unlikely	Not reasonably likely to occur
Geographic extent	Extensive	Within the two EMUs and four BCRs
	Regional	Within the 140-mile radius of the local area population for golden eagles
	Local	Within 4 miles of the Phase I development and infrastructure areas
	Limited	Within 1 mile of Phase I development and infrastructure areas

Potential impacts on birds (other than eagles) from the Proposed Action and alternatives are grouped into two main categories: construction and operation. The following general construction-related impacts are applicable to birds: (1) habitat loss, degradation, and fragmentation from construction of roads, power lines, wind turbines, turbine pads, and other facilities; (2) disruption, displacement, and avoidance due to construction activities and equipment; and (3) injury and fatality due to collision with construction vehicles or equipment. Construction-related impacts are typically temporary, whereas operation impacts are typically long-term. Operation impacts would begin when the first turbine is operational and would last as long as the CCSM Phase I Project is in operation. The following general operation-related impacts are applicable to birds: (1) continued indirect effects from habitat loss, alteration, and fragmentation; (2) continued disruption, displacement, and avoidance due to operation and maintenance of the CCSM Phase I Project; and (3) injury and fatality due to collisions with wind turbines, power lines, meteorological towers, communication towers, operation and maintenance buildings, or maintenance vehicles.

3.7.3.1 Summary Comparison of Alternatives

Based on our analysis of environmental consequences, discussed below, and using the evaluation criteria described in Table 3-23, we identified the following key differentiators for birds (other than eagles) among the alternatives:

- The No Build scenario under Alternative 4 (No Action: Denial of ETPs) would have the least impacts on birds (other than eagles), followed by Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project).
- Although the expected impacts of Alternative 1 (Proposed Action) and Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would have similar intensities, most impacts on birds (other than eagles) would be lower under Alternative 3 than under Alternative 1, as the extent would be less.

- Alternative 2 (Proposed Action with Different Mitigation) would have impacts on and benefits to birds (other than eagles) that would be similar to those under Alternative 1 (Proposed Action), but would vary by the compensatory mitigation measure selected.
- The Build Without ETPs scenario under Alternative 4 (No Action: Denial of ETPs) would have the greatest impacts on birds (other than eagles) because it would not include ETP permit stipulations that would include minimization measures and benefits to birds (other than eagles).

3.7.3.2 Alternative 1 – Proposed Action: Issue ETPs for Phase I Wind Turbine Development and Infrastructure Components

3.7.3.2.1 Construction

Construction of the CCSM Phase I Project would result in the direct loss and degradation of up to 4,465 acres of bird habitat, or up to 8 percent of the available habitat for birds in the Phase I development and infrastructure areas. This includes 264 acres of human modified and developed areas that may act as habitat for some bird species. An additional 440 acres of activity areas would be used during construction, and some vegetation may be cut or partially cut, but surface clearing and vegetation removal would not occur (see Table 3-9). In addition, an unknown and unquantifiable number of additional acres of bird habitat would be directly and indirectly impacted due to the influence of human activities beyond the construction footprint, as is discussed further below. Following construction, PCW would conduct reclamation activities intended to reestablish vegetation and habitat similar to baseline conditions for all but 850 acres (2 percent of the Phase I development and infrastructure areas) required for operation.

The CCSM Phase I Project would impact birds through injury and fatality caused by collisions with vehicles and other machinery during construction, direct loss of habitat from clearing and grading, degradation and fragmentation of habitat resulting in birds avoiding modified areas, and other potential impacts from construction activities as discussed below. These impacts common to all birds are discussed in detail below. Following that discussion, the unique potential impacts on waterbirds, passerines, upland game birds, raptors, ESA listed bird species, and other special status bird species (including BCC and SGCN bird species) are discussed separately.

All Birds (Other than Eagles)

The removal of vegetation during construction could destroy nests of ground- and shrub-nesting species, resulting in injury, fatality, or nest failure. However, the revised Phase I BBCS (as submitted to us May 20, 2016; see Attachment B) includes commitments by PCW to survey for nesting migratory birds within 7 days prior to the planned vegetation disturbance and to apply and implement appropriate nest management, or to conduct vegetation disturbance outside the active migratory bird breeding season. Given these commitments, direct impacts on nesting birds during construction are unlikely. Birds may also be at risk for collision with vehicles and other construction equipment; however, this is expected to be rare because construction equipment is normally slow-moving or stationary.

Additionally, PCW would post speed limits to reduce wildlife collisions (see Section 2.2.1.4.2).

Direct habitat loss from construction of the CCSM Phase I Project would remove potential nesting habitat and degrade habitat quality. This habitat loss and degradation would result in a decrease in the number of bird species within the Phase I development and infrastructure areas and displacement of birds to adjacent habitats. The shift of individuals to potentially less suitable habitats may lead to overcrowding, increased competition for resources, increased predation, and lower reproductive rates, and could potentially result in a reduction in survival rates (Madsen and Boertmann 2008).

The majority of habitat loss is proposed within shrub communities (that is, Wyoming big sagebrush, mountain big sagebrush, black sagebrush, and shadscale saltbush). These vegetation types provide important breeding, nesting, and foraging habitat for many bird species, including sagebrush-obligate species. The sagebrush steppe ecosystem is rapidly declining across the western United States due to resource development, exurban development, fires, and conifer encroachment (USFWS 2012e; 80 FR 59857-59942, October 2, 2015). Chapter 4.0 also discusses the conversion of sagebrush communities to cropland. Additional loss of sagebrush vegetation contributes further to the ongoing large-scale loss of habitat for several species of sagebrush-obligate bird species.

Habitat fragmentation, or the division of large, continuous habitats into smaller, isolated remnants, could amplify the impacts of habitat loss and disruption, displacement, and avoidance over a larger area. The impacts from fragmentation vary by species and depend on the bird's home range and territory size. The total amount of land that could be affected by indirect impacts such as habitat fragmentation, species disruption and displacement, and barrier effects could be substantially greater than the acreage directly impacted by temporary or permanent habitat loss or degradation. However, given the current state of scientific research on indirect effects like habitat fragmentation, species disruption and displacement, and barrier effects we have no way to quantify the extent of such impacts on birds. Some avian species may be affected more than others and some species may be unaffected. The distance to which edge effects would extend beyond the footprint and adversely affect birds would vary by species. Generally, passerines require less area for courtship, breeding, nesting, and feeding and are more tolerant of higher levels of habitat fragmentation than species such as greater sage-grouse, which require larger expanses of intact habitat (Odum and Kuenzler 1955; Connelly et al. 2000). The infrastructure required for construction, particularly linear features such as roads and power lines, creates edge effects that decrease the value of adjacent habitats nearby. The impacts on habitat from edge effects have been reported to be 2.5 to 3.5 times as great as the actual footprint of habitat loss (Reed et al. 1996). Indirect effects of construction, including noise and light pollution, fugitive dust, erosion, and human activity, could deter or harm birds in the surrounding landscape. This may result in the loss or degradation of bird foraging habitat, reduced prey or forage abundance and quality, resulting in reduced bird densities, distributions, and lower reproductive success. Some species, such as horned lark and western meadowlark, prefer these altered areas, so the abundance of some species may actually increase along habitat edges (Yahner 1988).

Roads and other modified areas can act as conduits for the spread of invasive or noxious plant species inadvertently introduced by humans. Roads and other infrastructure, in addition to invasive plants, can increase the potential for fire and perpetuate the spread of weeds following a fire, which severely reduces the quality of sagebrush habitat (USFWS 2013e). However, PCW would implement BMPs and other mitigation and minimization measures identified in the ECP, Appendix K (see Attachment A), and in the Phase I BBCS, Appendix I (see Attachment B), to reduce the potential for wildfires, prevent the introduction and spread of invasive plant species, and control or prevent the spread of introduced plants, including stabilization and rehabilitation of burned areas to prevent erosion and noxious plant invasion.

Linear infrastructure such as roads and power line corridors also facilitate the movement of predators and could lead to increased predation on birds in the Phase I development and infrastructure areas (USFWS 2008c, 2012e). Increasing habitat edges and high levels of fragmentation also lead to increased predation of birds (Andren and Angelstam 1988; Paton 1994; Keyser et al. 1998; Stephens et al. 2003; Rubenstahl et al. 2012). Coyotes and ravens are common predators in south-central Wyoming that may use roadways or other rights-of-way created during construction of the CCSM Phase I Project.

Waterbirds, Waterfowl, and Shorebirds

Waterbirds, waterfowl, and shorebirds are uncommon in the Phase I development and infrastructure areas, and their suitable habitat would not be directly affected in this area. Some shorebirds, such as mountain plover (discussed under Special Status Bird Species), may forage or nest in the Phase I development and infrastructure areas. Waterbirds, waterfowl, and shorebirds pass through the Phase I development and infrastructure areas while traveling to nearby reservoirs and wetlands, and during seasonal migration. Direct injury to or fatality of waterbirds, waterfowl, and shorebirds from collisions with construction equipment or vehicles is not expected.

Increased erosion or hazardous material spills could occur that may have an impact on surface water resources within and immediately outside the Phase I development and infrastructure areas as described in Section 3.3.3 (Water Resources). Increases in impervious surfaces degrade or reduce waterbird habitat. Impacts on waterbirds, waterfowl, and shorebirds due to spills, erosion, impervious surfaces, or sedimentation are unlikely; if they did occur, they would be minor in magnitude and temporary in duration because the erosion control and spill response measures to which PCW has committed would minimize the likelihood and consequence of these spill events and erosion on waterbirds, waterfowl, and shorebirds (see Section 2.2.1.4.2). If waterbirds, waterfowl, and shorebirds were impacted by spills, erosion, or sedimentation, this impact would occur on a regional extent (see Table 3-23 for definitions of impact criteria).

Construction activities would also require that no more than 336 acre-feet of water be removed from the Platte River system over the 5-year construction period (PCW 2014a, 2014b, 2014c, 2014d). Impacts on waterbird, waterfowl, and shorebird habitat are possible as a result of water depletion. Because the depletion for the CCSM Phase I Project would be relatively small and would occur in increments during construction, impacts would be minor

in magnitude and temporary in duration, but could occur over a regional extent (see Table 3-23 for definitions of impact criteria).

Passerines

Passerines are more susceptible to injury and fatality from construction than other bird groups, and are at higher risk for collision with vehicles and construction machinery. Collisions with stationary structures, such as cranes, would be more common during periods of low visibility, during poor weather, and during migration, when passerines commonly fly in flocks (Erickson et al. 2005). Vegetation cutting and clearing may directly affect ground- and shrub-nesting passerines through nest removal, nest failure, and direct fatality. However, given avoidance measures committed to by PCW in the revised Phase I BBCS (submitted to us on May 20, 2016; see Attachment B) impacts on nests or nest occupants from vegetation removal associated with construction during the nesting season are unlikely. In summary, direct impacts on passerines from construction of the CCSM Phase I Project are possible, but would be minor in magnitude, temporary in duration, and limited in extent (see Table 3-23 for definitions of impact criteria).

Passerines are the most likely group to be affected by habitat loss, degradation (including erosion, invasive plants, fugitive dust, noise, and light pollution), and fragmentation due to construction of the CCSM Phase I Project. Indirect impacts on passerines due to construction could include the degradation of foraging habitat, reduced forage quality or abundance, and increased wildfire risk, resulting in reduced bird densities, distribution, and reproductive success. The indirect impacts from construction can have greater effects on bird populations than direct impacts from wind energy facility operation (Gill et al. 1996; Jones et al. 2015). The total amount of land that could be affected by indirect impacts such as habitat fragmentation, species disruption and displacement, and barrier effects could be substantially greater than the acreage directly impacted by temporary or permanent habitat loss or degradation. Also, the extent to which birds are affected by these edge effects would vary by species. The increase in habitat edges would be most detrimental to sagebrush-obligates and habitat specialists. However, some passerines, such as horned larks, western meadowlarks, and other habitat generalists, prefer habitat edges and may increase in abundance in these areas (Ingelfinger and Anderson 2004; Gilbert and Chalfoun 2011). However, these species are common in the region and their populations are relatively healthy. The probable impacts on passerines from habitat loss, degradation, and fragmentation from construction of the CCSM Phase I Project under Alternative 1, although limited to local in extent, would be moderate in magnitude and would persist for the long-term (see Table 3-23 for definitions of impact criteria).

Predation and nest-parasitism (that is, a species that benefits from another species at the expense of the second) of passerines and their eggs or young may increase at or near habitat edges and with increasing levels of fragmentation in wind facilities (Andren and Angelstam 1988; Paton 1994; Keyser et al. 1998; Stephens et al. 2003; Rubenstahl et al. 2012). Nest predation and abundance of nest predators, such as rodents, increases with surrounding habitat loss (Hethcoat and Chalfoun 2015). Other nest predators, such as common ravens, may increase in abundance as a result of human activity and human development (Boarman and Heinrich 1999). The impacts of nest predation and nest parasitism due to construction are

probable and would be moderate in magnitude, limited to local in extent, and long-term in duration (see Table 3-23 for definitions of impact criteria).

Construction activities may also lead to disruption and displacement of passerines from suitable habitat. Passerine nest density increases with distance from edges (Renfrew et al. 2005). In oil and gas fields, well density was associated with decreases in the abundance of some shrub-steppe passerines (Gilbert and Chalfoun 2011). Patch size is positively associated with bird abundance in fragmented landscapes (Herkert 1994; Leddy et al. 1999). Impacts of displacement and disruption during construction are probable and would be moderate in magnitude, but limited to local in extent and temporary in duration (see Table 3-23 for definitions of impact criteria).

Raptors (Other than Eagles)

Raptors are common within the Phase I development and infrastructure areas (Johnson et al. 2008, 2009; Johnson, Rintz, and Strickland 2008a; SWCA 2011, 2012a, 2013a, 2014i). Raptors may feed on carrion along roadways, which would put them at increased risk of collision with construction traffic. Despite project speed limits and PCW's conservation measures to remove carrion (see Section 2.2.1.4.2), collisions with construction traffic would be possible. While raptors flying through the Phase I development and infrastructure areas may be at risk for collision with construction machinery (such as cranes), these types of collisions would also be unlikely, as these structures are generally stationary. Were injury or fatality to occur during construction, it would be minor in magnitude, temporary in duration, and limited in extent (see Table 3-23 for definitions of impact criteria).

Raptors would be affected by habitat loss, degradation (including fugitive dust, noise and light pollution, erosion, increased risk of wildfire, and invasive plants), and fragmentation. The total amount of land that could be affected by indirect impacts such as habitat fragmentation, species disruption and displacement, and barrier effects could be substantially greater than the acreage directly impacted by temporary or permanent habitat loss or degradation. The extent and degree to which disruption and displacement may occur would vary greatly by species. The primary indirect impact on raptors would be the removal of habitat for prey species or the increase in competition for prey, such as passerines, waterbirds, waterfowl, shorebirds, upland game birds, and small mammals. Although hunting success for raptors may increase in adjacent habitats, the removal of habitat in the Phase I development and infrastructure areas is a greater detriment to raptors in the long-term. Indirect impacts may result in reduced raptor densities, limited distribution, and lower reproductive success. Impacts on raptors from habitat loss, degradation, and fragmentation are probable and would be long-term in duration (see Table 3-23 for definitions of impact criteria). However, because raptors occupy large territories and use expansive home ranges, the impacts on raptors from habitat loss, degradation, and fragmentation are expected to be minor in magnitude and limited to local in extent (see Table 3-23).

Raptors are particularly susceptible to disruptions in nesting territories, which could lead to nest abandonment and failure (Steenhof and Kochert 1982). However, implementation of PCW's conservation measures described in Section 2.2.1.4.2 (such as timing windows that would restrict construction during key raptor nesting time periods, and buffer distances that

would keep construction away from nests) would reduce adverse impacts on nesting raptors. An unoccupied nest site, although unused for a number of years, may retain many of the qualities of a suitable nest site and have the potential to be used again in the future. Because there are no protection measures for unoccupied nests or nest sites, human activity during construction may degrade the quality of these potential nest sites and make them of lower quality for future use. Disruption and displacement impacts on raptors are probable, but would be minor in magnitude, limited to local in extent, and temporary in duration (see Table 3-23 for definitions of impact criteria).

Special Status Bird Species

Birds of Conservation Concern

In general, the potential impacts on BCCs are similar to those described for other bird species. However, BCC species exhibit some unique ecological characteristics, or their populations are uniquely at risk, which warrants protection measures that set them apart from other species.

Waterbirds, Waterfowl, and Shorebirds

Impacts on horned grebes, marbled godwit, and mountain plover would be similar to impacts on other waterbirds and shorebirds, as discussed above. Horned grebes and marbled godwit are unlikely to occur in the Phase I development and infrastructure areas, and therefore would not be directly impacted by construction of the CCSM Phase I Project. Impacts from potential spills, erosion, or water usage would affect these two species similarly to other waterbirds and shorebirds, as discussed above. Impacts on horned grebes and marbled godwit from erosion and potential spills are unlikely, but would be minor in magnitude, temporary in duration, and regional in extent (see Table 3-23 for definitions of impact criteria). It is possible that these species could be affected due to water depletion from the Platte River system, but this would also be minor in magnitude, temporary in duration, and regional in extent (see Table 3-23).

Construction of the CCSM Phase I Project would result in the temporary loss of 433 acres and the long-term loss of 78 acres of suitable mountain plover habitat (BLM 2014, 2016a). In addition, indirect impacts such as habitat loss, degradation (including edge effects, noise and light pollution, fugitive dust, erosion, invasive plants, and increased risk for wildfires) and fragmentation could affect an undetermined number of acres of mountain plover habitat outside this area. Construction of the Foote Creek Rim wind energy facility in south-central Wyoming resulted in displacement and a reduction in the local population of mountain plovers, although this could be attributed to regional population trends (Young et al. 2005a, as cited in Naugle et al. 2011). The effects of habitat loss, degradation, and fragmentation, as well as disruption and displacement, on mountain plovers are probable. Although it would be limited to local in extent and moderate in magnitude, the loss of habitat would last through the long-term. Disruption and displacement of mountain plovers would be temporary in duration (see Table 3-23 for definitions of impact criteria).

Vegetation removal during the mountain plover nesting season (approximately mid-April through early July) could result in direct impacts on nesting mountain plovers, including

collisions with construction equipment, nest destruction or failure. However, given avoidance measures committed to by PCW in the revised Phase I BBCS (submitted to us on May 20, 2016; see Attachment B) impacts on nests or nest occupants from vegetation removal associated with construction during the mountain plover nesting season are unlikely. Injury and fatality to mountain plovers due to construction of the CCSM Phase I Project are possible, and would be minor in magnitude, temporary in duration, and limited in extent (see Table 3-23 for definitions of impact criteria).

Passerines

BCC-listed passerines that may be affected by the CCSM Phase I Project include loggerhead shrike, Bewick's wren, sage thrasher, sagebrush sparrow, grasshopper sparrow, and McCown's longspur. Impacts on the McCown's longspur would be similar to impacts on other passerines, as discussed above, if they were to occur. However, McCown's longspurs were not observed during baseline avian studies; therefore, adverse impacts on this species from construction of the CCSM Phase I Project would be unlikely.

Impacts on BCC-listed passerines from construction of the CCSM Phase I Project would be similar to impacts described above for other passerine species. Direct injuries and fatalities are possible and would be minor in magnitude, temporary in duration, and limited in extent (see Table 3-23 for definitions of impact criteria).

Sage thrasher and sagebrush sparrow are sagebrush-obligates, meaning they are dependent on the sagebrush steppe ecosystem for forage and nesting habitat. The increase in habitat edges would be most detrimental to sagebrush-obligates. These species have shown average annual declines in abundance between 1980 and 2007 of 1.1 and 0.2 percent per year, respectively (Sauer et al. 2008). Hethcoat and Chalfoun (2015) monitored sagebrush-obligate songbird nests over 2 years in a western Wyoming natural gas field. They determined that detections of nest predators and nest predation increased with surrounding habitat loss. Most nest predators were rodents, and predation had the greatest impact on habitat specialists, such as sage thrasher and sagebrush sparrows. In oil and gas fields, well density was associated with decreases in abundance of these two species (Gilbert and Chalfoun 2011).

Impacts on BCC-listed passerines from habitat loss, degradation, fragmentation, nest predation, nest parasitism, or displacement or disruption due to construction are probable, and would be moderate in magnitude and limited to local in extent (see Table 3-23 for definitions of impact criteria). Displacement and disruption would be temporary impacts, whereas habitat loss, degradation, fragmentation, nest predation, and parasitism would persist for the long-term (see Table 3-23).

Raptors

The numbers of ferruginous hawks nesting in and near the Phase I development and infrastructure areas has declined since surveys began in 1980 (Johnson, Rintz, and Strickland 2008a). Although direct impacts from construction of the CCSM Phase I Project are unlikely, there is potential for indirect impacts on nest sites. There are no occupied nests in or within 5 miles of the Phase I development and infrastructure area. However, ferruginous hawks are

highly sensitive to human activity (Cook et al. 2003), and pairs may avoid nesting after disruptions caused by construction of the CCSM Phase I Project (Wallace et al. 2016). Environmental constraints identified in the ECP, Appendix K (see Attachment A), or in the BBCS, Appendix I (see Attachment B), preclude any surface structures within 1,200 feet (366 meters) of occupied (that is, active) ferruginous hawk nests (regardless of land ownership), suggesting that impacts from disruption and displacement would be unlikely. If impacts from disruption or displacement were to occur, they would be minor in magnitude, temporary in duration, and limited to local in extent (see Table 3-23 for definitions of impact criteria). Impacts from habitat loss and degradation are possible, and would be long-term in duration, minor in magnitude, and limited to local in extent. Due to the low population of ferruginous hawks, injury or fatality from construction is unlikely, and would be minor in magnitude, temporary in duration, and limited in extent (see Table 3-23).

There are nine occupied and one unoccupied prairie falcon nests within 5 miles of the Phase I development and infrastructure areas, including three within 1 mile of the Haul Road. Impacts on these nests could include disruption or displacement of individuals or even nest abandonment. Applicant-committed measures, including temporal and spatial buffers (that is, an 825-foot buffer from surface modification), would minimize impacts on occupied nest sites. Prairie falcons are one of the more common raptor species found in the Phase I development and infrastructure areas, and impacts on this species would be similar to impacts described above for other raptor species. That is, direct injury or fatality is unlikely, but would be minor in magnitude, temporary in duration and limited in extent were it to occur. Impacts to prairie falcons from habitat loss, degradation, fragmentation, displacement and disruption would be probable, minor in magnitude, and limited to local in extent. Although displacement and disruption would be temporary in duration, habitat loss, degradation, and fragmentation would be long-term in duration (see Figures 3-13 and 3-14).

Peregrine falcons are relatively rare within the Phase I development and infrastructure areas, and nesting is not known to occur; therefore, construction would have no effect on nest sites. Although the species are known to occur within the Phase I development and infrastructure areas, impacts from construction of the CCSM Phase I Project, such as habitat loss, degradation, fragmentation, displacement and disruption, are unlikely. If impacts were to occur, they would be minor in magnitude, temporary in duration, and limited to local in extent (see Table 3-23 for definitions of impact criteria).

Impacts on short-eared owls from construction of the CCSM Phase I Project would be similar to impacts described above for other raptors, if they were to occur. That is, direct injury and fatality would be minor in magnitude, temporary in duration, and limited in extent. Impacts to short-eared owls from habitat loss, degradation, fragmentation, displacement, and disruption would be minor in magnitude and limited to local in extent. While habitat loss, degradation, and fragmentation would occur over the long-term, displacement and disruption would be temporary. However, as short-eared owls have not been observed in the Phase I development and infrastructure areas, impacts from construction would be unlikely.

Burrowing owls are particularly sensitive to surface modification because they nest in subterranean burrows. The presence of potential nest burrows is a critical requirement for this species, and their nests are associated with a high density of small mammal burrows (Poulin

et al. 2011). Any development within white-tailed prairie dog colonies has greater potential to directly impact nesting burrowing owls. Although pre-construction surveys did not identify burrowing owl breeding activity, species-specific surveys were not completed. In addition, nests can be difficult to identify, and nesting may occur in the future. Two burrowing owls observed in or near the Phase I Sierra Madre WDA during pre-construction surveys may indicate nesting activity, even though no nest was recorded (Johnson, Rintz, and Strickland 2008a). Numerous white-tailed prairie dog colonies are located in the Phase I Sierra Madre WDA, and some are located along proposed access roads (see Figure 3-10); any of these colonies could be used by burrowing owls in the future. As described in Section 2.2.1.4.2, PCW has committed to conservation measures that include temporal and spatial raptor nest protection measures (that is, an 825-foot buffer from surface modification) that would reduce the potential for direct impacts on burrowing owls on public lands. In the revised Phase I BBCS (see Attachment B), PCW committed to extending these BLM environmental constraints to all state and private lands under their jurisdiction. Impacts on burrowing owls as a result of construction of the CCSM Phase I Project under Alternative 1 are possible, and would be both minor in magnitude and limited to local in extent (see Table 3-23 for definitions of impact criteria). Although direct habitat loss would be a long-term impact, potential disruption, displacement, and direct injury or fatality would be temporary in duration (see Table 3-23).

Species of Greatest Conservation Need

Waterbirds, Waterfowl, and Shorebirds

Impacts on SGCN waterbirds, waterfowl, and shorebirds would be similar to impacts described above on other waterbirds, waterfowl, and shorebirds. The 10 SGCN waterbirds, waterfowl, and shorebirds (see Table 3-22) are relatively uncommon in the Phase I development and infrastructure areas, but could occur during transit between waterbodies or during migration. Direct injuries or fatalities of these species due to construction activities are not expected and would have no effect. Impacts on water quality due to spills, erosion, impervious surfaces, or sedimentation from construction are unlikely and would be minor in magnitude, temporary in duration, and regional in extent (see Table 3-23 for definitions of impact criteria). Minor impacts on water quantity due to water extraction from the Platte River system would be probable and would occur on a regional extent, but would be temporary in duration (see Table 3-23).

Passerines

Impacts on SGCN-listed passerines (that is, Brewer’s sparrow and lark bunting) would be similar to impacts described above for other passerines. Therefore, direct injury or fatality of SGCN-listed passerines from construction of the CCSM Phase I Project is possible, but would be minor in magnitude, temporary in duration, and limited in extent (see Table 3-23 for definitions of impact criteria). Impacts of habitat loss, degradation, fragmentation, displacement, and disruption, as well as nest predation and nest parasitism, on SGCN-listed passerines are probable, limited to local in extent, and moderate in magnitude. Displacement and disruption would be temporary impacts, while other impacts on habitat and from nest predation would be long-term (see Table 3-23).

Upland Game Birds

The only SGCN-listed upland game bird that is known to occur in the CCSM Phase I Project area is the greater sage-grouse. As mentioned in Section 3.7.2.2.5, there is suitable habitat for Columbian sharp-tailed grouse; however, this species has not been observed in the CCSM Phase I Project area and will not be discussed further in this EIS. Potential impacts on greater sage-grouse from construction of the CCSM Phase I Project include (1) injury or fatality from collisions with vehicles or other construction machinery; (2) habitat loss, degradation (including edge effects, noise and light pollution, fugitive dust, erosion), and fragmentation; (3) increased nest predation and parasitism; (4) disruption and displacement; and (5) increased potential for the spread of invasive plants and resultant increased risk of wildfire.

The combination of a heavy body and small wings decreases aerial mobility, making greater sage-grouse more susceptible to collision with construction vehicles and equipment. Given implementation of Project speed limits and the generally stationary nature of construction equipment, collisions are expected to be rare. Due to known population sizes in the CCSM Phase I Project area, injuries or fatalities of greater sage-grouse are possible and, if they occurred, would be moderate in magnitude, temporary in duration (risk would only persist during construction), and limited in extent (see Table 3-23 for definitions of impact criteria).

Habitat loss, degradation, and fragmentation reduce the quality and quantity of habitat available to greater sage-grouse and are the primary causes of decline for the species (80 FR 59857-59942, October 2, 2015). The construction of the CCSM Phase I Project would result in the direct loss of up to 4,465 acres of potential greater sage-grouse habitat and temporary impacts on another 440 acres of habitat, and would result in indirect impacts such as fragmentation and edge effects on an additional unknown number of acres of habitat. Greater sage-grouse require large expanses of contiguous sagebrush (Johnson and Holloran 2010), but fragmentation creates both physical and behavioral barriers to movements between suitable habitat patches. Although a large number of habitat acres would be impacted, and other unquantified acres of habitat would be impacted by indirect impacts, PCW has incorporated numerous avoidance and minimization measures into the design of the CCSM Phase I Project to reduce the footprint, reduce habitat fragmentation, and avoid core population areas (see Section 2.2.1.3).

The location and design of the CCSM Phase I Project conforms to the Approved Resource Management Plan Amendment for Wyoming (BLM 2015a). The Phase I development and infrastructure areas are located outside of the Priority Habitat Management Areas, which for the CCSM Phase I Project, are coincident with the core areas designated in both Executive Order (EO) 2011-5 and EO 2015-4. There are also no Sagebrush Focal Areas in the vicinity of the CCSM Phase Project. The Approved Resource Management Plan Amendment is an effort to conserve greater sage-grouse habitat on public lands consistent with the sustained-yield and multiple-use mission of the BLM. The Phase I development and infrastructure areas are located within designated General Habitat Management Areas, which are open to wind energy development (BLM 2015a). Development within General Habitat Management Areas requires those BMPs and applicant-committed measures described in Sections 2.2.1.3.2 and 2.2.1.3.4. Furthermore, PCW's sage-grouse conservation plan, discussed below,

would minimize or reduce some of the impacts from habitat loss and degradation. The effects of direct habitat loss, degradation, and fragmentation from construction on greater sage-grouse in General Habitat Management Area populations are probable, and because the impacts would stem from existence of infrastructure, they would occur over the long-term (see Table 3-23 for definitions of impact criteria). Nonetheless, they would be moderate in magnitude. These impacts would exist on a local extent, which is defined as within 4 miles of the development and infrastructure areas, and therefore would include those portions of core areas (that is, Priority Habitat Management Area populations) within the local extent (see Table 3-23).

Several studies have shown that greater sage-grouse exhibit negative behavioral responses to energy development, including behavioral disruption and displacement from habitat, although data specific to wind energy are limited (Naugle et al. 2011; Walters et al. 2014). Research on the presence and absence of greater sage-grouse in wind facilities and surrounding areas is just being initiated at most locations. Studies in Wyoming suggest that greater sage-grouse abundance declines during construction of the facility (Johnson, Martinson, et al. 2010; Johnson, Rintz, et al. 2010; LeBeau et al. 2014). Additionally, pellet densities of greater sage-grouse have been less near wind turbines than those for paired reference areas (McCreight and Lehnen 2010; Johnson, Martinson, et al. 2010). However, the authors caution that these data are preliminary, and additional data are needed before definitive conclusions can be made about the impact of wind development facilities on greater sage-grouse. Greater sage-grouse hens with broods have been observed under turbines at Foote Creek Rim (Young 2004, pers. comm.). It is important to note that some of the above-referenced literature is not peer-reviewed, but does represent some of the best available data regarding wind energy impacts on greater sage-grouse.

When evaluating the impacts of construction of the CCSM Phase I Project, we substitute information on expected impacts obtained from other industrial construction and development for the lack of information on impacts specific to construction of wind facilities. Greater sage-grouse are known to avoid roads, overhead power lines, oil and gas wells, and buildings (Holloran 2005; Pruett et al. 2009). Industrial noise has been shown to mask greater sage-grouse communication and cause displacement of males from leks (Blickley et al. 2012; Blickley and Patricelli 2012). Walker, Naugle, and Doherty (2007) demonstrated that impacts on leks from oil and gas development remain discernible as far as about 4 miles, and other studies have found adverse impacts out to 12 miles (Naugle et al. 2011, as cited in Manier et al. 2014). Negative population trends were discernable when oil and gas wells were located within 2.5 miles of active leks (Johnson et al. 2011). It may take a few years after construction for displacement to occur and for population-level responses to appear (Johnson and Holloran 2010; Gregory and Beck 2014). There are 11 leks within 1 mile and 29 leks within 4 miles of the Phase I development and infrastructure areas. Impacts would be probable, and the immediate magnitude of the impacts would be major due to disruption and displacement of greater sage-grouse during construction, both on and off leks and at nest sites. However, due both to the limited duration of the construction activities, and the seasonal restrictions for those construction activities, the extent of impacts would be local and the duration would be temporary (see Table 3-23 for definitions of impact criteria).

Linear infrastructure such as roads and power line corridors facilitate the movement of predators and could lead to increased predation (USFWS 2012e). For instance, foraging behaviors by common ravens were concentrated within about 1.4 miles of power lines, and increased levels were observed out to about 6.8 miles in Idaho (Coates et al. 2014). In Wyoming, raven habitat abundance was greatest within 1.9 miles of human activity centers, and raven occupancy was correlated with greater sage-grouse nest failure (Bui et al. 2010). This impact would begin during construction and continue through operation. Because there are few effective measures to prevent an increase in predator abundance, impacts on greater sage-grouse from increased predation are probable. These effects would have moderate impacts at the local scale and would continue for the long-term (see Table 3-23 for definitions of impact criteria).

Humans inadvertently introduce noxious and invasive weeds along roadways as part of infrastructure development projects. Invasive grasses, such as cheatgrass (*Bromus tectorum*), increase the potential for fire and perpetuate the spread of non-native plants post-fire, which may reduce the quality of sagebrush habitat (Rhodes et al. 2010). Conservation measures to prevent noxious plant invasion will be required by BLM's permit conditions. We acknowledge that despite application of BMPs, the introduction of weeds in the Phase I development and infrastructure areas remains possible in areas within and near surface modification. If this were to occur, it would be possible that greater sage-grouse could be impacted by invasive weeds and the resultant impacts on their habitat, which would be long-term in duration. However, because of the application of the BLM permit conditions, the impacts on greater sage grouse from noxious plant invasion would be minor in magnitude and limited in extent (see Table 3-23 for definitions of impact criteria).

The Phase I development and infrastructure areas are not located within greater sage-grouse core population areas established by the State of Wyoming in EOs 2011-5 and 2015-4 (State of Wyoming 2015); however, the Sierra Madre WDA is surrounded on three sides by core population areas (see Figure 3-15). Potential impacts on greater sage-grouse from construction of the CCSM Phase I Project would be reduced as a result of numerous applicant-committed conservation measures, BMPs, requirements in the BLM FEIS and ROD for the CCSM Wind Energy Project (BLM 2012a) to follow all stipulations in the Wyoming Governor's EO 2011-5, and adherence to a sage-grouse conservation plan. Specifically, surface occupancy is prohibited within 0.25 mile of all leks (BLM 2012c), and high-profile structures are limited within 1 mile of leks on public land (BLM 2008). Surface-modifying and disruptive activities are prohibited from March 1 to July 15 within 2 miles of any lek on public land or within nesting and early brood-rearing habitat on public land (BLM 2008, 2012c). Finally, surface modification from November 15 to March 14 is prohibited in any public lands that provide winter habitat or concentration areas for core area populations (BLM 2008, 2012c).

An exception to the above conservation measures is necessary at the turbine road between LMH-D-11 and LMH-D-12, which would be located 0.23 mile away from the Deadman Creek South lek, shown in Figure 3-16. PCW was unable to relocate the road due to topographical and resource constraints. Therefore, PCW has proposed additional site-specific restrictions, which include avoidance of construction activities within 0.25 mile of the lek between March 1 and May 20. In addition, PCW has prepared a sage-grouse conservation

plan as an appendix to its original Plan of Development for the CCSM Phase I Project, which was submitted to the BLM and included in the BLM ROD as Appendix B (BLM 2012b), to guide management of greater sage-grouse habitat. This plan has committed PCW to do the following:

1. Map and evaluate greater sage-grouse habitat.
2. Manage land on the ranch to prevent conversion of greater sage-grouse habitat.
3. Protect core population areas.
4. Monitor greater sage-grouse populations.
5. Remove or mark fences to prevent collisions.
6. Install bird diverters on meteorological towers.
7. Install water tank escape ramps to prevent greater sage-grouse from drowning in stock tanks.
8. Suspend greater sage-grouse hunting on the ranch.
9. Improve greater sage-grouse habitat, including the following:
    a. Reclaim recently burned areas.
    b. Improve natural free-flowing water and wet meadow habitats.
    c. Improve relic agricultural fields for year-round greater sage-grouse habitat.
    d. Remove and reclaim unnecessary roadways.
    e. Control noxious and invasive species.
    f. Place conservation easements on 26,000 acres of private land adjacent to the CCSM Phase I Project.

Overall, the combined impacts on the local greater sage-grouse population from construction of the CCSM Phase I Project would be major in magnitude and probable, but local in extent and from temporary to long-term in duration (see Table 3-23 for definitions of impact criteria). Although development would be located entirely outside the core population areas established by the State of Wyoming, a large number of leks are located relatively close to proposed construction activities. BLM restrictions prohibit surface use within 0.25 mile of known leks and apply seasonal restrictions, but current best available information indicates a continued possibility for both disruption at lek sites and a reduction in male lek attendance. In addition, the conservation measures committed to by PCW in its sage-grouse conservation plan would be beneficial to greater sage-grouse, but they would not eliminate the impacts from construction of the CCSM Phase I Project.

Figure 3-16. Greater Sage-Grouse Deadman Creek South Lek in relation to the Phase I Sierra Madre Wind Development Area for the CCSM Phase I Project in Wyoming

Raptors

Impacts on SGCN-listed raptors would be similar to those described above for other raptors. Only one Swainson's hawk nest was located during the 5 years of raptor nest surveys in the Phase I development and infrastructure areas. This nest is located approximately 3 miles outside the Phase I Sierra Madre WDA (see Figure 3-15). Swainson's hawks are relatively rare and northern goshawk and merlins are very rare. Therefore, impacts on individuals may result in greater relative impacts at the population level, though these differences are not expected to be substantial. Injuries or fatalities are unlikely and, were they to occur, would be minor in magnitude, limited in extent, and temporary (see Table 3-23 for definitions of impact criteria). The probable impacts from habitat loss, fragmentation, disruption, or displacement would also be minor in magnitude, limited to local in extent, and temporary in duration. While habitat loss, degradation, and fragmentation would persist for the long-term, displacement and disruption would be temporary in duration (see Table 3-23).

Summary of Construction Impacts Under Alternative 1

Under Alternative 1 (Proposed Action), construction of the CCSM Phase I Project would result in the following impacts on birds (other than eagles) (see Table 3-23 for definitions of impact criteria):

- Injury or fatality from collisions with construction equipment or vehicles is possible for some species.
- Initial clearing and grading would result in the loss and degradation of up to 4,465 acres of bird habitat.
- Displacement or disruption of birds from suitable nesting, brooding, or foraging habitat to less suitable areas would likely occur.
- Displacement or disruption of greater sage-grouse at leks or nests is probable and would result in major impacts on the local population.
- Habitat loss and human presence would likely increase the number of nest predators, such as common ravens and coyotes, and increase the potential for predation of ground and shrub nests.
- Small mammal prey for raptors may be displaced due to construction activities, or their abundance may decrease due to habitat loss, degradation, and fragmentation, which could result in decreased productivity or survival of local raptors.
- Impacts from construction activity, including fugitive dust, invasive plants, erosion, and noise and light pollution could reduce bird densities, alter distribution, increase the potential for wildfires, and result in reduced reproductive success.

3.7.3.2.2 Operation

Direct and Indirect Impacts

Direct impacts on birds from operation of the CCSM Phase I Project would include injury or fatality from collision with turbines, plus other potential injuries or fatalities due to collisions with power lines, meteorological or communication towers, buildings, or operation vehicles.

Indirect effects would include continued habitat loss, degradation, and fragmentation; and disruption and displacement due to continued human activity and operation of facilities.

All Birds (Other than Eagles)

Injury and Fatality

In its 2012 FEIS, the BLM projected avian fatality from operation of the CCSM Project to be 1.8 birds per MW per year based on a meta-analysis of post-construction mortality studies at 21 wind facilities throughout the western United States and Canada, as compiled by Johnson and Stephens (2011). Since publication of the BLM FEIS, Loss et al. (2013) published a meta-analysis of avian fatalities at 53 wind facilities across the contiguous United States, and used model selection to develop estimates for facilities in the east, Great Plains, west, and California. Loss et al. (2013) estimated an annual fatality rate of about 2.8 birds per MW (with a 95 percent confidence that the actual number of fatalities would fall in the range between 2.1 and 3.6 birds per MW), based on 17 facilities in the intermountain west avifaunal biome (Rich et al. 2004), which coincides extensively with the Southern Rockies/Colorado Plateau and Northern Rockies BCRs (see Figure 2-2). There are several limitations with the Loss et al. (2013) results, including (1) their work was based on a limited number of existing wind energy facilities with publically available bird mortality data (most United States wind energy facilities do not monitor and report bird mortalities post-construction); (2) inconsistency in monitoring survey protocols used for wind facilities that do report bird mortality data and make it available; (3) failure to distinguish mortalities that were incidental observations versus those found during systematic searches; (4) mortality monitoring studies are not always completed using statistically robust study designs; (5) some studies corrected for incomplete searches of plots while others failed to do this; and (6) use of different statistical estimators to generate mortality estimates for the studies. Further, the main purpose of the Loss et al. (2013) paper was to derive the best available and most up-to-date estimates of bird mortality at United States wind energy facilities at large geographic scales despite the many limitations of the data used to derive these estimates. Also, while Loss et al. (2013) used robust scientific methods to reach their reported values, they did not develop a model for use in predicting bird fatalities at the scale of individual wind energy projects. Still, the results represent our best estimates of bird mortality associated with United States wind energy facilities at this time. Therefore, without a peer-reviewed statistical model to predict general bird mortalities for wind energy facilities or any other suitable, peer-reviewed scientific literature, we choose to use those estimates in this EIS to derive rough estimates of bird mortality for the CCSM Phase I Project, and we acknowledge the multiple deficiencies associated with this estimate. We fully recognize the limitations of this approach and acknowledge that the risk of bird fatalities at wind projects is normally associated with site-specific characteristics around wind turbines and turbine configuration, whereas pre-construction avian surveys are poor predictors (Ferrer et al. 2012; Hein et al. 2013; Katzner et al. 2016).

Therefore, based on the above 95 percent confidence interval fatality rate estimate of 2.1 to 3.6 birds per MW from Loss et al. (2013), and the 1,500 MW of wind generation that would be installed by the CCSM Phase I Project, we roughly estimate that operation of the CCSM Phase I Project could result in a range of 3,150 to 5,400 bird fatalities (for all species) per

year. However, this represents a very rough estimate of fatalities, and is not based on modeled projections. Further, this estimate is made with all of the caveats and limitations acknowledged above. We suspect that this estimate of bird fatalities for the CCSM Phase I Project is high, based on preliminary and confidential results from post-construction mortality monitoring recently begun at some other existing wind energy facilities in Wyoming using statistically valid and robust sampling methods with all appropriate bias trials to collect these data. The birds at risk of colliding with turbines would be both resident birds foraging and flying within the WDAs and migrant birds traveling through the WDAs seasonally. In addition, depending on the species, artificial light sources may attract nocturnal birds and lead to collision, or deter birds and lead to displacement (Jones et al. 2015). Given the numerous avoidance and minimization measures for eagles that would be implemented by PCW in the design of the CCSM Phase I Project, we would expect that this would help reduce mortalities for other bird species, especially for raptors. Additionally, PCW will be implementing the Phase I BBCS as a condition of the right-of-way permit issued by BLM. Through the adaptive management program and proactive to avoidance and minimization measures, as described in the Phase I BBCS (see Attachment B), the actual number of fatalities could be reduced.

Birds may also collide with, or be electrocuted by, transmission lines and collection lines (collectively, power lines) associated with the CCSM Phase I Project. Approximately 41.7 miles of 34.5-kilovolt (kV) overhead collection lines and 33.5 miles of 230-kV overhead transmission lines would be constructed under Alternative 1 (Proposed Action). Overhead power lines present a collision risk that is greater for large-bodied, small-winged birds, such as waterfowl and greater sage-grouse (Harness and Wilson 2001). Electrocution risk is greater for large birds, such as raptors, that are capable of bridging the connection between two different phases or hot and grounded wires (Harness and Wilson 2001; Lehman et al. 2007), although even small birds have been electrocuted on power lines (Loss et al. 2014a). Transformers and substations also pose a risk of electrocution (Harness and Wilson 2001; Erickson et al. 2005). Loss et al. (2014a) synthesized power line fatality studies across the U.S. and calculated median values for bird collisions with transmission lines and bird electrocutions on distribution lines. There is poor confidence in these estimates due to multiple limitations (Loss et al. 2014a), and the types of power lines included in the study are generally different from those proposed for the CCSM Phase I Project. Because the Loss et al. (2014) work was based on a small number of studies, the studies likely used non-random sampling methods, and study sample design and data collection methods varied among these studies, we elected to not use their estimates to project any estimate of bird collisions or electrocutions with power lines associated with the CCSM Phase I Project. Another key factor in our decision to not provide such estimates is that the main purpose of the Loss et al. (2014) work was to derive estimates of bird collisions electrocutions due to power lines for the U.S. as a whole. Their methods were not developed to be used to estimate bird mortalities due to power lines at the scale of an individual project. Studies conducted to assess the amount of mortality due to power lines are challenging due to numerous variables associated with the structure of power lines and low searcher efficiency, which leads to low estimates of small bird fatalities (Loss et al. 2014a). PCW's commitment to minimize the amount of overhead lines and to design overhead lines to meet Avian Power Line Interaction Committee (APLIC) recommendations would minimize the risk of bird electrocution and collision (APLIC 2012).

Birds may also collide with meteorological and communication towers. Towers with guy wires pose a greater risk for collision, and have been shown to cause more fatalities than wind turbines (Erickson et al. 2005). Meteorological and communication towers associated with the CCSM Phase I Project would not use guy wires, and so collisions are expected to be rare. Bird fatalities from vehicle collisions, maintenance equipment, and other operation infrastructure are also expected to be rare, given the conservation measures described in the Phase I BBCS (see Attachment B). Fatality estimates from these other sources are either not available or are grossly insufficient for the purposes of this analysis.

Habitat Loss, Degradation, and Fragmentation

No additional habitat loss or alteration would occur during operation of the CCSM Phase I Project; however, 850 acres of long-term habitat loss would persist throughout operation. Reclamation of the 3,615 acres of temporary habitat loss due to construction would occur during the beginning of operation. Successful reclamation to pre-construction conditions could take 15 to 50 years or longer for sagebrush and is complicated by the arid environment and long-lived biology of native vegetation (Bergquist et al. 2007). Vegetation in newly reclaimed areas is at an earlier successional stage and will likely provide lower quality habitat for birds. These areas would not likely provide suitable habitat for a full suite of bird species and would result in habitat loss throughout many years of operation. Because there are numerous variables that affect the rate of reclamation success, it is not possible to quantify the number of acres of habitat loss because of fragmentation, reduced patch size, or the creation of habitat edges; or the rate of recovery over time. In addition to direct habitat loss, an undetermined number of acres of bird habitat located beyond the footprint would be directly and indirectly affected by operation activities, as discussed below. The total amount of land that could be affected by indirect impacts such as habitat fragmentation, species disruption and displacement, and barrier effects could be substantially more than the acreage directly impacted by temporary or permanent habitat loss or degradation. The magnitude of impacts on birds from habitat loss, degradation, and fragmentation would vary by species. Some species may be affected by these impacts far from where they occur and some may not be affected at all. Given the state of the science on such effects, we currently lack the ability to predict the extent or magnitude of indirect impacts on birds. Periodic vegetation maintenance, including trimming or removal of vegetation, would occur during operation of the CCSM Phase I Project. However, these activities would be limited to the existing project footprint and would not result in additional habitat loss or degradation. The access roads and transmission lines would continue to fragment habitat, contribute to increased wildfire risk for project habitats, and provide a means for the spread of invasive plant species (Kuvlesky et al. 2007) throughout the life of the project. However, BMPs and other measures in the weed management and site-specific reclamation plans would reduce impacts.

Disruption and Displacement

The operation of the CCSM Phase I Project would cause disruption and displacement to birds due to operation and maintenance activities. Wind turbines could cause displacement of birds from nesting or foraging habitat due to visual avoidance, noise pollution, light pollution, and other factors. This could result in reduced bird densities, altered distribution, and reduced bird reproductive success.

Turbines would be unnatural, vertical objects on the landscape that would be visible for many miles and would likely cause at least some bird avoidance. The layout and distribution of turbines relative to the surrounding landscape is also an important consideration for the regional movement of birds. Strings of numerous turbines may create a barrier along migration paths or between foraging and roosting areas. This type of disruption could cause a behavioral shift in birds, avoidance of habitats associated with and adjacent to wind projects, and an increase in the amount of energy expended during movements (Osborn et al. 1998; Drewitt and Langston 2006).

Turbines create aerodynamic noise from the displacement of air by the turbine blades. Noise created by wind turbines may exceed 100 decibels (Rogers et al. 2006), but is tempered by the sound of the wind and is dependent on the characteristics of the surrounding landscape and other nearby turbines or other noise sources (Jones and Pejchar 2013). Birds cannot hear the noise from wind turbine blades as well as humans, and most likely a human with normal hearing can hear a wind turbine twice as far away as can the average bird (Dooling 2002). Although birds may habituate to consistent noise, there may still be fitness costs to individuals due to greater than ambient noise levels (Francis and Barber 2013). Studies have shown that densities of bird populations in the vicinity of wind energy projects are reduced near turbines, power lines, and other facility equipment if continuous noise levels are in the range of 40 decibels or higher (Nicholoff 2003). The operation of the turbines would regularly exceed 40 decibels within relative proximity, but would be tempered by the sound of the wind. Although noise could disrupt birds, visual disruption and disruption from human activity is expected to be a greater impact.

Disruption of birds as a result of vehicles and human activity during operation would be similar to the disruption described for construction, but to a lesser degree because activity would be less. Maintenance activities include visual, noise, and light disruption through the presence of vehicles and human activity throughout the facility (Leddy et al. 1999; Jones et al. 2015). Scheduled and unscheduled maintenance activities would be limited during operation and may include only periodic visits to select turbines. However, required post-construction bird and bat fatality monitoring as described in the ECP (Attachment A) and the revised BBCS (Attachment B) would contribute to human and vehicular activity within the Phase I development areas. Access associated with monitoring would occur on an almost daily basis during at least the first 24 months of operation. Maintenance and monitoring would occur primarily during daylight hours to reduce the amount of artificial light pollution and impacts on nocturnal birds (see Section 2.2.1.2.2).

Some studies suggest that displacement impacts may have a greater impact on birds than collisions (Gill et al. 1996; Shaffer and Buhl 2016). It is presumed that birds shift use to less-suitable habitat, where competition for resources is greater or they face new threats to persistence (Sawyer et al. 2006). Displacements of birds from facilities in unaltered landscapes are of greater concern than facilities in agricultural fields or previously altered landscapes (Leddy et al. 1999; Larsen and Madsen 2000; Mabey and Paul 2007). Development in already altered areas results in fewer additional impacts on biodiversity and ecosystem services (Jones and Pejchar 2013) and could reduce avian fatalities associated with operation (Graff et al. 2016).

Waterbirds, Waterfowl, and Shorebirds

Waterbirds, waterfowl, and shorebirds are relatively rare in the Phase I development and infrastructure areas, but are common on nearby reservoirs. Waterbirds, waterfowl, and shorebirds passing through the Phase I development and infrastructure areas between reservoirs or during migration would be at risk for collisions with turbines, power lines, meteorological towers, and operation vehicles. Relatively high fatality rates have been associated with wind facilities located in areas with high waterbird and waterfowl densities associated with grasslands and wetlands (Graff et al. 2016). Johnson and Stephens (2011) reported that waterbirds, waterfowl, and shorebirds together account for 6.1 percent of all collision fatalities in western U.S. and Canada, while Erickson et al. (2014) reported that waterbirds (including shorebirds, waterfowl, gulls or terns, and loons or grebes) comprised 5.9 percent of turbine collisions based on a sample of studies from the U.S. and Canada. The Erickson et al. (2014) study was not available to BLM in its 2012 FEIS. There are several limitations with these types of fatality estimates, including (1) a limited number of existing wind energy facilities with publically available bird mortality data (most wind energy facilities do not monitor and report bird mortalities post-construction), (2) inconsistency in monitoring survey protocols used for wind facilities that do report bird mortality data and make it available, (3) failure to distinguish mortalities that were incidental finds versus those found during systematic searches, (4) some studies corrected for incomplete searches of plots while others failed to do this, (5) use of different statistical estimators to generate mortality estimates, and (6) inappropriate comparisons that are made across different habitat types and at different facilities. However, as the literature on wind energy impacts on waterbirds, waterfowl, and shorebirds is limited, these estimates are the best available to us at this time. Lacking a peer-reviewed statistical model to predict general waterbird, waterfowl, and shorebird mortalities for wind energy facilities or any other suitable, peer-reviewed scientific literature, we chose to use the above fatality rates to derive rough estimates of mortality for the CCSM Phase I Project. Using the high and low estimates of these two studies as a proportion of total bird fatalities described above (that is, 5.9 percent of 3,150 and 6.1 percent of 5,400), we roughly estimate that between 186 and 329 fatalities of waterbirds, waterfowl and shorebirds could occur as a result of the CCSM Phase I Project each year. We would expect these fatalities to be concentrated during spring or fall migration. As with the estimate provided for all bird species above we suspect this estimate for waterbirds, waterfowl, and shorebirds is an over-estimate. Again, this represents a very rough estimate, and is not based on modeled projections. Measures proposed by PCW to avoid and minimize collision risk during project design and operation (see Attachment B), and effective adaptive management as described in the Phase I BBCS, could help to avoid and minimize waterbird fatalities.

Waterbirds, waterfowl, and shorebirds as a group are more susceptible to collisions with overhead power lines than passerines because they generally have larger bodies and smaller wings, which reduce aerial agility (Kingsley and Whittam 2005). Waterbirds, waterfowl, and shorebirds are more likely to collide with power lines in proximity to wetlands and lakes (APLIC 2012; Faanes 1987). Waterbird, waterfowl, and shorebird collisions with turbines and overhead power lines as a result of operation of the CCSM Phase I Project would be probable, moderate in magnitude, and long-term in duration, but limited in extent (see Table 3-23 for definitions of impact criteria).

There would be no direct loss of waterbird habitat in the Phase I development and infrastructure areas as a result of the CCSM Phase I Project, and water usage would be negligible during operation. The active footprint of the wind energy facility would include impervious surfaces that prevent infiltration of water into the soil, increase runoff, interfere with pollutant processing, and lead to the degradation of riparian areas through increased sediment load (Hansen et al. 2005; Jones et al. 2015). Impervious surfaces may therefore lead to the degradation of waterbird habitat, though this would likely be minor. Impacts from continued erosion, hazardous material spills, and sedimentation would be unlikely, given the applicant-committed measures to limit and control spills and erosion. Should either of such impacts occur, they would be minor in magnitude, but long-term in duration and regional in extent (see Table 3-23 for definitions of impact criteria).

Passerines

Passerines comprise a large proportion of the fatalities at wind facilities and involve both resident and migratory species (Johnson and Stephens 2011). They were also the most commonly observed group of birds during pre-construction surveys at the CCSM Project site (Johnson et al. 2009; SWCA 2014e, 2014f, 2014g, 2014h). Following publication of the 2012 BLM FEIS, Erickson et al. (2014) reported that passerines account for 62.5 percent of fatalities in their review of studies conducted at U.S. and Canadian wind energy facilities, Johnson and Stephens (2011) reported that 59.3 percent of all fatalities were passerines for their review of studies, also from U.S. and Canadian wind facilities. Lacking a peer-reviewed statistical model to predict passerine mortalities for wind energy facilities or any other suitable, peer-reviewed scientific literature, we chose to use those fatality rates to derive rough estimates of mortality for passerines for the CCSM Phase I Project. Using the high and low estimates of these two studies as a proportion of total bird fatalities described above (that is, 59.3 percent of 3,150 and 62.5 percent of 5,400), we roughly estimate that between 1,868 and 3,375 passerine fatalities could occur annually as a result of the CCSM Phase I Project. However, these numbers are not derived from modeled projections. We fully acknowledge the multiple deficiencies associated with this approach. There are several limitations with these fatality estimates, including (1) a limited number of existing wind energy facilities with publically available bird mortality data (most United States wind energy facilities do not monitor and report bird mortalities post-construction), (2) inconsistency in monitoring survey protocols used for wind facilities that do report bird mortality data and make it available, and (3) failure to distinguish mortalities that were incidental observations versus those found during systematic searches, (4) some studies corrected for incomplete searches of plots while others failed to do this, (5) use of different statistical estimators to generate mortality estimates, and (6) inappropriate comparisons that are made across different habitat types and at different facilities. As with the estimate provided for all bird species above we suspect this estimate for passerine fatalities is an over-estimate. As the literature on wind energy impacts on passerines is limited, these estimates are the best available to us at this time. We expect that horned larks would be the most common passerine to collide with turbines because they were the most common species observed during pre-construction studies, as discussed in the Phase I BBCS, Appendix E (see Attachment B), and were the most common passerine fatality found among studies cited in Erickson et al. (2014).

Nocturnal migrants comprise a large portion of avian fatalities at wind turbines. A review of 31 fatality studies found that 78 percent of carcasses were migratory songbirds, and half of those were nocturnal migrants (Erickson et al. 2001; Kunz et al. 2007). Bird and bat radar surveys for the CCSM Phase I Project showed that the highest number of observations occurred at night during the spring, summer, and fall, as documented in the Phase I BBCS, Appendix E (see Attachment B). Apart from impaired vision during darkness, nocturnally active passerines could be attracted to or disoriented by artificial lights on turbines or other facilities. A portion of the turbines associated with the CCSM Phase I Project would be lit. All lights on turbines would meet FAA requirements and would likely consist of medium intensity synchronized red LED lights. Birds can be particularly disoriented by and attracted to red and white lights (Poot et al. 2008). As a consequence, there are records of large fatalities at a variety of lit structures, arising from nocturnal-migrant songbirds being disoriented by lights (Gauthreaux and Belser 2006). Resident birds may be less affected, as they can habituate to the presence of artificial light (Mouritsen et al. 2005). An analysis of the impact of flashing red lights recommended by the FAA did not reveal significant differences between fatality rates at wind turbines with or without flashing red lights at the same wind energy facility (Kerlinger et al. 2010). Gehring et al. (2009) reported that flashing (as opposed to steady-burning) red lights appear to be less attractive to birds. Nevertheless, the presence of lighting on some turbines might attract birds to the turbines and increase the potential for collision fatalities at both the lighted and unlighted turbines (Johnson et al. 2002).

Passerines may also collide with overhead power lines, operation vehicles, or meteorological towers, and some passerines (particularly large passerines, such as common ravens and American crows) could be electrocuted at power poles. Collision potential would be greatest during periods of inclement weather, during migration, or at night. Compared with turbines, the potential for collision with these objects would be minor. Additionally, efforts by PCW to limit the amount of overhead power lines, implement speed limits on operation vehicles, and not use guy wires on meteorological towers would further reduce the risk of collision. Overall, it is probable that direct injury or fatality from operation of the CCSM Phase I Project would have a major impact on the regional and local passerine population. Impacts would be limited in extent, and long-term in duration (see Table 3-23 for definitions of impact criteria).

Passerines in the Phase I development and infrastructure areas could continue to experience detrimental impacts from habitat loss and fragmentation of available habitat from construction of the CCSM Phase I Project. The initial impacts from construction would decrease as reclamation progresses during operation, and habitat becomes available again. Impacts will vary by species and be dependent on numerous other factors. Mahoney and Chalfoun (2016) found evidence that turbine density was negatively related to nest success and nestling mass of horned larks at a Wyoming wind energy facility, but did not see similar correlations with McCown's longspurs. It is probable that impacts on passerines from habitat loss, degradation, and fragmentation would continue during operation of the CCSM Phase I Project and would be moderate in magnitude and long-term in duration, but limited to local in extent (see Table 3-23 for definitions of impact criteria).

The effects of increased predation and nest parasitism, particularly by rodents, due to habitat loss and alteration would continue for the long-term as described above under Section 3.7.3.2.1, Construction. A study at a wind energy facility in northern Texas found that proximity to turbines might reduce aerial predation on passerine nests (Rubenstahl et al. 2012); however, this does not prevent predation at nests away from turbines and may present additional problems associated with proximity to turbines. The presence of power lines, which provide perching structures, may also facilitate increased predation of passerines by some raptors. It is probable that moderate, long-term impacts from nest predation and nest parasitism would occur during operation of the CCSM Phase I Project, though these would be limited to local in extent (see Table 3-23 for definitions of impact criteria).

Displacement of passerines near turbines or high-activity areas would continue for the life of the project. We expect sagebrush-obligate passerines to be less abundant near turbines, while generalist passerines such as horned larks and western meadowlarks may increase in abundance near turbines, roads, and other infrastructure (Piorkowski 2006; Gilbert and Chalfoun 2011). Although this would be a benefit to those generalist species, overall species diversity would decrease, and the result would be negative to the avian community. Local displacement of passerines is likely to occur due to turbine noise, and operation and maintenance activities. The displacement of grassland bird species in response to wind energy development is species-specific and inconsistent (Mabey and Paul 2007; Hatchett et al. 2013; Loesch et al. 2013; Stevens et al. 2013; Shaffer and Buhl 2016). Leddy et al. (1999) documented adverse effects on population densities of breeding grassland and shrub-steppe birds in proximity to wind turbines. Displacement effects may range from approximately 250 to 2,600 feet (75 to 800 meters) away from wind turbines (Leddy et al. 1999; Strickland 2004). Despite conservation measures identified in the ECP, Appendix K (see Attachment A), or in the Phase I BBCS, Appendix I (see Attachment B), to limit impacts on birds, many of the impacts on passerines are unavoidable as a result of operation. Impacts on passerines from disruption and displacement due to operation of the CCSM Phase I Project are probable and would be moderate in magnitude and long-term in duration, but limited to local in extent (see Table 3-23 for definitions of impact criteria).

Raptors (Other than Eagles)

Direct impacts on raptors from operation of the CCSM Phase I Project would include collisions with wind turbines and other potential collisions with overhead power lines, meteorological and communication towers, buildings, and operation vehicles on roadways. Erickson et al. (2014) reported that raptors comprised 10.4 percent of all bird fatalities and Johnson and Stephens (2011) reported that raptors comprised 19.4 percent of all bird fatalities from two samples of U.S. and Canadian wind energy facilities. Using these two estimates as a proportion of total bird fatalities (that is, 10.4 percent of 3,150 and 19.4 percent of 5,400) produces a range of 328 to 1,048 raptor fatalities per year. However, this represents a very rough estimate of fatalities, and is not based on modeled projections. As with the estimate provided for all bird species above we suspect this estimate for raptors is an over-estimate. There are several limitations with these fatality estimates, including (1) a limited number of existing wind energy facilities with publically available bird mortality data (most United States wind energy facilities do not monitor and report bird mortalities post-construction), (2) inconsistency in monitoring survey protocols used for wind facilities that

do report bird mortality data and make it available, and (3) failure to distinguish mortalities that were incidental finds versus those found during systematic searches, (4) some studies corrected for incomplete searches of plots while others failed to do this, (5) use of different statistical estimators to generate mortality rates for the studies, and (6) inappropriate comparisons that are made across different habitat types and at different facilities.. However, as the literature on wind energy impacts on raptors is limited, these estimates are the best available to us at this time.

In general, American kestrel, red-tailed hawk, and northern harrier are at greatest risk for collision with wind turbines because they are the most common non-eagle raptors in the Phase I development and infrastructure areas, based on pre-construction surveys (Johnson et al. 2008, 2009; Johnson, Rintz, and Strickland 2008a; SWCA 2011, 2012a, 2013a, 2014i). Raptors as a group are at higher risk for population level impacts from wind energy development than other avian families (Beston et al. 2016). However, there are important characteristics of local raptor behavior, in concert with the topography and landscape, that could increase or decrease collision potential for certain species. PCW took into account observed behavior for all raptors, including eagles, in numerous design modifications to avoid or reduce impacts.

Overhead power lines would create additional risks for raptors, and collisions would likely occur as a result of operation of the CCSM Phase I Project. A greater threat to raptors from power lines is electrocution. As stated above, large raptors are more susceptible to electrocution because they are capable of bridging a connection between different phases or between hot and grounded wires (Harness and Wilson 2001; Lehman et al. 2007). Given PCW's commitment to construct new power poles and substations following APLIC guidelines, the risk of electrocution of raptors would be greatly reduced, but some threat of electrocution would remain. Raptors may also collide with meteorological towers or operation vehicles. However, because meteorological towers would not be supported by guy wires, collisions are unlikely. Overall, injuries and fatalities to non-eagle raptors are probable, would be long-term in duration, limited in extent, and would have a major impact on the species group (see Table 3-23 for definitions of impact criteria).

During operation of the CCSM Phase I Project, the impacts on raptors from habitat loss, alteration, and fragmentation would carry over, but possibly to a lesser degree following reclamation of initial clearing and grading areas. The presence of turbines, power lines, and other infrastructure is not expected to result in substantial raptor avoidance. Some studies have indicated that displacement of raptors near wind turbines is negligible (de Lucas et al. 2004; Hoover and Morrison 2005; Madders and Whitfield 2006). In fact, the presence of overhead power lines and power poles may attract raptors for perching and nesting opportunities (Ritchie 1991). However, this would lead to increased exposure to power lines and may increase the potential for collision, for electrocution, or even for nests to catch fire. Actual perching and nesting use would be dependent on the specific avian protection measures and design features implemented by PCW. Although habitat quality may be reduced, hunting opportunities may improve where small mammals use modified areas for burrows (Smallwood and Thelander 2004). It is probable that non-eagle raptors would experience moderate impacts due to continued effects from habitat loss, degradation, and fragmentation; and disruption and displacement as a result of operation of the CCSM Phase I

Project. These impacts would be long-term in duration, but limited to local in extent (see Table 3-23 for definitions of impact criteria).

Special Status Bird Species

Birds of Conservation Concern

In general, the potential impacts on BCCs from operation of the CCSM Phase I Project are similar to impacts described above for other bird species. However, these species do exhibit some unique ecological characteristics, or their populations are uniquely at risk, which warrants additional protection measures that set them apart from other species.

Waterbirds, Waterfowl, and Shorebirds

Impacts on horned grebes and marbled godwit from operation of the CCSM Phase I Project would be similar to impacts on other waterbirds and shorebirds discussed above. Given the relatively low abundance of horned grebes and marbled godwit within the Phase I development area, direct injury and fatality are possible and would be long-term in duration, moderate in magnitude, and limited in extent (see Table 3-23 for definitions of impact criteria). Minor impacts on these species from increased erosion, sedimentation, chemical spills, or other habitat degradation would be unlikely, but would be long-term in duration and regional in extent if it were to occur (see Table 3-23).

Operation of the CCSM Phase I Project would not result in additional impacts on mountain plover potential habitat, but could include continued impacts from habitat loss, alteration, and fragmentation carried over from construction. Long-term monitoring of mountain plovers at Foote Creek Rim wind energy facility showed a reduction in population and some displacement, followed by a slow increase during operation, although these results may be confounded by regional population trends. Some mountain plover nests were located within 75 meters of turbines at Foote Creek Rim, and many of those nests were successful (Young et al. 2005a, as cited in Naugle et al. 2011). Shorebird collisions with turbines appear to be rare, accounting for only 1 percent of fatalities in a review of U.S. and Canadian wind energy facilities (Erickson et al. 2014). Nonetheless, there is a potential for mountain plovers to collide with wind turbines, operation vehicles, meteorological and communication towers, or other buildings and structures.

Shorebird collisions with overhead power lines are more common than with turbines (Loss et al. 2014a), but are largely dependent on the habitat surrounding the power line. PCW's conservation measures intended to avoid and minimize impacts on numerous bird species, including mountain plovers, would reduce the potential for impacts. Impacts from habitat loss, degradation, and fragmentation, as well as disruption and displacement, of mountain plovers due to operation of the CCSM Phase I Project are probable, while direct impacts from injury or fatality are possible. We expect all impacts on mountain plovers from operation of the CCSM Phase I Project to be moderate in magnitude, long-term in duration, and limited to local in extent (see Table 3-23 for definitions of impact criteria).

Passerines

Impacts on the McCown's longspur would be similar to impacts on other passerines, as discussed above, if they were to occur. However, McCown's longspurs were not observed during baseline avian studies; therefore, impacts from operation of the CCSM Phase I Project would be unlikely.

Much the same as other passerines, BCC-listed passerines would be impacted by the continuation of habitat loss, degradation, and fragmentation; and displacement and disruption carried over from construction. The increased presence of nest predators would also persist throughout operation. As for other passerines, impacts on habitat and increased nest predation risk are probable and would be moderate in magnitude, limited to local in extent, and long-term in duration (see Table 3-23 for definitions of impact criteria).

BCC-listed passerines would likely comprise some of the expected injuries and fatalities to passerines due to operation of the CCSM Phase I Project. Injuries and fatalities to BCC-listed passerines due to operation of the CCSM Phase I Project are probable and would be major in magnitude, limited in extent, and long-term in duration (see Table 3-23 for definitions of impact criteria).

Raptors

Ferruginous hawks may collide with turbines, overhead power lines, meteorological towers, or vehicles, or they could be electrocuted at power poles associated with operation of the CCSM Phase I Project. Ferruginous hawks accounted for 7 percent of raptor fatalities at wind facilities in the Columbia Plateau Ecoregion of Washington and Oregon (Johnson and Erickson 2008). Because ferruginous hawks are relatively rare in the Phase I development and infrastructure areas and because we do not expect their abundance to increase during operation of the CCSM Phase I Project, ferruginous hawk fatalities are unlikely and impacts would be minor in magnitude. However, given the small regional population size and low survival rate of ferruginous hawks, even relatively low fatality rates may have compounded effects on the larger population. As such, direct injury and fatality to ferruginous hawks would have long-term and regional impacts (see Table 3-23 for definitions of impact criteria). Operation of the CCSM Phase I Project would not result in additional impacts on ferruginous hawk potential habitat, but could include continued impacts from habitat loss and fragmentation carried over from construction. It is unlikely that ferruginous hawks would be affected by habitat loss, alteration, fragmentation or displacement and disruption due to operation of the CCSM Phase I Project. However, were impacts to occur, they would be minor in magnitude and limited to local in extent, but long-term in duration (see Table 3-23).

Prairie falcons are relatively common within the Phase I development and infrastructure areas. Available literature suggests this species is less prone to collision fatalities at wind facilities. Loss et al. (2013) reported only one prairie falcon fatality at a wind energy facility, and three fatalities were recorded at the Altamont Pass Wind Resource Area between 1998 and 2003 (Smallwood and Thelander 2004). Being a smaller raptor, the prairie falcon is less prone to electrocution at power lines than larger birds. Although injury or fatality of prairie falcons may be less likely than injury or fatality of some other raptor species, fatality rates

may be higher due to their relative abundance in the Phase I development and infrastructure areas. Direct impacts from collisions with wind turbines or other infrastructure are probable and would be major in magnitude, long-term in duration, and limited in extent (see Table 3-23 for definitions of impact criteria). Indirect impacts such as habitat loss, degradation, and fragmentation; and disruption and displacement would carry forward from construction and are probable, moderate in magnitude, long-term in duration, and limited to local in extent (see Table 3-23).

Peregrine falcons are relatively rare in the CCSM Phase I Project area, and injuries or fatalities due to collisions with turbines are unlikely. Loss et al. (2013) reported two peregrine falcon fatalities at wind facilities in the contiguous United States. Despite being unlikely, collisions with turbines or other infrastructure could occur, and the impact would be moderate in magnitude, long-term in duration, and limited in extent (see Table 3-23 for definitions of impact criteria). Indirect impacts on peregrine falcon foraging or nesting habitat from operation, including impacts on their prey base, located outside the CCSM Phase I Project area, would be unlikely. However, were impacts to occur, they would be minor in magnitude, long-term in duration, and limited to local in extent (see Table 3-23).

Impacts on short-eared owls from operation of the CCSM Phase I Project would be similar to impacts on other raptors, as described above. However, because short-eared owls have not been observed in the Phase I development and infrastructure areas, impacts are unlikely. Suitable nesting and foraging habitat for short-eared owls does exist throughout the area, and the species may occur in low numbers in the future. Other wind energy developments with higher populations of short-eared owls have seen relatively high levels of mortality. Short-eared owls were the third most common raptor fatality in the Columbia Plateau Ecoregion, representing 12.3 percent of all raptor fatalities due to collision with wind turbines (Johnson and Erickson 2008). Loss et al. (2013) reported 10 short-eared owl fatalities at 6 different facilities in the contiguous United States. Although it is unlikely that direct or indirect impacts on short-eared owls would occur as a result of operation of the CCSM Phase I Project, were they to occur, they would be moderate in magnitude, long-term in duration, and limited in extent (see Table 3-23 for definitions of impact criteria).

Operation of the CCSM Phase I Project would not result in additional impacts on burrowing owl potential habitat, but could include continued impacts from habitat loss and fragmentation from construction. Roads, turbine pads, and other areas of loose soil may continue to provide suitable nesting areas for burrowing owls or could provide habitat for burrowing owl prey, such as small mammals. Research from the Altamont Pass Wind Resource Area in California suggests that owls collide with wind turbines more often in areas where owl burrows are more numerous, and owl burrows are positively associated with ground squirrel burrows and prairie dog colonies (Smallwood et al. 2007). Burrowing owls were observed near the Phase I development and infrastructure areas during pre-construction surveys, and suitable nesting habitat was recorded, primarily throughout the Phase I Sierra Madre WDA. Given applicant-committed conservation measures outlined in Section 2.2.1.3.4, minor impacts on burrowing owls from operation of the CCSM Phase I Project are possible. These impacts would be limited to local in extent but long-term in duration (see Table 3-23 for definitions of impact criteria).

Species of Greatest Conservation Need

Waterbirds, Waterfowl, and Shorebirds

Impacts on SGCN-listed waterbirds, waterfowl, and shorebirds would be similar to impacts described above for other waterbirds, waterfowl, and shorebirds. The 10 SGCN-listed waterbird, waterfowl, and shorebird species are relatively uncommon in the Phase I development and infrastructure areas, but could occur during transit between waterbodies or during migration. Collisions with wind turbines and power lines are possible because waterbirds, waterfowl, and shorebirds generally have larger bodies and smaller wings, which reduce aerial agility (Kingsley and Whittam 2005). Direct injuries or fatalities of these species due to operation are possible and would be moderate in magnitude, long-term in duration, and limited in extent (see Table 3-23 for definitions of impact criteria). Impacts on waterbird habitat from erosion, impervious surfaces, or sedimentation are unlikely, given the applicant-committed measures to limit and control spills and erosion. Should such impacts occur, they would be minor in magnitude, but long-term in duration and regional in extent (see Table 3-23).

Passerines

Impacts on SGCN-listed passerines would be similar to those described above for other passerines. Injuries and fatalities to Brewer's sparrows and lark buntings from collisions with turbines, meteorological or communication towers, operation vehicles, and other buildings or infrastructure are probable. Brewer's sparrows are one of the more common passerines observed during baseline avian studies in the Phase I development and infrastructure areas (Johnson et al. 2009), and therefore could experience relatively high levels of fatality. Loss et al. (2013) recorded four Brewer's sparrow fatalities and one lark bunting fatality within the contiguous United States. Because lark buntings occur in low numbers, impacts would be less likely, but would be amplified on these species were they to occur. Injuries and fatalities of both species are probable and would have a major impact on the regional populations of these species (see Table 3-23 for definitions of impact criteria). These impacts would be limited in extent and long-term in duration. Impacts of habitat loss, degradation, and fragmentation, as well as nest predation and nest parasitism on SGCN-listed passerines are probable, moderate in magnitude, and limited to local in extent, and would persist for the long-term (see Table 3-23).

Upland Game Birds

Wind turbines, overhead power lines, meteorological and communication towers, buildings, and operation vehicles may present a risk of collision for greater sage-grouse. As discussed above, conservation measures, including the use of meteorological towers without guy wires and project speed-limits, would minimize potential collisions with those features. Collisions with turbines and overhead power lines are also unlikely, but may occur where these features are located between foraging and resting habitats (Bevanger 1998; Johnson and Holloran 2010). Greater sage-grouse are poor flyers and are not as capable of avoiding unexpected obstacles (Bevanger 1998). One greater sage-grouse was found dead within 148 feet (45 meters) of a turbine on the Foote Creek Rim wind energy facility in south-central

Wyoming, presumably from flying into a turbine (Young, Erickson, et al., "Comparison of Avian," 2003). This was the only known greater sage-grouse mortality at this facility during 3 years of monitoring. Other mortalities have been recorded at three additional wind facilities in Wyoming (Johnson, Martinson, et al. 2010; Johnson, Rintz, et al. 2010), including one apparently resulting from a greater sage-grouse colliding with wires supporting a meteorological tower (Duke Energy 2010). It is important to note that many of the above references are not peer-reviewed, but represent the best available information for wind energy operation impacts on greater sage-grouse. Many wind development facilities are not monitored for avian fatalities, or monitoring is so infrequent that any fatalities may not be detected due to scavenging or decomposition (Johnson, Martinson, et al. 2010). Therefore, upland game bird mortalities from collisions with turbines or related infrastructure are likely to be underestimated and underreported. Although greater sage-grouse collisions with turbines or other infrastructure would be rare, they are possible and would be a long-term threat, but would have moderate impacts and would be limited in extent (see Table 3-23 for definitions of impact criteria).

Greater sage-grouse in the Phase I development and infrastructure areas would continue to experience detrimental impacts from habitat loss, alteration, and fragmentation from construction of the CCSM Phase I Project. The initial impacts from construction would decrease as reclamation progresses during operation and sagebrush habitat becomes available again, which may not occur within the proposed 30-year life of the project. However, the presence of wind turbines and overhead power lines would likely increase disruption and displacement of greater sage-grouse. Because greater sage-grouse evolved in habitats with little vertical structure, placement of tall man-made structures in their habitat may cause avoidance and may result in a decrease in habitat suitability (USFWS 2004; Pruett et al. 2009; Manier et al. 2014; Walters et al. 2014). If greater sage-grouse are displaced it is unknown whether populations may eventually become acclimated to elevated structures and return to the area. Overhead power lines also present an increased risk for wildlife on the landscape, and are a substantial risk to greater sage-grouse (USFWS 2004; Pruett et al. 2009; Manier et al. 2014; Walters et al. 2014). As such, it is probable that the loss, degradation, and fragmentation of greater sage-grouse habitat from wind turbines and overhead power lines would have an effect that is moderate in magnitude, local in extent, and long-term in duration (see Table 3-23 for definitions of impact criteria).

A recent study of greater sage-grouse in south-central Wyoming found that female greater sage-grouse survival did not differ based on distance to turbines, but they did identify a decrease in nest success and brood survival as proximity to turbines increases. Specifically, there was a 7.1 percent and 38.1 percent decrease in nest and brood failure, respectively, with every 1-kilometer increase in distance from the nearest turbine. The authors suspect that this was due to increased predation, a product of human development and habitat fragmentation (LeBeau et al. 2014). Slightly more wind-wildlife research was completed in the Midwest on other prairie grouse species that are ecologically similar. A study of greater prairie chickens in Kansas found that females avoided turbines, but rates of female survival did not change before and after development (Winder et al. 2014). Female survival may not be affected because consistent human activity is minimal in a wind energy facility and does not elicit continuous stress responses (Holloran 2005). Lek persistence was lower in proximity to turbines for greater prairie chickens in Kansas, and male body mass decreased following

wind energy facility construction (Winder et al. 2015). Male greater sage-grouse abundance at leks decreased and stress levels increased as a result of noise associated with oil and gas, and similar impacts are predicted due to noise from wind energy (Blickley et al. 2012; Blickley, Blackwood, and Patricelli 2012).

Johnson et al. (2011) documented negative trends in lek counts within about 12 miles of overhead power lines. Johnson (2009, as cited in Johnson and Holloran 2010) conducted an extensive review of literature on power line impacts on greater sage-grouse and found that although the response of greater sage-grouse to power lines varies widely, population-level impacts could occur out to 3 miles from power lines, with one study showing lek attendance decreases out to 5 miles. Prairie grouse in Oklahoma did not perceive highways as barriers, but avoided power lines, likely due to the vertical structure of the power poles (Pruett et al. 2009).

PCW has committed to numerous conservation measures intended to minimize and avoid impacts on greater sage-grouse. PCW has also committed to work cooperatively with BLM and WGFD to continue to monitor sage-grouse populations for 5 years post-construction, including continuation of the GPS telemetry study. The monitoring will be used to assess impacts on greater sage-grouse from construction and operation of the CCSM Phase I Project. These measures are discussed in Section 2.2.1.4.2 and are outlined in PCW's sage-grouse conservation plan (PCW 2012). The conservation measures committed to by PCW in its sage-grouse conservation plan would be beneficial to greater sage-grouse, but they would not eliminate the impacts from construction and operation of the CCSM Phase I Project.

BLM environmental constraints applicable to construction and operation of the CCSM Phase I Project are consistent with greater sage-grouse conservation plans, including the Approved Resource Management Plan Amendment, which have been determined to be protective at a range-wide and population level. These constraints include measures that apply the highest levels of protection to designated core area habitats, or Priority Habitat Management Areas, and minimize impacts on other greater sage-grouse habitat, including General Habitat Management Areas. For example, BLM environmental constraints prohibit surface use within 0.25 mile of sage-grouse leks. BLM measures also identify management actions intended to reduce the risk of rangeland fire by reducing the spread of invasive cheatgrass. Finally, coordinated monitoring and evaluation of species and habitat changes lend information to an adaptive-management framework to ensure overall conservation of the species (80 FR 59857-59942, October 2, 2015).

Recent studies suggest that prohibition of surface use within 0.25 mile of known leks may not prevent impacts on greater sage-grouse, even if surface use is outside core population areas (LeBeau et al. 2014; Manier et al. 2014). LeBeau et al. (2014) and Manier et al. (2014) recommend buffers on the order of 3 to 5 miles from leks which are approximate to the local extent defined in Table 3-23 and the buffer distance commonly used around active leks by the BLM (BLM 2015a). There are 29 leks within 4 miles of Phase I development areas, and the available data suggest that nest and brood failure in this area would increase above normal or background levels (LeBeau et al. 2014). Infrastructure such as turbines located less than 4 miles from a lek may result in reduced attendance or in some cases even abandonment of the lek, with impacts likely greater as distances decrease. Some leks in core areas are

located within 4 miles of infrastructure. Post-construction bird and bat fatality monitoring would increase the levels of disruption and displacement during at least the first 24 months of operation. The direct impacts of displacement to greater sage-grouse, particularly at lek sites within and near the Phase I development and infrastructure areas, would be probable as a result of operation of the CCSM Phase I Project (see Table 3-23 for definitions of impact criteria). These impacts would be long-term in duration, local in extent, and have a major impact on the local greater sage-grouse population (see Table 3-23).

As discussed in Section 3.7.3.2.1, an exception to the avoidance measures would be required for the Deadman Creek South lek. PCW has committed to conduct all non-critical operation and maintenance activities that require the use of the road located within 0.25 mile of Deadman Creek South lek before March 1 or after May 20. Any critical, non-emergency, operation or maintenance activities required between March 1 and May 20 would be completed between the hours of 9:00 a.m. and 6:00 p.m. Critical operation and maintenance activities may include, but are not limited to: unscheduled maintenance of wind turbines and electrical components; road, culvert, and erosion control repair; disabled vehicle repair or removal; and application of dust suppression.

Conservation measures to prevent noxious plant invasion will be required by BLM's permit conditions. We acknowledge that despite application of BMPs, the introduction of weeds in the Phase I development and infrastructure areas remains possible within and near surface modification. The effects of increased predation on greater sage-grouse would be probable and an increase in noxious weeds would be possible throughout operation (see Table 3-23 for definitions of impact criteria). Increased predation would have a moderate impact on greater sage-grouse at the local extent, while invasive plants would have a minor impact at the limited extent because conservation measures would have some success in preventing and controlling the spread of noxious and invasive plants. Both increased predation and noxious weed invasion would persist for the long-term (see Table 3-23).

Raptors

Swainson's hawks, northern goshawks, and merlins may collide with turbines, overhead power lines, meteorological towers, or vehicles, or they could be electrocuted at power poles associated with operation of the CCSM Phase I Project. Swainson's hawks accounted for 5.3 percent of raptor fatalities at wind facilities in the Columbia Plateau Ecoregion of Washington and Oregon (Johnson and Erickson 2008). Loss et al. (2013) reported 12 Swainson's hawk fatalities at 4 facilities, 3 merlin fatalities at 3 facilities, and zero northern goshawk fatalities in the contiguous U.S. Swainson's hawks were identified by Beston et al. (2016) as one of the highest priority species due to potential risk for population level impacts from wind energy development. Although all three species are relatively rare in the Phase I development and infrastructure areas, collisions with wind turbines or other infrastructure are possible (see Table 3-23 for definitions of impact criteria). Direct injury and fatality of SGCN-listed raptors would have long-term, regional impacts that would be moderate in magnitude (see Table 3-23). Operation of the CCSM Phase I Project would not result in additional impacts on SGCN-listed habitat, but could include continued impacts from habitat loss and fragmentation carried over from construction. It is unlikely that these species would be affected by habitat loss and alteration, or disruption due to operation of the CCSM Phase I

Project. However, were impacts to occur, they would be minor in magnitude and limited to local in extent, but long-term in duration (see Table 3-23).

Compensatory Mitigation

PCW has proposed to retrofit high-risk power poles at off-site locations as compensatory mitigation for predicted eagle fatalities associated with the CCSM Phase I Project (see Section 2.2.1.4.5). In general, this mitigation would be beneficial to raptors that may roost on power poles, but would likely have only minor benefit to other birds. Minor and temporary construction activities to retrofit poles could result in short-term avoidance or displacement by birds. Power pole retrofits could also indirectly benefit most of the greater avian community through protection of apex predators at approximately current population levels. Specifically, impacts on passerines, burrowing owls, and mountain plovers from power pole retrofits would likely be negligible, resulting in a finding of no effect. Waterbirds and greater sage-grouse may experience minor increases in predation. If increases in predation were to occur, they would be long-term, and could be extensive, depending where retrofits occurred. Large raptor species, including ferruginous hawks, could experience minor to moderate benefits from a reduction in electrocution rates and increased survival. Such benefits would be long-term and extensive. The likelihood of these benefits would be probable for raptors in general but only possible for ferruginous hawks because of their lower population in the vicinity of the CCSM Phase I Project (see Table 3-23 for definitions of impact criteria).

Summary of Operation Impacts Under Alternative 1

Under Alternative 1 (Proposed Action), operation of the CCSM Phase I Project would result in the following impacts on birds (other than eagles) (see Table 3-23 for definitions of impact criteria):

- We roughly estimate between 3,150 and 5,400 bird fatalities could occur annually due to collision with operating wind turbines. However, these numbers are subject to numerous biases and limitations which are described in detail throughout Section 3.7.3.
- We estimate roughly, based on proportions of total bird fatalities, that annual fatalities due to the CCSM Phase I Project would be between 186 and 329 for waterbirds, waterfowl, and shorebirds; between 1,868 and 3,375 for passerines; and between 328 and 1,048 for raptors. These estimates are not based on modeled projections and there is substantial uncertainty in these estimates, as described above. Again, the limitations of the estimates are described throughout Section 3.7.3.
- Additional fatalities may occur due to collisions with overhead power lines, meteorological or communication towers, buildings, or maintenance vehicles. Electrocution of birds, particularly large raptors, could occur at overhead power poles.
- Impacts from habitat loss, alteration, and fragmentation would continue during operation. Some of this habitat would be restored over time; however, for certain habitats such as sagebrush steppe, restoration may take many years. Eventually, 850 acres of habitat loss would persist for the life of the project.

- Displacement and disruption of birds from foraging or nesting areas could occur due to operation of wind turbines and other operation activities. Greater sage-grouse would be affected the most from disruption and displacement due to operation, which would result in probable, major, long-term, and local impacts on the greater sage-grouse population.
- Increased levels of nest predation and parasitism could continue during operation due to surface modification and human activity.
- Compensatory mitigation would benefit primarily large raptors, and would have less benefit to other birds.

3.7.3.3 Alternative 2 – Proposed Action with Different Mitigation

Under Alternative 2, the Phase I development and infrastructure areas would be developed as proposed by PCW, but the compensatory mitigation for golden eagle take would be different. Instead of PCW's proposed power pole retrofits, we would require different compensatory mitigation, as described in Section 2.2.2. The compensatory mitigation options and their potential environmental consequences to birds, other than eagles, are discussed below.

3.7.3.3.1 Construction

Under Alternative 2 (Proposed Action with Different Mitigation), the Phase I Chokecherry and Phase I Sierra Madre WDAs would be developed as proposed by PCW, but the compensatory mitigation for golden eagle take would be different than that described in PCW's ETP application. Construction impacts on birds (other than eagles) would be consistent with those described under Alternative 1 (Proposed Action) in Section 3.7.3.2.1.

3.7.3.3.2 Operation

Under Alternative 2 (Proposed Action with Different Mitigation), predicted operation impacts on golden eagles described in Section 3.7.3.2.2 would be mitigated by one or more compensatory mitigation options, as discussed in Section 2.2.2.1. The impacts from operation of the CCSM Phase I Project would be identical to those described under Alternative 1 (Proposed Action), except for the compensatory mitigation.

In general, compensatory mitigation measures to increase survival and abundance of golden eagles would also likely benefit other raptors to varying degrees, and migratory birds. The more similar the physiology, behavior, and ecology of other raptors to golden eagles, the more likely those species would experience beneficial impacts. Actions that increase golden eagle abundance may result in minor, local increases in predation of waterbirds, waterfowl, shorebirds, greater sage-grouse, and some passerine species. However, because the mitigation would offset the fatality of golden eagles from the CCSM Phase I Project, impacts would generally be widespread and minor.

Waterbirds, Waterfowl, and Shorebirds

Compensatory mitigation measures that include carcass removal, carcass avoidance, lead abatement, and rehabilitation of injured eagles would not likely affect waterbirds, waterfowl, or shorebirds.

Mitigation of Existing Wind Facilities

The daytime curtailment and decommissioning of existing wind turbines could reduce potential impacts on waterbirds, waterfowl, and shorebirds. The magnitude of the benefit from this mitigation option would be dependent on the location and number of turbines mitigated and the presence or absence of waterbird, waterfowl, and shorebird habitat or migration routes. Although waterbirds, waterfowl, and shorebirds may avoid areas during implementation of this mitigation option due to human activity, this would be minor in magnitude and temporary in duration (see Table 3-23 for definitions of impact criteria). As compared to the mitigation proposed under Alternative 1, the mitigation of existing wind facilities would likely be more beneficial to waterbirds. It is possible that the mitigation of existing wind facilities could have minor beneficial impacts on waterbirds, waterfowl, and shorebirds that are long-term in duration and occur across an extensive area (see Table 3-23).

Wind Conservation Easements

Establishing a wind conservation easement could prevent future potential injuries and fatalities of waterbirds, waterfowl, and shorebirds due to operation of wind turbines, overhead power lines, meteorological and communication towers, buildings, and operation vehicles. However, it would not necessarily protect waterbirds, waterfowl, and shorebirds from other land uses. The exact location of the easement and amount of suitable habitat for waterbirds, waterfowl, and shorebirds in that area would determine the extent to which this easement could prevent future impacts. As compared to the mitigation proposed under Alternative 1, a wind conservation easement would be more beneficial to waterbirds, waterfowl, and shorebirds. It is probable that a wind conservation easement could have moderate beneficial impacts on waterbirds, waterfowl, and shorebirds that are long-term in duration and regional in extent (see Table 3-23 for definitions of impact criteria).

Habitat Enhancement

Habitat enhancements and modifications designed to improve golden eagle habitat and increase prey availability could also indirectly benefit waterbirds, waterfowl, and shorebirds. Habitat enhancement would likely include measures to reduce existing cover and spread of noxious weeds and invasive plant species. Habitat enhancement projects could include restoring altered, burned, or overgrazed areas with native vegetation communities. Projects to restore woody riparian habitat for eagles could also be selected. Conservation easements, increases in prey availability, and vegetation improvements could also indirectly maintain or enhance waterbird habitat quality. As compared to the mitigation proposed under Alternative 1, habitat enhancements would be more beneficial to waterbirds, waterfowl, and shorebirds. It is probable that habitat enhancements could have minor beneficial impacts on

waterbirds, waterfowl, and shorebirds that are long-term in duration and occur over an extensive area (see Table 3-23 for definitions of impact criteria).

Passerines

The rehabilitation of injured eagles would not affect passerines, but all other compensatory mitigation options could result in beneficial effects on passerines.

Mitigation of Existing Wind Facilities

The mitigation of existing wind facilities could result in both adverse and beneficial impacts on passerines. Increasing the blade size and turbine hazardous area (that is, the cylindrical volume around a turbine from ground level to a height of 650 feet [200 meters]) for each turbine could put a greater number of passerines at risk and could result in additional passerine fatalities. However, if a single newer model turbine replaced more than one older model turbine, there would be a net decrease in the turbine hazardous area, and this could be a benefit to passerines. The decommissioning of existing wind energy developments and daytime curtailment of turbines could reduce the number of passerine collision fatalities (Arnett and May 2016). Although passerines may avoid areas during implementation of this mitigation option due to human activity, this would be minor in magnitude and temporary in duration (see Table 3-23 for definitions of impact criteria). As compared to the mitigation proposed under Alternative 1 (Proposed Action), the mitigation of existing wind facilities would be more beneficial to passerines. It is probable that the mitigation of existing wind facilities could have minor beneficial impacts on passerines that are long-term in duration and occur over an extensive area (see Table 3-23).

Lead Abatement, Carcass Removal and Carcass Avoidance

The lead abatement, carcass removal and carcass avoidance mitigation options could benefit carrion-feeding passerines, such as corvids (that is, crows, ravens, jays, and magpies), and even some non-corvids (such as starlings or larks) to a lesser degree, by reducing the potential exposure to lead shot and reducing the number of bird-vehicle collisions. Loss et al. (2014b) found that at a national level, crows, gray jays, magpies, and starlings each comprised at least 5 percent of recorded bird-vehicle collision fatalities. It is probable that lead abatement, carcass removal or carcass avoidance mitigation measures would result in minor beneficial impacts on passerines that are long-term in duration and regional in extent (see Table 3-23 for definitions of impact criteria).

Wind Conservation Easements

Establishing a wind conservation easement would prevent future potential injuries and fatalities of passerines due to operation of wind turbines, overhead power lines, meteorological towers and communication towers, buildings, and operation vehicles. However, it would not necessarily protect passerines from effects of other land uses not excluded in such easements. The exact location of the easement and amount of suitable habitat for passerines in that area would determine the extent to which the easement would prevent future impacts. We expect the number of passerines and amount of suitable passerine habitat protected would be similar to the number and amount put at risk by the CCSM Phase

I Project. As compared to the mitigation proposed under Alternative 1 (Proposed Action), a wind conservation easement would be more beneficial to passerines. It is probable that a wind conservation easement could have moderate beneficial impacts on passerines that are long-term in duration and occur over a regional extent (see Table 3-23 for definitions of impact criteria).

Habitat Enhancement

Habitat enhancements and modifications designed to improve eagle habitat and increase prey availability would also indirectly benefit passerines. Conservation easements, increases in prey availability, and sagebrush vegetation improvements, including prevention and removal of noxious or invasive weeds, could maintain or enhance passerine habitat quality. In particular, improvements to sagebrush-steppe habitat could benefit sagebrush-obligate passerines such as Brewer's sparrow, sage thrasher, and sagebrush sparrow, which are currently experiencing population declines (Sauer et al. 2008). As compared to the mitigation proposed under Alternative 1 (Proposed Action), habitat enhancements and modifications would be more beneficial to passerines. It is probable that habitat enhancements could have moderate beneficial impacts on passerines that are long-term in duration and occur over an extensive area (see Table 3-23 for definitions of impact criteria).

Raptors (Other than Eagles)

All of the possible compensatory mitigation options could benefit raptors, though the benefits would vary by species.

Mitigation of Existing Wind Facilities

The decommissioning of existing wind turbines or curtailment of turbines could reduce direct injury and fatality of raptors (Arnett and May 2016) at the locations where mitigation would occur. The use of anthropogenic perches by raptors varies by species, and so the benefits of this mitigation measure would also vary by species. Although raptors may avoid areas during implementation of this mitigation option due to human activity, this would be minor in magnitude and temporary in duration (see Table 3-23 for definitions of impact criteria). As compared to the mitigation proposed under Alternative 1 (Proposed Action), more non-eagle raptors would likely benefit from the mitigation of existing wind facilities than from power pole retrofits. It is probable that the mitigation of existing wind facilities could have major beneficial impacts on raptors (other than eagles) that are long-term in duration and occur over an extensive area (see Table 3-23).

Lead Abatement, Carcass Removal, and Carcass Avoidance

The lead abatement, carcass removal, and carcass avoidance mitigation options could benefit carrion-feeding raptors by reducing the number of birds affected by lead poisoning and reducing the number of raptor-vehicle collisions. In Wyoming, red-tailed hawks commonly feed on carrion. Swainson's hawks, ferruginous hawks (both discussed further below), rough-legged hawks, and vultures also feed on carrion opportunistically (Rodewald 2015). All other raptor species would not be affected by these mitigation options. As such, it is likely that there would be little difference between the mitigation proposed under Alternative 1

(Proposed Action), and the lead abatement, carcass removal, or carcass avoidance mitigation measures. It is probable that lead abatement, carcass removal, or carcass avoidance mitigation measures would result in moderate beneficial impacts on raptors (other than eagles) that are long-term in duration. Carcass removal and avoidance would occur over a regional extent, whereas lead abatement could occur across an extensive area (see Table 3-23 for definitions of impact criteria).

Wind Conservation Easement

Establishing a wind conservation easement could prevent future potential injuries and fatalities of raptors due to operation of wind turbines, overhead power lines, meteorological and communication towers, buildings, and operation vehicles. However, it would not necessarily protect raptors from the effects of other land uses not excluded in such easements. The exact location of the easement and amount of suitable habitat for raptors in that area would determine the extent to which the easement could prevent future impacts. As compared to the mitigation proposed under Alternative 1, a wind conservation easement would be more beneficial to all raptor species. It is probable that a wind conservation easement would result in major beneficial impacts on raptors that would be long-term in duration and occur over a regional extent (see Table 3-23 for definitions of impact criteria).

Habitat Enhancement

Habitat enhancements and modifications designed to improve golden eagle habitat and increase prey availability would also indirectly benefit other raptors. Conservation easements, increases in prey availability, and sagebrush vegetation improvements, including prevention and removal of noxious or invasive weeds, could also improve habitat and prey availability for other raptors. As compared to the mitigation proposed under Alternative 1 (Proposed Action), habitat enhancements and modifications would be more beneficial to raptors. It is probable that habitat enhancements would result in moderate beneficial impacts on raptors that are long-term in duration and occur over an extensive area (see Table 3-23 for definitions of impact criteria).

Rehabilitation of Injured Eagles

Increasing the number of golden eagles in the region that are rehabilitated and reintroduced to the wild would primarily benefit only golden eagles. However, if funds for eagle rehabilitation were provided to rehabilitation centers that also care for non-eagle raptors, there could be minor benefits to non-eagle raptors (see Table 3-23 for definitions of impact criteria). As compared to the mitigation proposed under Alternative 1 (Proposed Action), rehabilitation of injured golden eagles would likely be less beneficial to other raptors. It is unlikely that efforts to increase rehabilitation of golden eagles would affect other raptors. However, if rehabilitation efforts were extended to other raptors, the result could be minor beneficial impacts that are long-term in duration and occur over an extensive area (see Table 3-23).

Special Status Bird Species

Birds of Conservation Concern

In general, the potential impacts on BCCs from compensatory mitigation options are similar to impacts described above for other bird species. However, these species do exhibit some unique ecological characteristics and protection measures that set them apart from other species.

Waterbirds, Waterfowl, and Shorebirds

Compensatory mitigation options that include lead abatement, carcass removal, carcass avoidance, and rehabilitation of injured eagles would not affect BCC-listed waterbirds, waterfowl, and shorebirds.

Mitigation of Existing Wind Facilities

The daytime curtailment and decommissioning of existing wind turbines could reduce potential impacts on BCC-listed waterbirds and shorebirds. Although these species may avoid areas during implementation of this mitigation option due to human activity, this would be minor in magnitude and temporary in duration (see Table 3-23 for definitions of impact criteria). The magnitude of the benefit from this mitigation measure would be dependent on the location and number of turbines mitigated and the presence or absence of horned grebe, marbled godwit, or mountain plover habitat. However, as compared to the mitigation proposed under Alternative 1 (Proposed Action), the mitigation of existing wind facilities would be more beneficial to these species. It is possible that the mitigation of wind facilities could result in minor beneficial impacts on these species that are long-term in duration and occur over an extensive area (see Table 3-23).

Wind Conservation Easement

Establishing a wind conservation easement could prevent future potential injuries and fatalities of BCC-listed waterbirds and shorebirds due to operation of wind turbines, overhead power lines, meteorological and communication towers, buildings, and operation vehicles. However, it would not necessarily protect these species from the effects of other land uses not excluded by such easements. The exact location of the easement and amount of suitable habitat for mountain plovers in that area would determine the extent to which the easement could prevent future impacts. However, as compared to the mitigation proposed under Alternative 1 (Proposed Action), a wind conservation easement would be more beneficial to BCC-listed waterbirds and shorebirds. It is probable that a wind conservation easement could result in moderate beneficial impacts on these species that are long-term in duration and regional in extent (see Table 3-23 for definitions of impact criteria).

Habitat Enhancement

Habitat enhancements and modifications designed to improve eagle habitat and increase prey availability could also benefit BCC-listed waterbirds and shorebirds. Conservation easements, increases in prey availability, and sagebrush vegetation improvements, including

prevention and removal of noxious or invasive weeds, could also improve habitat for these species. The magnitude and extent of the benefits from habitat enhancements to are dependent on the location chosen and actions taken to improve habitat. As compared to the mitigation proposed under Alternative 1 (Proposed Action), habitat enhancements and modifications would be more beneficial to BCC-listed waterbirds and shorebirds. It is probable that habitat enhancements would have moderate beneficial impacts on these species that are long-term in duration and occur over an extensive area (see Table 3-23 for definitions of impact criteria).

Passerines

Compensatory mitigation options that include lead abatement, carcass removal, carcass avoidance, and rehabilitation of injured eagles would not affect most BCC-listed passerines. The mitigation of existing wind facilities, development of a wind conservation easement, and habitat enhancement would result in impacts on BBC-listed passerines identical to those described above for other passerines. That is, these mitigation options would result in minor to moderate beneficial impacts that are long-term in duration and occur over a regional extent or extensive area (see Table 3-23 for definitions of impact criteria). However, the loggerhead shrike is known to consume carrion (Yosef 1996); therefore, it may benefit from the lead abatement, carcass removal and carcass avoidance mitigation options similarly to other carrion-feeding passerines described above.

Raptors

The beneficial or detrimental impacts of the different compensatory mitigation options on BCC-listed raptor species would vary depending on the species. All of the potential compensatory mitigation options would benefit one or more BCC-listed raptor species, but the extent and nature of the benefits would vary by species.

Mitigation of Existing Wind Facilities

The decommissioning of existing wind turbines or curtailment of turbines could reduce direct injury and fatality of all five BCC-listed raptor species at the locations where mitigation would occur. The magnitude of the benefit from this mitigation measure would be dependent on the location and number of turbines mitigated and the presence or absence of BCC-listed raptor species habitat. Although all birds may avoid areas during implementation of this mitigation option due to human activity, this would be minor in magnitude and temporary in duration (see Table 3-23 for definitions of impact criteria). Compared to golden eagles, all of the BCC-listed raptors are electrocuted at power poles far less (Harness and Wilson 2001). Therefore, in comparison to the mitigation proposed under Alternative 1 (Proposed Action), the mitigation of existing wind facilities would be more beneficial to these species. It is probable that the mitigation of existing wind facilities would result in moderate beneficial impacts on BCC-listed raptors that are long-term in duration and occur over an extensive area (see Table 3-23).

Lead Abatement, Carcass Removal, and Carcass Avoidance

The lead abatement, carcass removal, and carcass avoidance mitigation options could benefit BCC-listed raptor species by reducing the number of birds affected by lead poisoning and reducing the number of raptor-vehicle collisions. Burrowing owls, prairie falcons, peregrine falcons, and short-eared owls rarely consume carrion and therefore would not likely benefit from this mitigation option (Poulin et al. 2011; Steenhof 2013; White et al. 2002; Wiggins et al. 2006). Ferruginous hawks will feed on carrion opportunistically (Bechard and Schmutz 1995), but not to the same extent as eagles. As such, ferruginous hawks would not benefit to the same extent that eagles would from these mitigation measures. Benefits from lead abatement, carcass removal, and the carcass avoidance mitigation options, compared to the mitigation proposed under Alternative 1 (Proposed Action), would be approximately similar for ferruginous hawks. It is possible that lead abatement, carcass removal, and carcass avoidance measures would result in minor beneficial impacts on ferruginous hawks that are long-term in duration (see Table 3-23 for definitions of impact criteria). Carcass removal and avoidance would occur over a regional extent, whereas lead abatement could occur across an extensive area (see Table 3-23).

Wind Conservation Easement

Establishing a wind conservation easement could prevent future potential injuries and fatalities of BCC-listed raptors due to operation of wind turbines, overhead power lines, meteorological and communication towers, buildings, and operation vehicles. However, it would not necessarily protect these species from the effects of other land uses no excluded by such easements. The exact location of the easement and amount of suitable habitat for each of these species in that area would determine the extent to which the easement might prevent future impacts. As compared to the mitigation proposed under Alternative 1 (Proposed Action), a wind conservation easement would be more beneficial to all BCC-listed species. It is probable that a wind conservation easement could result in moderate beneficial impacts on these species that are long-term in duration and regional in extent (see Table 3-23 for definitions of impact criteria).

Habitat Enhancement

Habitat enhancements and modifications designed to improve golden eagle habitat and increase prey availability could also benefit BCC-listed raptors. Conservation easements, increases in prey availability, and sagebrush vegetation improvements, including prevention and removal of noxious or invasive weeds, would also improve habitat and prey availability for BCC-listed raptors. As compared to the mitigation proposed under Alternative 1 (Proposed Action), habitat enhancements and modifications would be more beneficial to these species. It is probable that habitat enhancements could result in moderate beneficial impacts on BCC-listed raptors that are long-term in duration and occur over an extensive area (see Table 3-23 for definitions of impact criteria).

Rehabilitation of Injured Eagles

Increasing the number of golden eagles in the region that are rehabilitated and reintroduced to the wild would primarily benefit only golden eagles. However, if funds for eagle rehabilitation were provided to rehabilitation centers that also care for non-eagle raptors, there could be minor benefits to non-eagle raptors (see Table 3-23 for definitions of impact criteria). As compared to the mitigation proposed under Alternative 1 (Proposed Action), rehabilitation of injured golden eagles would be less beneficial to BCC-listed raptors. It is unlikely that efforts to increase rehabilitation of golden eagles would affect other raptors. However, if rehabilitation efforts were extended to other species, the result could be minor beneficial impacts that are long-term in duration and occur over an extensive area (see Table 3-23).

Species of Greatest Conservation Need

Waterbirds, Waterfowl, and Shorebirds

Compensatory mitigation measures that include carcass removal, carcass avoidance, lead abatement, and rehabilitation of injured eagles would not likely affect SGCN-listed waterbirds, waterfowl, or shorebirds. The mitigation of existing wind facilities, establishment of a wind conservation easement, and habitat enhancements could result in benefits to SGCN-listed waterbirds, waterfowl, and shorebirds identical to the benefits described above for other waterbirds, waterfowl, and shorebirds.

Passerines

Compensatory mitigation options that include lead abatement, carcass removal, carcass avoidance, and rehabilitation of injured eagles would not affect SGCN-listed passerines. The mitigation of existing wind facilities, development of a wind conservation easement, and habitat enhancement could result in impacts on SGCN-listed passerines identical to those described above for other passerines.

Upland Game Birds

Compensatory mitigation measures that include carcass removal, carcass avoidance, lead abatement measures, and rehabilitation of injured eagles would not likely affect greater sage-grouse. The mitigation of existing wind facilities, wind conservation easement, and habitat enhancement mitigation options could benefit greater sage-grouse.

Mitigation of Existing Wind Facilities

The mitigation of existing wind facilities, specifically the daytime curtailment and decommissioning of existing turbines, may result in minor beneficial impacts on greater sage-grouse by reducing the potential for collisions. The magnitude of the benefit would depend on the surrounding habitat, the existing greater sage-grouse communities present there, and other specific details of the mitigation methods. Although greater sage-grouse may avoid areas during implementation of this mitigation option due to human activity, this would be minor in magnitude and temporary in duration (see Table 3-23 for definitions of impact

criteria). As compared to the mitigation proposed under Alternative 1 (Proposed Action), the mitigation of existing wind facilities would be more beneficial to greater sage-grouse. It is possible that the mitigation of existing wind facilities could result in minor beneficial impacts on greater sage-grouse that would be long-term in duration and occur over an extensive area (see Table 3-23).

Wind Conservation Easement

Establishing a wind conservation easement could prevent future potential injuries and fatalities of greater sage-grouse due to collisions with wind turbines, overhead power lines, meteorological and communication towers, buildings, and operation vehicles. However, it would not necessarily protect greater sage-grouse from the effects of other land uses not excluded from such easements. The exact location of the easement and the amount and quality of habitat in that area would determine the extent to which the easement could prevent future impacts. As compared to the mitigation proposed under Alternative 1 (Proposed Action), the mitigation of existing wind facilities could be more beneficial to greater sage-grouse depending on the nature of the future land uses. It is possible that a wind conservation easement could result in moderate beneficial impacts on greater sage-grouse that are long-term in duration and occur over an extensive area (see Table 3-23 for definitions of impact criteria).

Habitat Enhancement

Habitat enhancements and modifications designed to improve golden eagle habitat and increase prey availability could also benefit greater sage-grouse. Conservation easements, increases in prey availability, and sagebrush vegetation improvements, including prevention and removal of noxious or invasive weeds, could maintain or enhance habitat quality. In particular, improvements to sagebrush-steppe habitat could directly benefit greater sage-grouse. An unintended consequence of this mitigation measure could be increased predation by eagles on greater sage-grouse. Although local predation rates may increase, regional predation rates would likely stay about the same. As compared to the mitigation proposed under Alternative 1 (Proposed Action), habitat enhancements and modifications would be more beneficial to greater sage-grouse. It is probable that habitat enhancements could result in moderate beneficial impacts on greater sage-grouse that are long-term in duration and occur over an extensive area (see Table 3-23 for definitions of impact criteria).

Raptors

All of the alternative compensatory mitigation options would benefit Swainson's hawks, northern goshawks, and merlins. The magnitude, duration, potential to occur, and extent of benefits would be similar to those described above for other raptor species.

3.7.3.3.3 Summary of Construction and Operation Impacts Under Alternative 2

Alternative compensatory mitigation options that would remove carcasses, avoid carcasses, or reduce the use of lead during hunting would benefit primarily carcass-feeding birds, but have little effect on other birds. Increased funding for rehabilitation of injured eagles would benefit only eagles, unless funds were also distributed for the rehabilitation of other birds.

Habitat enhancements and the mitigation of existing wind facilities would provide either minor or moderate benefits to all birds that are long-term in duration (see Table 3-23 for definitions of impact criteria). A wind conservation easement could provide the greatest benefit to the most bird species by preventing future injuries or fatalities due to a wind energy facility. As all mitigation options are designed to increase off-site eagle populations, predation by eagles on other bird species (including greater sage-grouse) may increase in those areas. However, the detrimental effects on these species would be minor in magnitude (see Table 3-23).

3.7.3.4 Alternative 3 – Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project

Under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), only the Phase I Sierra Madre WDA and the associated infrastructure components would be developed as proposed by PCW. This alternative would result in impacts on birds (other than eagles) as described in Section 3.7.3.2 under Alternative 1 (Proposed Action), except impacts associated with construction and operation of the Chokecherry WDA would not occur.

3.7.3.4.1 Construction

The types of direct and indirect impacts on birds (other than eagles) that would occur during construction would not differ between the Proposed Action and Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project). Construction of the Phase I Sierra Madre WDA and infrastructure components would result in the temporary loss of up to 3,262 acres of bird habitat. This would be 1,203 acres less than under the Proposed Action, or a reduction of approximately 27 percent.

Impacts on waterbirds, waterfowl, shorebirds, upland game birds, burrowing owls, mountain plovers, and ferruginous hawks from construction under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would be less than those under Alternative 1 (Proposed Action), but the impact findings remain the same.

For passerines, the potential for injury and fatality from construction under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would be less than those under Alternative 1 (Proposed Action), but the impact findings remain the same.

Construction activities may disrupt or displace nesting raptors within or near the Phase I Sierra Madre WDA. There are seven occupied raptor nests within 1 mile of the Phase I development and infrastructure areas under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), as compared to 14 under Alternative 1 (Proposed Action). Overall, the impacts from construction under Alternative 3 would be less than the impacts under Alternative 1, but the impact findings remain the same.

Construction activities, in addition to impacts from habitat alteration and fragmentation, may disrupt or displace greater sage-grouse at lek sites or in nesting habitat. There are 8 greater sage-grouse leks within 1 mile and 28 within 4 miles of Phase I development and infrastructure associated with Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of

the CCSM Phase I Project) (including two leks within the boundaries of the Phase I Sierra Madre WDA), which is only slightly fewer than under Alternative 1 (Proposed Action). In addition, the Phase I Sierra Madre WDA is surrounded on three sides by South Rawlins greater sage-grouse core population area (see Figure 3-15). The impacts from construction under Alternative 3 would be slightly less than the impacts under Alternative 1, but because of the greater sage-grouse activity in and near the Phase I Sierra Madre WDA, the impact findings remain the same.

The intensity of impacts on mountain plovers would be less under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) as compared to the impacts under Alternative 1 (Proposed Action), , but the impact findings remain the same.

3.7.3.4.2 Operation

The types of direct and indirect impacts on birds (other than eagles) that would occur during operation would not differ between Alternative 1 (Proposed Action) and Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project). However, the magnitude of these impacts would be less under Alternative 3. Under Alternative 3, a total of 298 turbines (approximately 894 MW) would be developed in the Phase I Sierra Madre WDA, which is 202 fewer wind turbines than the Proposed Action, or a reduction of about 40 percent. Applying the same annual bird fatality rate estimate described in Section 3.7.3.2.2 (95 percent confidence interval = 2.1 – 3.6 birds per MW per year), we estimate roughly 1,890 to 3,240 annual bird fatalities would result from Alternative 3. All of the caveats discussed in Section 3.7.3.2.2 also apply to this estimate. Despite these limitations, the data represent our best available estimates of bird mortality associated with United States wind energy facilities. This estimate is based on an assumption that the risk of avian collision is equal for all wind turbines, hence the risk for injury and fatality is 40 percent lower. However, it is unlikely that all proposed wind turbines would have the same mortality risk to birds, but given the available information we are unable to quantify risk by turbine or WDA.

Long-term habitat loss would total about 658 acres, and is about 192 acres (about 22 percent) less than the proposed project. From a landscape perspective, restricting surface modification to one area rather than two would reduce edge effects and limit the direct and indirect impacts on all birds (Jones et al. 2015). The change in expected impacts due to operation of the CCSM Phase I Project under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) as compared to the impacts under Alternative 1 (Proposed Action) is discussed below separately for waterbirds, waterfowl, and shorebirds; passerines; upland game birds; raptors; and special status bird species.

Waterbirds, Waterfowl, and Shorebirds

Under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), as under Alternative 1 (Proposed Action), there would be no direct loss of waterbird habitat nor would disruption or displacement of waterbirds, waterfowl, and shorebirds be expected. We assume that the potential for waterbirds, waterfowl, and shorebirds to collide with wind turbines would be at least 40 percent less than the potential expected under

Alternative 1. However, as mentioned above, this is based on the assumption that avian collision risk is homogenous across both WDAs, which is unlikely. Using the estimates from Section 3.7.3.2.2 that between 5.9 and 6.1 percent of all bird fatalities would be waterbirds, waterfowl, or shorebirds, we estimate between 111and 197 such fatalities per year under Alternative 3. This fatality range estimate includes all the caveats and limitations described in Section 3.7.3.2.2. Because of the distribution of waterbodies in the area, the potential for waterbird, waterfowl, and shorebird collisions with wind turbines would be higher in the Phase I Chokecherry WDA than in the Phase I Sierra Madre WDA. Given this and the efforts taken by PCW to avoid and minimize impacts on waterbirds, waterfowl, and shorebirds, we expect the estimates above to be over-estimates. Although the direct and indirect impacts on waterbirds, waterfowl, and shorebirds under Alternative 3 would be less than under Alternative 1, there is no change in the impact findings.

Passerines

Under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), the impacts on passerines from habitat loss, alteration, and fragmentation due to long-term surface modification would be 22 percent less than under Alternative 1 (Proposed Action). An equivalent reduction in disruption and displacement of passerines would be expected. In addition, the distribution of surface modification under Alternative 3 would be constricted to only the Phase I Sierra Madre WDA, leaving the Phase I Chokecherry WDA in its current condition. The operation of turbines, which are both a prominent source of disruption and a cause of passerine fatalities, would also be restricted to the Phase I Sierra Madre WDA. The passerine abundance and use of both WDAs are similar, so a 40 percent reduction in the number of turbines may result in a 40 percent reduction in passerine fatalities under Alternative 3 as compared to under Alternative 1. However, this is based on the assumption that passerine collision risk is consistent between the two WDAs, which is unlikely. Given the range of fatality rate estimates presented in Section 3.7.3.2.2, we estimate total annual passerine fatalities would be between 1,121 and 2,025 under Alternative 3. These estimates include all the caveats and limitations described in Section 3.7.3.2.2. Again we suspect this represents an over-estimate of passerine mortality. Despite a reduction in impacts on passerines under Alternative 3, there is no change in the impact findings.

Raptors (Other than Eagles)

Potential impacts on raptors from operation of the CCSM Phase I Project under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would also be less than those described for operation under Alternative 1 (Proposed Action). Long-term habitat loss would be 22 percent less than under Alternative 1, which equates to a reduction in habitat loss, alteration, fragmentation, and disruption and displacement. There are 50 percent fewer raptor nests within 1 mile of the turbines and infrastructure under Alternative 3 than under Alternative 1. In addition, the number of turbines in operation would be reduced by 202, or 40 percent, as compared to Alternative 1. However, this is based on an assumption that raptor collision risk is consistent between WDAs, which is unlikely. We are unable to quantify risk to raptors by WDA and therefore we accept this assumption. Given the range of annual raptor fatality rate estimates from Section 3.7.3.2.2, we estimate roughly between 197 and 629 raptor fatalities per year under Alternative 3. Again, we suspect this is

an over-estimate of raptor fatality for this Alternative. These estimates are subject to all the caveats and limitations described in Section 3.7.3.2.2. Despite the reduction in impacts on raptors, there is no change in the impact findings from Alternative 1.

Special Status Bird Species

Birds of Conservation Concern

The types of impacts on BCCs under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would be similar to impacts described under Alternative 1 (Proposed Action) in Section 3.7.3.2; however, the magnitude of the impacts would be less. For most BCCs, the impact findings are identical to those described for Alternative 1 (Proposed Action) in Section 3.7.3.2.2. However, projected impacts on mountain plovers would change slightly.

Approximately 19 acres of long-term habitat loss would occur within suitable mountain plover habitat, or 59 acres less than under Alternative 1 (Proposed Action). We also assume there would be approximately a 40 percent reduction in potential for mountain plover collisions with wind turbines given the equivalent reduction in the number of turbines. The actual reduction in mortality risk would be dependent on the presence of mountain plover habitat relative to turbines. Injury or fatality of mountain plovers under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) are possible, would be minor in magnitude, long-term in duration and limited in extent. Impacts on mountain plover habitat due to operation of the CCSM Phase I Project under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) is probable, but would be minor in magnitude, limited to local in extent, and would persist for the long-term (see Table 3-23 for definitions of impact criteria).

Species of Greatest Conservation Need

The types of impacts on SGCN-listed birds under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would be similar to impacts under Alternative 1 (Proposed Action) described in Section 3.7.3.2.2; however, the magnitude of the impacts would be less. Impacts on SGCN-listed birds are similar to those described above for other waterbirds, waterfowl, shorebirds, passerines, and raptors.

The types of impacts on greater sage-grouse under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would be similar to impacts described in Section 3.7.3.2.2. As compared to the proposed project, operation of the CCSM Phase I Project under Alternative 3 would include a 22 percent reduction in long-term habitat loss, a 40 percent reduction in operating wind turbines, and a concentration of impacts within only the Phase I Sierra Madre WDA. However, the Phase I Sierra Madre WDA is surrounded on three sides by State of Wyoming designated core population areas (or Primary Habitat Management Areas), and eight leks are within 1 mile of Phase I development and infrastructure components under Alternative 3, including two leks located within the Phase I Sierra Madre WDA (see Figure 3-15). Greater sage-grouse activity is higher in the Phase I Sierra Madre WDA than in the Phase I Chokecherry WDA. Although overall loss of habitat would be reduced by approximately 22 percent, impacts on core population areas would be

similar to those described under the Proposed Action, and potential impacts on existing leks would also be similar. A zone of 4 miles was cited in the BLM FEIS (BLM 2012a) as an area in which indirect impacts could occur (and this is consistent with our local extent, which is defined in Table 3-23), but some research suggests that this could be as great as 11 miles (Naugle et al. 2011). Although there may be a small reduction in the impacts under Alternative 3 compared to Alternative 1 (Proposed Action), the impact findings remain the same.

Summary of Operation Impacts Under Alternative 3

Operation of the CCSM Phase I Project under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would result in impacts on birds (other than eagles) similar to the impacts under Alternative 1 (Proposed Action). However, the size of the footprint and number of turbines would be less, which could reduce the number of injuries and fatalities from collisions; habitat loss, alteration, and fragmentation; and disruption and displacement for all birds. Nonetheless, the impact findings for all birds except mountain plovers remain the same as under Alternative 1. Under Alternative 3, there would be fewer impacts on mountain plover habitat and direct impacts are less likely, resulting in a reduction in the magnitude of impacts on this species.

3.7.3.5 Alternative 4 – No Action: Denial of ETPs

Under the No Action Alternative, an ETP would not be issued because the permit is denied or because the permit application is withdrawn. If no ETP is issued for the CCSM Phase I Project, PCW may decide not to build the project or they may decide to move forward with their proposed project without an ETP.

3.7.3.5.1 No Build

If PCW decides not to build the CCSM Phase I Project, there would be no direct or indirect impacts on birds from development of the WDAs, or from construction or operation of the CCSM Phase I Project. The potential benefits of conservation measures, including those described in PCW's sage-grouse conservation plan and the compensatory mitigation, would not occur, so the current impacts on birds would remain the same.

3.7.3.5.2 Build Without ETPs

If PCW decides to move forward with the CCSM Phase I Project without ETPs, we assume that the company would construct and operate the proposed project as outlined in its SPODs and as permitted by the BLM. However, we assume that none of the measures described in the ETP application and the ECP and as outlined in Section 2.2.1.4 would be implemented, including EACPs, monitoring, adaptive management, and compensatory mitigation. In addition, stipulations we would include with the ETPs would not be implemented. Constructing and operating the CCSM Phase I Project without standard and programmatic ETPs would result in all of the adverse impacts described under Alternative 1 (Proposed Action) in Section 3.7.3.2. If the CCSM Phase I Project were built without ETPs, monitoring and adaptive management intended to correct unexpected impacts would not be implemented, which could have detrimental impacts on birds (other than eagles). For

example, lost benefits to other bird species might include curtailment measures if they would have been applied to benefit eagles, monitoring measures that are no longer implemented without an ETP, or other measures that would have been part of a BBCS meant to accompany an ETP. Also, under this alternative, compensatory mitigation for eagles would not be implemented, and the potential benefits on other birds, as described under Alternatives 1 (Proposed Action) and 2 (Proposed Action with Different Mitigation), would not be realized. Under this alternative, PCW would still be subject legally to all take prohibitions under the MBTA and the Bald and Golden Eagle Protection Act (BGEPA). The avoidance and minimization measures, conservation measures, and BMPs described in Section 2.2.1.3 would still be implemented. These measures include numerous actions to reduce detrimental impacts on eagles as well as other birds.

Overall, building the CCSM Phase I Project without ETPs would result in impacts on birds ranging in magnitude from minor to major, depending on the type of impact and the species considered (see Table 3-23 for definitions of impact criteria). Permit stipulations would include measures intended to mitigate impacts on eagles, so their impacts on other most other birds are minimal, and exclusion of those permits would not change the level of impacts on birds as described under the Proposed Action.

3.7.3.6 Summary of Impacts under Each Alternative

Impacts on birds (other than eagles) from construction and operation of the CCSM Phase I Project would be as follows (see Table 3-23 for definitions of impact criteria):

- **Alternative 1 (Proposed Action)** – Birds would be impacted by habitat loss and degradation, behavioral disruption and displacement, and injury and fatality. Displacement and disruption of greater sage-grouse leks or nests would be probable and would result in major impacts on the local population of greater sage-grouse. Nest predators could increase and small mammal prey for raptors could decrease, resulting in decreased productivity and survival. Roughly estimated, collisions with wind turbines could result in a range of 3,150 to 5,400 bird fatalities annually; additional fatalities could occur from collisions with other infrastructure.
- **Alternative 2 (Proposed Action with Different Mitigation)** – Impacts would be similar to those under Alternative 1 (Proposed Action). Compensatory mitigation would be different under Alternative 2, which would result in different levels of impacts on and benefits for birds (other than eagles) depending on the compensatory mitigation option selected (see Table 3-24).
- **Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project)** – Impacts would be similar to those under Alternatives 1 (Proposed Action) and 2 (Proposed Action with Different Mitigation), but most impacts would be reduced under Alternative 3 because the number of wind turbines would be reduced.
- **Alternative 4 (No Action: Denial of ETPs)**
    - The No Build scenario would result in no impacts on birds.
    - The Build Without ETPs scenario would result in impacts similar to those under Alternatives 1 (Proposed Action), 2 (Proposed Action with Different Mitigation), and 3 (Issue ETPs for Only the Sierra Madre Portion of the

CCSM Phase I Project) if PCW decides to move forward with the proposed project without ETPs. Under this scenario, the potential beneficial effects on birds (other than eagles) associated with ETP stipulations, adaptive management, and compensatory mitigation measures required for the programmatic ETP would not be implemented.

Table 3-24 compares potential compensatory mitigation under Alternative 1 (Proposed Action) and Alternative 2 (Proposed Action with Different Mitigation) (see Table 3-23 for definitions of impact criteria).

Table 3-24. Comparison of Compensatory Mitigation Measures for Birds (other than Eagles) for the CCSM Phase I Project in Wyoming

Compensatory Mitigation Measure	Effects on Birds (other than Eagles)
Power pole retrofits	Minor temporary bird avoidance during construction activities. Small, localized increases in golden eagle populations within the four BCRs could impact bald and golden eagle prey species such as waterfowl and greater sage-grouse. The impact would be negligible because the overall golden eagle population would remain the same. Birds, particularly larger species, could experience minor to moderate, long-term, and extensive benefits. The likelihood of benefits would be probable for raptors in general but possible for ferruginous hawks because of their lower population in the project vicinity.
Mitigation of existing wind facilities	Minor or moderate, long-term, probable, and regional benefits to most bird species (other than eagles). Magnitude depends on locations and number of mitigated facilities.
Lead abatement	Benefits for carcass-feeding birds (other than eagles) would be similar to benefits from power pole retrofits. No effect on other species of birds.
Carcass removal	Benefits for carcass-feeding birds (other than eagles) would be similar to benefits from power pole retrofits. No effect on other species of birds.
Carcass avoidance	Benefits for carcass-feeding birds (other than eagles) would be similar to benefits from power pole retrofits. No effect on other species of birds.
Wind conservation easement	Provides the greatest benefit to bird species (other than eagles) by preventing future injuries and fatalities from wind turbines.

Compensatory Mitigation Measure	Effects on Birds (other than Eagles)
Habitat enhancement	Minor or moderate, long-term, probable, and regional benefits to most bird species (other than eagles). Magnitude depends on habitats that are enhanced and the bird species associated with the habitats.
Rehabilitation of injured eagles	No effect on birds (other than eagles) is expected.

3.8 Eagles

3.8.1 Approach

Analysis of the eagle population information collected for the CCSM Phase I Project requires consideration of the number of eagles within the local area population (LAP) and the EMUs coincident with the LAPs. In our ECP guidance, we outline measures to ensure that local eagle populations are not depleted by take that would be otherwise regionally acceptable (USFWS 2013b). To evaluate effects on eagles at the LAP level for bald eagles, we conducted our analysis using a 43-mile buffer around the CCSM Phase I Project, and for golden eagles, we conducted our analysis using a 140-mile buffer around the CCSM Phase I Project. These distances are based on median dispersal distance from nests as presented in the ECP guidance (USFWS 2013b). For bald eagles, the LAP analysis for the CCSM Phase I Project includes all portions of the Northern Rocky Mountains and Rocky Mountains and Plains EMUs within 43 miles of the CCSM Phase I Project. For golden eagles, the LAP analysis for the CCSM Phase I Project includes all portions of any of the BCRs within 140 miles of the CCSM Phase I Project. For the CCSM Phase I Project, this includes portions of the Northern Rockies BCR (BCR 10), Southern Rockies/Colorado Plateau BCR (BCR 16), Badlands and Prairies BCR (BCR 17), and Shortgrass Prairie BCR (BCR18). BCRs are defined in Section 2.1.2.2 and shown in Figure 2-2. Following completion of a review of the impacts on eagles at the EMU/BCR level, we further consider the predicted level of eagle take at the LAP level for both species. Further discussion of the take limits is provided in Section 2.1.2.

For our analysis of eagles, we have reviewed the BLM FEIS and ROD, EA1, and EA2. New information gathered since the publication of these documents, information about eagles we have that was not available to BLM (that is, the complete results of pre-construction eagle surveys completed for the CCSM Project, eagle mortality records, and information on golden eagles from ongoing satellite telemetry studies), and additional information about effects on eagles that is relevant to our analysis and consideration of whether or not to issue standard and programmatic ETPs, were included in this section. Public, agency, and tribal input regarding eagles received during the scoping process and tribal consultation was included in the characterization and analysis of this resource.

3.8.2 Affected Environment

Except to the extent that new information or new analysis provided herein updates the previous discussions, we are incorporating into this EIS by reference the information about eagles that is adequate for our analysis from the following documents:

- BLM FEIS – Section 3.14, found on pages 3.14-1 through 3.14-28; and Section 3.15, found on pages 3.15-1 through 3.15-20
- EA1 – Section 3.14, found on pages 3-46 through 3-63
- EA2 – Section 3.9

3.8.2.1 Overview of Studies Conducted on Eagles in the CCSM Phase I Project Area

Abundance of eagles and other birds at the Phase I development and infrastructure areas was studied between 2008 and 2014. Biologists conducted baseline avian surveys for the Phase I development and infrastructure areas in 2008 and 2009 using fixed-point counts to estimate seasonal, spatial, and temporal use of the Phase I development and infrastructure areas. However, many of the survey points used in 2008 were outside the current Phase I WDAs. Survey methods sought to sample representative habitats and topography within the CCSM Project area with 20-minute fixed-point counts. Biologists recorded all avian species observed and noted incidental observations separately. A comprehensive summary of findings is found in Johnson et al. (2009).

Subsequent surveys continued in the Phase I development and infrastructure areas to understand potential impacts on eagles and on regional eagle populations. PCW initiated discussions in 2010 with USFWS, BLM, and WGFD staff to identify a process for collecting pre-construction eagle survey data. A draft survey protocol was presented to us, the BLM, and WGFD for review and implementation in 2011. This second round of surveys was designed to identify high avian use areas, particularly for eagles and other avian species of concern within the CCSM Project area. The survey protocols were developed to assess site-specific risk, and to identify eagle use areas and high-use areas that might be avoided when siting turbines.

The studies conducted to assess eagle use in and near the Phase I development and infrastructure areas are described below and summarized in Table 3-25. Although they were planned in coordination with the USFWS, these studies were conducted using protocols and methods that varied over time. Many of the studies were completed prior to issuance of the ECP guidance (USFWS 2013b) and therefore differ in the degree to which they comply with our pre-construction survey recommendations for eagles in the current ECP guidance. Each of the studies conducted for the CCSM Phase I Project had different survey area boundaries. For instance, flight path surveys were confined to the boundary of the Phase I WDAs, while nest surveys included both the Phase I WDAs and a 5-mile buffer. Furthermore, these surveys were conducted specifically for the CCSM Project and were not peer-reviewed; however, they do generally represent the best available data on eagle use in the Phase I development and infrastructure areas. Ultimately, we relied primarily on results from the 2,625-foot (800-meter) raptor count surveys, helicopter and ground-based nest surveys, long-watch raptor surveys, and prey base surveys to evaluate overall impacts, predict eagle

fatalities using our model, and make recommendations for avoidance and minimization of eagle take associated with the CCSM Phase I Project. Eagle surveys performed for the CCSM Phase I Project are listed in Table 3-25; prey base surveys performed for the CCSM Phase I Project are listed in Table 3-26; and prey are further described in Sections 3.5, 3.6, and 3.7. Throughout this section where any conclusions are provided relative to any pre-construction eagle surveys, and the surveys that the conclusions are based upon did not comply with our survey standards in the ECP guidance (USFWS 2013b), we present applicable caveats or qualifiers so that the studies can be placed in the proper context.

PCW contractors conducted long-watch raptor surveys from April 2011 through July 2012. Surveys were completed at 15 fixed points within a 13,000-foot-radius (4,000-meter-radius) plot from April 2011 through March 2012, and at 14 locations from April 2012 through August 2012. Surveys were conducted biweekly between April 4 and November 16, 2011, monthly from December 2011 through March 2012, and biweekly again from April 2012 through July 2012 (PCW 2015b; SWCA 2012a).

PCW contractors also monitored eagle activity using 2,625-foot-radius (800-meter-radius) plots from November 2012 through August 2013, initially using 40 plots and later using 60 plots. Biologists monitored each plot biweekly for 1 hour to quantify eagle flight time within each plot and estimated the altitude and flight distance within the plot for each observation. Data were collected for raptors at altitudes between 100 feet (30 meters) and 500 feet (150 meters) above ground level (PCW 2015b; SWCA 2013a, 2013b, 2013c). Additional efforts to monitor avian use included continuous radar monitoring from March 2011 through March 2013 using a DeTect MERLIN Avian Radar System (see Appendix B, p. 4-56). The radar system has a horizontal scanning component with a detection range of a few miles that is variable depending on the size of birds. This radar provides location data as the birds move through the scanning area. To some extent, these data can be used to understand general use by birds of topographic features within the Phase I development and infrastructure areas. The vertical scanning component of the radar system detects approximate elevations of flight paths. Field validation surveys were conducted in an attempt to identify birds to species. However, the radar system was not refined enough for consistent identification of species (PCW 2015b), it did not have any utility for use in making recommendations for avoidance and minimization of eagle take, and we are not relying on these data for consideration in this EIS.

The BLM Rawlins Field Office has compiled locations of eagle and other raptor nests since the 1980s. In addition, PCW contractors conducted surveys for eagle nests in 2008 (Johnson, Rintz, and Strickland 2008a) and from 2011 through 2014 (SWCA 2011, 2012a, 2013a, 2014i). These helicopter and ground-based surveys were conducted between April and July in suitable eagle nesting habitats within 5 miles of the Phase I development and infrastructure areas, although the exact survey boundaries varied (for example, a 1-mile buffer was used in 2008). Results from eagle nest surveys conducted within a 5-mile buffer around the Phase I development and infrastructure areas were used to calculate the mean inter-nest distance (MIND) for the CCSM Phase I Project. Eagle nests identified during these surveys are shown in Figures 3-17 and 3-18.

Throughout Section 3.8, Eagles, the terms "occupied nest" and "unoccupied nest" have two uses. The first use of these terms describes *whether eagles are, or are not, present at a nest during the breeding season*. Evidence of an occupied nest includes presence of adult, eggs, or young, freshly molted feathers or plucked down, or current year's mutes (whitewash). If an adult, eggs, or young, freshly molted feathers or plucked down, or current year's mutes are not present during the breeding season, the nest is unoccupied. The second use of these terms is in relation to the *status of a nest prior to construction of a wind energy facility* as used in the Region 6 Recommendations for Avoidance and Minimization of Impacts to Golden Eagles at Wind Energy Facilities, dated April 11, 2013 (USFWS 2013f). In the Region 6 recommendations, the designation of nests as "Occupied" were those nests that were occupied at least once during the last 5 years or last 5 years of field surveys, specifically between 2008 and 2012. Conversely, the nests grouped in the "Unoccupied" class were those nests that were never occupied between 2008 and 2012. Hence, in the recommendations, the terms were used to describe both the activity at the nest and the type of nest to which certain recommendations would apply (USFWS 2013f). To minimize confusion in this EIS, the terms "Occupied" and "Unoccupied" will be capitalized when referencing the class of nests in the recommendations document, but will not be capitalized when used to describe whether evidence of eagle use is or is not present during the breeding season for the CCSM Phase I Project.

Table 3-25. Pre-Construction Eagle Surveys Conducted in and near the Phase I Development and Infrastructure Areas for the CCSM Phase I Project in Wyoming

Survey Type	Year of Survey	Report (Reference)	Summary of Results
Long-watch raptor surveys	2011 and 2012	April 2011–March 2012 Supplemental Wildlife Report, Chokecherry and Sierra Madre Wind Energy Project (SWCA 2012a)	There were a total of 164 golden eagle flight minutes (0.002 minute of flight per minute of survey) and 32 bald eagle flight minutes (0.0004 minute per minute of survey) recorded.
2,625-foot (800-meter) raptor count surveys	2012 and 2013	August 20 through November 9, 2012, Eagle Summary Report, Chokecherry and Sierra Madre Wind Energy Project (SWCA 2013a)	A total of 51 golden eagle flight minutes were recorded (including 31 minutes above 500 feet [150 meters]), and 2 minutes of bald eagle flight were recorded.
		November 12, 2012, through March 29, 2013, Eagle Summary Report, Chokecherry and Sierra Madre Wind Energy Project (SWCA 2013b); April 1 through June 21, 2013, Eagle Summary Report, Chokecherry and Sierra Madre Wind Energy Project (SWCA 2013c)	Biweekly surveys were conducted at 60 sites from November 2012 to August 2013. A total of 52 golden eagle flight minutes were recorded for use in the eagle fatality prediction model (including 19 minutes above 150 meters). No bald eagle flights were recorded.
Avian radar surveys	2011, 2012 and 2013	ECP, Chapter 5 (PCW 2015b)	Attempts were made to use avian radar to understand eagle use of the CCSM Project area and to train the radar system for species recognition of eagles, but ultimately none of these efforts proved successful.

Survey Type	Year of Survey	Report (Reference)	Summary of Results
Helicopter and ground-based nest surveys	2008, 2011, 2012, 2013, and 2014	Raptor Nest Surveys for the Chokecherry and Sierra Madre Wind Resource Areas, Carbon County, Wyoming (Johnson, Rintz, and Strickland 2008a)	The Phase I development and infrastructure areas and a 1-mile buffer were surveyed by helicopter in May 2008. A total of 3 Occupied golden eagle nests were identified within the Phase I Chokecherry WDA, and none were identified in the Phase I Sierra Madre WDA.
		Summary Report for 2011 Nest Surveys, Chokecherry and Sierra Madre Wind Energy Project (SWCA 2011)	The Phase I development and infrastructure areas and a 5-mile buffer were surveyed by helicopter between May and July 2011. During this survey, 2 Occupied golden eagle nests and 3 Occupied bald eagle nests were recorded. One golden eagle and 2 bald eagle nests were nearest to the Phase I Chokecherry WDA. One golden eagle nest was located in the Phase I Sierra Madre WDA, and 1 bald eagle nest was located nearest to the Phase I Sierra Madre WDA.
		Summary Report for 2012 Nest Surveys, Chokecherry and Sierra Madre Wind Energy Project (SWCA 2012d)	The Phase I development and infrastructure areas and a 5-mile buffer was surveyed by helicopter in April through July 2012. During this survey, 4 Occupied golden eagle nests and 3 Occupied bald eagle nests were recorded. No nests were recorded within either Phase I WDA, but all eagle nests were nearest to the Phase I Chokecherry WDA.

Survey Type	Year of Survey	Report (Reference)	Summary of Results
		Summary Report for 2013 Nest Surveys, Chokecherry and Sierra Madre Wind Energy Project (SWCA 2013d)	The Phase I development and infrastructure areas and a 5-mile buffer were surveyed by helicopter between April and July 2013. During this survey, 3 Occupied golden eagle nests and 3 Occupied bald eagle nests were recorded. No nests were recorded within either Phase I WDA, but 1 golden eagle nest was nearest the Phase I Chokecherry WDA, while the other 2 were nearest the Phase I Sierra Madre WDA. All 3 bald eagle nests were nearest to the Phase I Chokecherry WDA.
		Summary Report for 2014 Nest Surveys, Chokecherry and Sierra Madre Wind Energy Project (SWCA 2014i)	The Phase I development and infrastructure areas and a 5-mile buffer were surveyed by helicopter in April and July 2014. During this survey, 9 Occupied golden eagle nests and 3 Occupied bald eagle nests were recorded. Four golden eagle nests were located within the Phase I Chokecherry WDA, 4 others were located near the Phase I Chokecherry WDA, and only 1 was located nearest to the Phase I Sierra Madre WDA. Two bald eagle nests were nearest to the Phase I Chokecherry WDA, and 1 was nearest to the Phase I Sierra Madre WDA.

Survey Type	Year of Survey	Report (Reference)	Summary of Results
Communal roost location surveys	2013	Summary Report for 2013 Eagle Roost Surveys, Chokecherry and Sierra Madre Wind Energy Project (SWCA 2013e)	Fixed-wing surveys of areas with high potential for roosting activity were conducted throughout each WDA (Phase I and Phase II boundaries) on a single day in February 2013. No communal roost areas were identified during these surveys; however, we consider the survey effort insufficient to derive reliable conclusions.
Golden eagle telemetry study (USFWS)	2013 – current	NA	Satellite telemetry tags on golden eagles from Wyoming, Nebraska, and Colorado. To date, no established territories or regular use of the CCSM Phase I development and infrastructure areas have been observed.

The survey efforts were conducted to identify the scope of eagle use in and near the Phase I development and infrastructure areas. We define important eagle-use areas "as an eagle nest, foraging area, or communal roost site that eagles rely on for breeding, sheltering, or feeding, and the landscape features surrounding such nest, foraging area, or roost site that are essential for the continued viability of the site for breeding, feeding, or sheltering eagles" (50 CFR 22.3). Eagle "use" follows this broadly defined group of eagle behavior and activities throughout this document. The focus of the implemented surveys was to identify high-use areas and other locations where eagles occur, identify potential prey sources, quantify use areas associated with eagle activities, and understand temporal variations in eagle use of sites within and adjacent to the Phase I development and infrastructure areas. Information gathered from these efforts, in addition to other eagle information we have, provide the basis for our decision on whether or not an ETP is issued.

In 2013 the USFWS, Region 6, Migratory Bird Management Office initiated a satellite telemetry study on golden eagles within Region 6. We attached satellite telemetry tags on golden eagles trapped in Wyoming, Nebraska, and Colorado and have monitored their activity since. Based on a recent check of golden eagles with these telemetry units there have been a few rare instances where they have flown within a 10-mile buffer of the CCSM Phase I development and infrastructure areas. However, to date none of these golden eagles have

established themselves within the CCSM Phase I Project or made regular use of the area. Therefore, this telemetry study and related results are not discussed further in this EIS.

3.8.2.2 Landscape Setting and Habitat

The Phase I development and infrastructure areas lie entirely within the Wyoming Basin ecoregion (Chapman, Bryce, et al. 2004). Chapman, Bryce, et al. (2004) define the Wyoming Basin as:

> a broad arid intermontane basin interrupted by hills and low mountains and dominated by grasslands and shrublands. Nearly surrounded by forest-covered mountains, the region is drier than the Northwestern Great Plains to the northeast and does not have the extensive cover of pinyon-juniper woodland found in the Colorado Plateaus to the south. Much of the region is used for livestock grazing, although many areas lack sufficient forage to support this activity. The region contains major natural gas and petroleum producing field. The Wyoming Basin also has extensive coal deposits along with areas of trona, bentonite, clay, and uranium mining.

Section 3.4, Vegetation and Wetlands, provides additional information on ecoregions and the dominant vegetation communities in the Phase I development and infrastructure areas.

The landscape within the Phase I development and infrastructure areas is characterized by four distinct topographic features: the Bolten Rim and Chokecherry Basin in the Phase I Chokecherry WDA, and Miller Hill Rim and Pine Grove Basin in the Phase I Sierra Madre WDA. The Bolten Rim and Miller Hill Rim provide promontories (that is, raised masses of land that decline abruptly from one side) that are used by eagles for hunting, perching, roosting, or nesting (PCW 2015b). There are numerous aeries (that is, large nests typically built high on a tree or cliff) and other nest features that are used by eagles and other raptors on Bolten Rim (PCW 2015b). Miller Hill also provides topographic features capable of supporting promontories used by eagles for perching, roosting, or nesting.

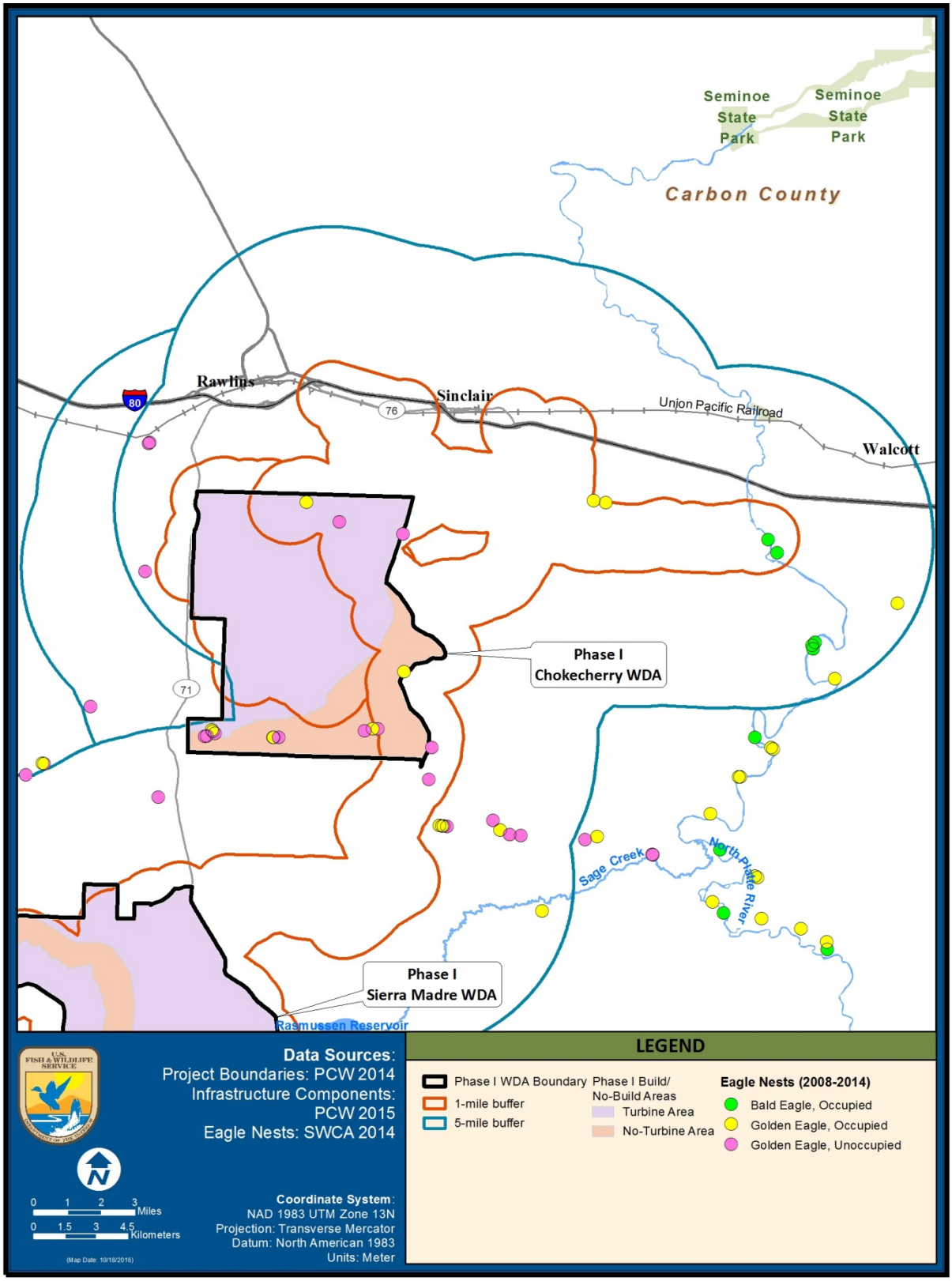

Figure 3-17. Occupied and Unoccupied Eagle Nests in and within 5 miles of the Phase I Chokecherry Wind Development Area and Infrastructure Areas for the CCSM Phase I Project in Wyoming, based on surveys from 2008 and 2011 to 2014

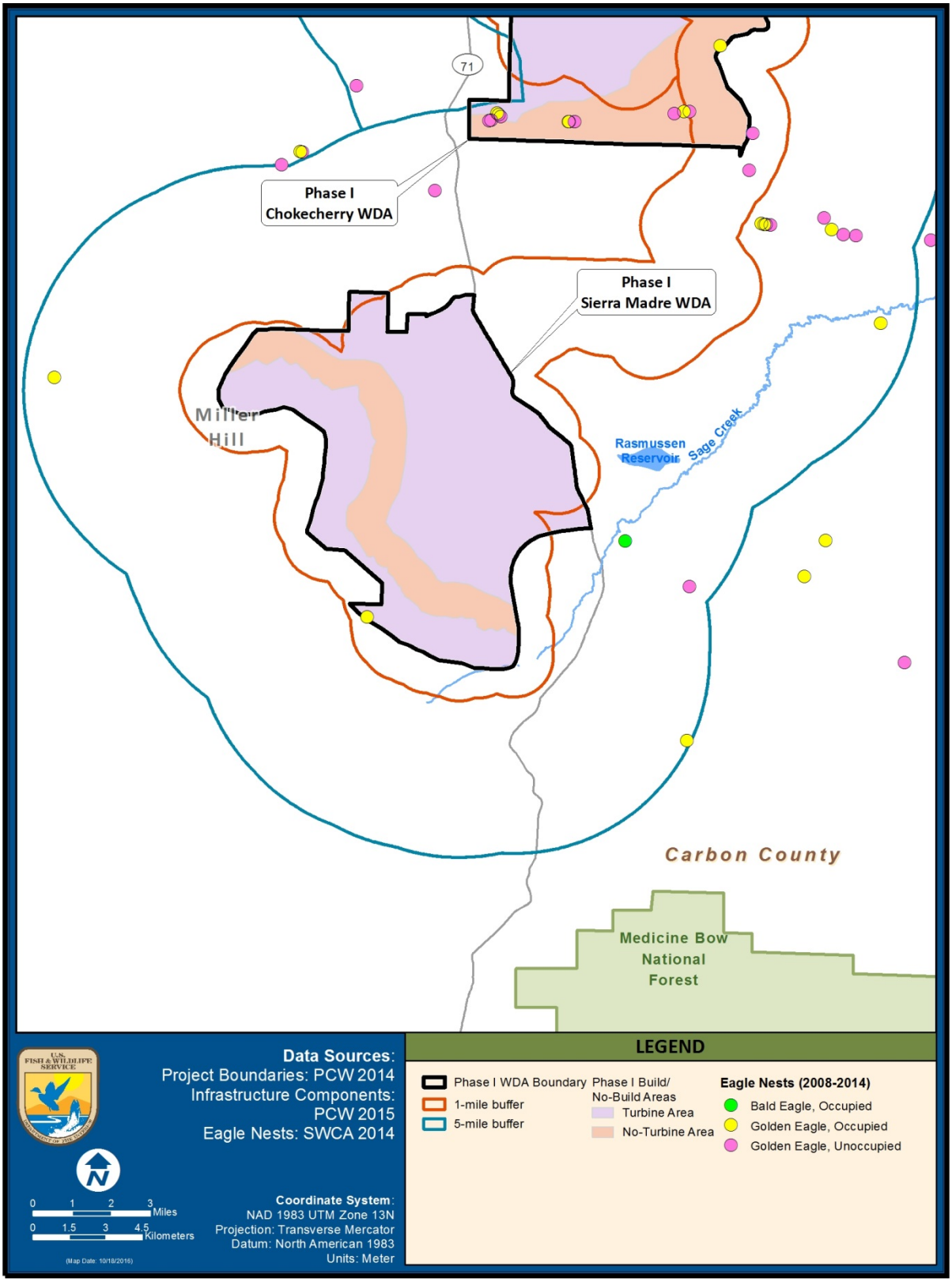

Figure 3-18. Occupied and Unoccupied Eagle Nests in and within 5 miles of the Phase I Sierra Madre Wind Development Area and Infrastructure Areas for the CCSM Phase I Project in Wyoming, based on surveys from 2008 and 2011 to 2014

3.8.2.3 Distribution and Trends

Both bald and golden eagles occur in the Phase I development and infrastructure areas year-round. The following discussion includes information on eagles within a 5-mile buffer area around the perimeter of the Phase I development and infrastructure areas, because eagles that use the surrounding area for nesting, feeding, and other activities also likely use the Phase I development and infrastructure areas.

3.8.2.3.1 Bald Eagles

Bald eagles occurred historically throughout North America. Adult bald eagles are distinguished by a white head and white tail feathers. Bald eagles are powerful, predatory birds that may weigh up to 14 pounds and have a wingspan of up to 8 feet, with the largest birds found in the northern part of their range (that is, Alaska and Canada). As with most other raptors, females are about 25 percent larger than males; the sexes are otherwise similar in appearance (Buehler 2000). Sometimes confused with golden eagles, juvenile bald eagles are mostly dark brown or mottled until they are 4 to 5 years old, when they acquire their characteristic adult plumage (Buehler 2000).

Bald eagles may live 15 to 25 years. Breeding bald eagles typically lay one to three eggs once per year, and the eggs hatch after about 35 days. The young eagles are able to fly 55 to 75 days after they hatch and are on their own about a month later. Bald eagles begin breeding in their fifth year of life (that is, 4+ years old) when adult plumage is attained. Bald eagles typically have one brood per breeding season (Buehler 2000).

Pesticides, shooting, and habitat loss reduced the bald eagle populations in the contiguous 48 states to only 417 nesting pairs by 1963 (USFWS 2007b). As of 2016, USFWS estimates the bald eagle population to be about 143,000 for the United States, with roughly 71,000 of these in Alaska alone (USFWS 2016c). There are nesting records in all of the United States except Hawaii, with the largest breeding populations in Alaska and British Columbia, Canada (Buehler 2000; USFWS 2007b; USFWS 2016c). Recent population estimates of bald eagles in the west indicate that populations have rebounded (USFWS 2016c; USFWS 2016d), and that they continue to increase. The Wyoming breeding population was estimated to be 139 pairs in 2010 (WGFD 2010b), which has climbed from 95 in 2007 (USFWS 2007c). The bald eagle occurs throughout Wyoming near lakes and along rivers and large streams (Travsky and Beauvais 2004). The breeding population in Wyoming exhibits fidelity to nest sites, roosting areas, and wintering sites (WGFD 2000). Resident breeding pairs overwinter near established nest sites and do not migrate great distances from their nests unless food is scarce (Travsky and Beauvais 2004). Bald eagles will defend nesting territories, which usually include more than one nest site, from other eagles. They generally nest near rivers, lakes, impoundments, or other water sources that support an adequate food supply (USFWS 2007b). Nest sites are most often found in super-canopy, mature, or large trees, but bald eagles will nest on power poles, transmission line towers, or other man-made structures, and occasionally nest on the ground (USFWS 2007b). Nest sites include perches that allow eagles a view of nearby foraging areas, and many researchers found that nests are typically found within 1 mile of open water (Buehler 2000). Other factors that influence nest site selection

include diversity and abundance of prey, and proximity to shallow water or absence of sources of human activity (Buehler 2000). In Wyoming, groves of mature cottonwoods or riverside conifers (that is, any numerous, chiefly evergreen trees or shrubs, including pine, spruce, fir, and other cone-bearing trees and shrubs) along streams and rivers are typical bald eagle nesting habitat (BLM 2003). In the Greater Yellowstone area, bald eagles breed in areas along the banks of rivers, streams, or lakes and select large trees for nesting within 0.9 mile of river or lake shores (Harmata and Oakleaf 1992). Wyoming bald eagles generally initiate nest building in January or early February (USFWS 2007b), with some nest repairs or pair bonding occurring throughout the late fall and early winter.

The National Bald Eagle Management Guidelines (USFWS 2007b) state that

> During the breeding season, bald eagles are sensitive to a variety of human activities. However, not all bald eagle pairs react to human activities in the same way. Some pairs nest successfully just dozens of yards from human activity, while others abandon nest sites in response to activities much farther away. This variability may be related to a number of factors, including visibility, duration, noise levels, extent of the area affected by the activity, prior experiences with humans, and tolerance of the individual nesting pair.

Perching and roosting trees are important to bald eagles as places to hunt, feed, display, and loaf; protection from weather; and resting sites. Winter roosts are important sources of protection from weather and are often found in ravines or hilly areas that provide additional shelter from prevailing winds. High-quality winter roost sites are often used consistently for many years (Buehler 2000). Mature forest stands are preferred, as are forest and landform configurations that provide shelter from nighttime winds. Eagles may switch to alternate roosts when winds shift or to sites that are closer to foraging sites (Buehler 2000). In Wyoming, winter roosts are often associated with riparian forests, upland conifer forests, or ponderosa pine stands on northeast-facing slopes (Travsky and Beauvais 2004).

Bald eagles display opportunistic feeding habits and take both live prey and carrion. Fish are often the most common food item, followed by waterfowl and shorebirds (Stalmaster 1987; Buehler 2000). Bald eagles often catch live fish, but also feed on dead and dying fish frequently. They also forage on other aquatic and terrestrial animals such as waterfowl, muskrats, raccoons, and other small mammals, which are taken alive or scavenged as carrion (Stalmaster 1987; Jackman et al. 1999; Buehler 2000). In Wyoming, mammals (for example, prairie dogs and jackrabbits) and carrion from big game and livestock seasonally are important food for bald eagles (Travsky and Beauvais 2004). Bald eagle foraging habitat includes large bodies of water such as lakes, reservoirs, rivers, and streams with abundant fish and waterfowl.

Bald eagles that breed in the northern latitudes of North America migrate south for the winter and are often found following migrating waterfowl along rivers, lakes, and other waterbodies where an abundant food source is available (Buehler 2000). Wintering habitat is variable, and eagle use is dictated by prey abundance and suitable night roosts (BLM 2003; Dzus and Gerrard 1993; Buehler 2000). Wintering bald eagles are often found along rivers, at warm water discharge sites, or in other areas where open water remains to provide access to fish or

waterfowl. Wintering eagles also eat carrion and other opportunistic food sources, such as animals killed along roads or highways, dead livestock in disposal areas (USFWS 1983), and occasionally, garbage at landfills. Waterbodies that remain ice-free and sites that frequently provide carrion from roadkill are important winter forage sites (Buehler 2000).

There are no bald eagle nests within the Phase I development and infrastructure areas, but there are six Occupied bald eagle nests within 5 miles of the Phase I development and infrastructure areas. These include two Occupied bald eagle nests near the North Platte River Water Extraction Facility, three farther south from this facility along the North Platte River, and one along Sage Creek near Rasmussen Lake (see Figures 3-17 and 3-18). There were consistently three Occupied bald eagle nests within 5 miles of the Phase I development and infrastructure areas between 2011 and 2014, suggesting that three nesting pairs occupy this area but have alternated their nest locations regularly (Johnson, Rintz, and Strickland 2008a; SWCA 2012c, 2013a, 2014i). A number of other bald eagle nests are located along the North Platte River, at least 5 miles east of the Phase I development and infrastructure areas. This stretch of the river also provides foraging, roosting, and sheltering sites that bald eagles use throughout the year.

Between 2008 and 2014, bald eagle activity in the Phase I development and infrastructure areas was relatively low. Only six bald eagles were observed during fixed-point count surveys within the CCSM Project area in 2008 and 2009 (Johnson et al. 2009). Long-watch raptor surveys recorded 32 minutes of bald eagle flight time within the CCSM Project area (PCW 2015b). The 2,625-foot (800-meter) raptor count surveys recorded only 2 minutes of bald eagle flight time. This was recorded from a single bald eagle on two separate occasions on the same day (SWCA 2013d). Bald eagles were rarely observed foraging, and the highest availability of prey base for eagles and other raptors occurs outside of the Phase I development and infrastructure areas (SWCA 2012c).

3.8.2.3.2 Golden Eagles

Adult golden eagles are entirely dark brown except for golden feathers on back of the head and neck, bars on the tail, and upper wing coverts that are often more pale than the surrounding feathers (Clark and Wheeler 1987; Kochert et al. 2002). Juvenile golden eagles have white patches on the wings and white at the base of the tail feathers. The amount of white in the tail and wing gradually diminish as golden eagles age, and adult plumage is acquired in the fifth summer (Kochert et al. 2002). Golden eagles range in length from 33 to 38 inches and have a wingspan of 6.5 to 7.5 feet. Males and females are similar in appearance, although females are larger on average than males (Clark and Wheeler 1987; Watson 1997; Kochert et al. 2002).

Golden eagles first breed when 4 to 5 years old. Golden eagles have one brood per season, but will re-nest if eggs fail to hatch. Laying dates vary among populations and among years, with laying beginning as early as late January and early February in southwest Idaho and as late as late March through early May in Alaska (Kochert et al. 2002). One to three eggs are laid; clutches with three eggs are most common in years when prey is abundant. Estimated average incubation period is 42 days. Young eagles leave the nest as early as 45 days of age and as late as 81 days (Kochert et al. 2002).

Historical evidence suggests that golden eagles nested in specific areas across most of North America (Bent 1937; Kochert et al. 2002). Today, golden eagles in western North America breed from Alaska to central Mexico, from the Pacific coast throughout the Rocky Mountains and the western portion of the Great Plains (Kochert et al. 2002). Some past long-term studies conducted in the continental United States have indicated that the golden eagle population is declining (Kochert and Steenhof 2002; USFWS 2009; Katzner et al. 2012). Some of the same research suggests that habitat changes that affect golden eagle prey are the reason for the declining population. Other recent studies have found that western populations of golden eagles may be stable (Nielson et al. 2013; Nielson et al. 2014; Millsap et al. 2013). Based on a USFWS analysis, the current estimate of golden eagles for the contiguous western United States is about 31,000 individuals (USFWS 2016c). The population estimate for the species in this same region has been stable over the timeframe used for the analysis (that is, 1967 to 2014; USFWS 2016c). Although golden eagle population estimates appear to be stable for the contiguous western United States, there are some differences in trends at the BCR scale (Millsap et al. 2013; USFWS 2016c). Trend estimates from BCRs 10, 17, and 18 were above zero (suggesting population growth) while the trend estimate for BCR 16 was below zero (suggesting population decline) (Millsap et al. 2013; USFWS 2016c). The LAP for the CCSM Phase I Project was based on the median dispersal distance from the nest, which is a buffer of 140 miles from the Phase I development and infrastructure areas (USFWS 2013b).

Golden eagle breeding habitat includes grassland, shrubland, and riparian vegetation communities (Kochert et al. 2002). Golden eagles use a variety of substrates for nesting, including cliff faces, large trees, artificial structures, and the ground, depending upon availability (Morneau et al. 1994). Many nest sites occur in large trees, on cliff faces, or on prominent escarpments with an ample view of the surrounding area (Bates and Moretti 1994; Kochert et al. 2002). Proximity to hunting grounds is an important factor in nest-site selection (Murphy et al. 1969), and nest sites are generally located near open areas with grasslands or shrub-steppe vegetation, where golden eagles prefer to forage. Cliff faces are the most common sites selected for nests by golden eagles throughout most of North America; however, tree nests are more common in northeastern Wyoming (Menkens and Anderson 1987; Phillips and Beske 1990; Kochert et al. 2002) and are typically sited near water courses (Phillips et al. 1990). In Wyoming, golden eagle pairs often remain on, and add materials to, nesting territories year-round (Kochert et al. 2002). Resident golden eagles may switch nest sites between years and nest activity is not dependent on previous year's success (Boeker and Ray 1971).

Golden eagles that breed in the northern latitudes (that is, Canada and Alaska) are migratory and can be found throughout the northern tier of contiguous United States during winter where sufficient prey is available (Kessel 1989). Individuals migrating to wintering areas take direct routes with little or no wandering until they reach wintering destinations (Applegate et al. 1987; Brodeur et al. 1996). Peak passage dates during fall migratory periods for golden eagles at Commissary Ridge in western Wyoming occur in late October or early November (Hawk Migration Association of North America 2014). Spring migration begins in March for adults and can continue into April for juveniles (Kochert et al. 2002; Sherrington 1997). Migratory routes in the west generally follow north-south oriented mountain ranges, such as the Rocky Mountains. Mountain ranges provide orographic lift

(that is, an air mass forced from a low elevation to a high elevation as it moves over rising terrain) and thermal convection (that is, vertical atmospheric currents produced by solar heating of the ground, also known as thermals). Golden eagles use orographic lift and thermal convection to gain altitude and aid in energy-efficient migration (Kerlinger 1989; Sherrington 1993). Golden eagle wintering habitat varies based on the physiographic region. Vegetative communities frequented by golden eagles in the west include open habitats with native vegetation, sagebrush communities, sagebrush or rabbitbrush, whereas riparian areas; urban, agricultural, and forested areas are generally avoided (Millsap 1981; Fischer et al. 1984; Craig et al. 1986; Marzluff et al. 1997).

Golden eagles are opportunistic and generalist carnivores that take both live prey and carrion (Kochert et al. 2002). Across its range, the golden eagle preys on a variety of vertebrates. Typically golden eagles prefer an abundant prey species (Bedrosian 2014) but will shift to alternate prey in response to changing abundance of prey species (MacLaren et al. 1988; Steenhof and Kochert 1988). Despite their ability to switch prey opportunistically, rabbits and hares were found to comprise more than half of all golden eagle prey in the western United States (Bedrosian 2014). In Wyoming, several studies (Millsap 1978; MacLaren et al. 1988; Arnold 1954; Schmalzried 1976) document that rabbits and hares are a major component of golden eagle diets despite the varied proportions noted in each study. These studies also documented squirrels, prairie dogs, and other rodents, as well as ducks, coyote, fox, beaver, and greater sage-grouse as prey items consumed by Wyoming Basin golden eagles. A study of diets of nonbreeding golden eagles indicates that mammals are an important food source, and use of carrion may be substantial in some areas during non-breeding seasons (Marr and Knight 1983). Large mammals are also an important food source for golden eagles. Marr and Knight (1983) report that mule deer carrion is the most important fall and winter food for golden eagles. Observations from the Wyoming Basin also indicate that pronghorn are an important food source during the winter (Goodwin 1977).

Prey resources available in the Phase I development and infrastructure areas include white-tailed prairie dogs, greater sage-grouse, white-tailed jackrabbit, and cottontail rabbit. Golden eagles may also prey on a variety of waterbirds and waterfowl that are available at water sources outside the Phase I development and infrastructure areas, such as the North Platte River and nearby reservoirs. Additional prey sources in the Phase I development and infrastructure areas include big game species such as mule deer, elk, and pronghorn. Some of the animals available as prey for golden eagles in the Phase I development and infrastructure areas were surveyed between 2008 and 2014. Eagle prey-base surveys that were conducted for the CCSM Phase I Project include (1) white-tailed prairie dog surveys, (2) waterbird and waterfowl surveys, and (3) greater sage-grouse lek counts and telemetry monitoring (see Table 3-26). These surveys were designed to identify available prey sources and the location and abundance of these resources for both golden and bald eagles. A more detailed description of prey abundance in and near the Phase I development and infrastructure areas is presented in this EIS in Sections 3.6, Mammals, and 3.7, Birds (Other than Eagles). Table 3-26 lists surveys of golden eagle prey conducted in the Phase I development and infrastructure areas.

Table 3-26. Golden Eagle Prey Base Surveys in and near Phase I Development and Infrastructure Areas for the CCSM Phase I Project in Wyoming from 2008 to 2014

Survey Type	Year of Survey	Report (Reference)	Survey Results
White-tailed prairie dog surveys	2012 and 2013	*Eagle and Raptor Prey Base Assessment, Chokecherry and Sierra Madre Wind Project 2012* (SWCA 2012c)	Transect surveys within the Phase I and II Chokecherry and Sierra Madre WDAs in October 2012. White-tailed prairie dog burrow densities from 1.8 per acre at Upper Miller Hill to 8.8 per acre in the Sage Creek Basin. All white-tailed prairie dog burrows observed on Upper Miller Hill were unoccupied. An average of 3.3 occupied burrows per acre was observed in the Sage Creek Basin (see also Section 3.5.2.2.2).
		Chokecherry and Sierra Madre Wind Project, 2013 White-tailed Prairie Dog Survey Report and Eagle Use Assessment (SWCA 2013f)	Transect surveys within the Phase I Chokecherry WDA and Phase I Sierra Madre WDA from May to August 2013. No white-tailed prairie dog colonies were recorded in the Phase I Chokecherry WDA. A total of 11 active white-tailed prairie dog colonies were recorded north of the Phase I Chokecherry WDA, 3 active colonies were recorded at Upper Miller Hill, and 99 active colonies were recorded in Sage Creek Basin (see also Section 3.5.2.2.2).
Waterbird and waterfowl surveys	2011	ECP, Chapter 5 (PCW 2015b)	Waterbird and waterfowl surveys at four major reservoirs in the vicinity were conducted in 2011. Surveyors observed 1,415 individuals representing 35 species in the spring; 1,708 individuals representing 29 species in the summer; and 11,473 individuals representing 29 species in the fall (see also Section 3.7.2.2.1).

Survey Type	Year of Survey	Report (Reference)	Survey Results
Greater sage-grouse monitoring surveys – lek surveys	2008, 2010-2014	*Greater Sage-Grouse Lek Surveys for the Chokecherry and Sierra Madre Wind Resource Areas, Carbon County, Wyoming* (Johnson, Rintz, and Strickland 2008b)	Aerial and ground surveys in Chokecherry and Sierra Madre WDAs (Phase I and II boundaries) were completed in April and May 2008. A total of 16 lek sites were identified. Lek attendance by males was 158 at the Chokecherry WDA and 120 at the Sierra Madre WDA.
		Greater Sage-Grouse Brood Surveys for the Chokecherry and Sierra Madre Wind Resource Areas, Carbon County, Wyoming (Johnson, Rintz, and Strickland 2008c)	The Chokecherry and Sierra Madre WDAs (Phase I and II boundaries) were surveyed in August and September 2008. A total of 153 greater sage-grouse were observed in the Chokecherry WDA, and 894 greater sage-grouse were observed in the Sierra Madre WDA.
		SWCA 2014e, 2014f, 2014g, 2014h	Surveys identified and monitored 29 leks within 4 miles of the Phase I development and infrastructure areas, including 11 leks within 1 mile.
Greater sage-grouse telemetry surveys	2010-2014	SWCA 2014e, 2014f, 2014g, 2014h	A total of 143 greater sage-grouse were captured and fitted with GPS transmitters to study distribution, range, and movement patterns (see also Section 3.7.2.2.5).

Eagle observation data collected from studies conducted in the Phase I development and infrastructure areas indicate that golden eagles routinely forage on lands within the Phase I development and infrastructure areas (Johnson et al. 2009; SWCA 2013a, 2013b, 2013c), with nesting concentrated in portions of the Phase I development and infrastructure areas (see Figures 3-17 and 3-18; Johnson, Rintz, and Strickland 2008a; SWCA 2011, 2012a, 2013a, 2014i). Baseline avian use surveys found that golden eagles were among the most abundant raptor species in the CCSM Project area, along with American kestrels, red-tailed hawks, Swainson's hawks, and northern harriers (Johnson et al. 2009; SWCA 2013a, 2013b, 2013c). Subsequent surveys of the Phase I development and infrastructure areas found that active golden eagle nesting occurs mainly along the Bolten Rim in the Chokecherry Plateau and along the North Platte River (Johnson et al. 2009; SWCA 2013a, 2013b, 2013c).

A total of 16 Occupied and 23 Unoccupied golden eagle nests were identified between 2008 and 2014, located within 5 miles of the Phase I development and infrastructure areas (see Table 3-27; Johnson, Rintz, and Strickland 2008a; SWCA 2011, 2012a, 2013a, 2014i). Data collected during annual nest surveys from 2011 through 2014 indicate that between 2 and 9 golden eagle nests were occupied within 5 miles of the Phase I development and infrastructure areas, as shown in Table 3-27 and Figures 3-17 and 3-18. Surveys completed in support of the CCSM Phase I Project may not have been sufficient to determine the number and distribution of Occupied golden eagles in the Phase I development and infrastructure areas. The time period used to survey for eagle nests for the CCSM Phase I Project does not align with current USFWS Region 6 recommendations. Since these nest surveys were conducted in the April to July time period there is the likelihood that Occupied eagle nests were missed since the eagle nesting season in Wyoming starts in January. It is possible that eagle nests that were Occupied early in the nesting season, but then were subsequently abandoned, or nests that failed relatively early in the nesting season were missed. To address this concern, we provided a new eagle nest survey protocol to PCW for the post-construction nest surveys in 2015. The reason for increase in the number of Occupied nests from 3 in 2013 to 9 in 2014 is unknown. Most of the eagles observed during surveys conducted at the Phase I development and infrastructure areas appear to be territorial birds or juveniles from the current year. In addition to breeding adults, the population of golden eagles includes non-breeding adult or subadult birds (SWCA 2013a, 2013b, 2013c). These birds, called floaters (Brown 1969), may move through the area and occupy territories that may become vacant as a result of breeding eagles dying or abandoning a territory.

Based on surveys in the Phase I development and infrastructure areas, golden eagles are most abundant between August and March (see Section 3.8.2.1; SWCA 2012a, SWCA 2013a, 2013b, 2013c). Higher abundance during late summer, fall, and winter could be attributed to the influx of fledged juveniles into the Phase I development and infrastructure areas from elsewhere in the LAP, or an influx of migratory or wintering golden eagles from other parts of the continent. The increased numbers could also be attributed to a change in site use by adult resident golden eagles within the LAP, including the Phase I development and infrastructure areas, to use larger foraging areas post-nesting.

Table 3-27. Summary of Occupied Golden Eagle Nests within 5 miles of the Phase I Development and Infrastructure Areas for the CCSM Phase I Project in Wyoming, between 2011 and 2014

Survey Year	Number of Occupied Nests
2011	2
2012	4
2013	3
2014	9

3.8.3 Environmental Consequences

For our analysis of eagles, we have reviewed the relevant portions of the BLM FEIS, ROD, EA1, and EA2 which discuss the direct and indirect impacts on eagles as a result of the CCSM Project. In accordance with 40 CFR 1502.2, and except to the extent that new information or new analysis provided herein updates the previous discussions, we are incorporating by reference information about direct and indirect impacts on eagles that we have found to be adequate for our analysis from the following documents:

- BLM FEIS – Section 4.14, found on pages 4.14-22 through 4.14-24
- EA1 – Section 4.2.14.2.4, found on pages 4-52 through 4-53
- EA2 – Section 4.2.9.2

In addition to the impact analysis in the BLM's NEPA documents, we reviewed comments we received during scoping, PCW's SPODs, and other PCW-supplied documents. PCW has committed to numerous conservation measures, as outlined in Chapter 2.0 of this EIS and in the ECP, Appendix K (see Attachment A). PCW has prepared an ECP for the CCSM Phase I Project, which is designed to avoid and minimize impacts on golden and bald eagles. Similarly, the sage-grouse conservation plan could indirectly benefit golden eagles by helping to maintain greater sage-grouse populations as a prey base of eagles. In addition, the Phase I BBCS was developed with the primary goal of reducing impacts on all birds. Finally, we compared several different compensatory mitigation options as described under Alternatives 1 (Proposed Action) and 2 (Proposed Action with Different Mitigation), which are designed to compensate for golden eagle take predicted for the CCSM Phase I Project and would likely also benefit bald eagles. The analysis completed in the BLM FEIS, ROD, EA1, and EA2, as well as the conservation and mitigation measures to which PCW has committed through the above documents, form the basis of our analysis in this section, which uses the impact criteria described in Table 3-28 to evaluate the level of impact of the Proposed Action and alternatives on eagles.

Potential impacts on eagles from the proposed alternatives are grouped into two main categories: construction and operation. The following general construction-related impacts are applicable to eagles: (1) injury or fatality due to collision with construction vehicles or equipment; (2) habitat loss, degradation, and fragmentation from construction of roads, power lines, turbine pads, and other surface use facilities; and (3) disturbance and displacement due to construction activities and equipment. Construction-related impacts are typically temporary, whereas operation impacts are typically long-term. Operation impacts would begin when the first turbine is operational and last as long as the CCSM Phase I Project is in operation and maintenance activities are conducted. The general operation-related impacts on eagles include (1) injury and fatality of bald and golden eagles due to collision with wind turbines as discussed in Section 2.2.1.3; (2) injury or fatality of eagles due to collisions with overhead power lines, meteorological or communication towers, buildings, or operation vehicles; (3) injury or fatality of eagles due to electrocution from overhead power lines; (4) continued effects from habitat loss, degradation, and fragmentation; and (5) continued disturbance and displacement due to operation and maintenance of the facility.

Our cumulative impacts analysis in Chapter 4.0 evaluates two landscape scales for population effects on eagles: the LAP and the EMU. The EMU for bald eagles is the Northern Rocky Mountains and Rocky Mountains and Plains (USFWS 2013b) and the EMU for golden eagles is the four BCRs described in Section 2.2.1.4.5. The LAP for bald eagles is a 43-mile radius around the CCSM Phase I Project and the LAP for golden eagles is a 140-mile radius around the CCSM Phase I Project.

Table 3-28. Impact Criteria for Eagles for the CCSM Phase I Project

Impact Category	Intensity Type	Definition
Magnitude	Major	The action would result in a large indirect impact on habitat from reduction or alteration of habitat, resulting in a substantial reduction in use by eagles for nesting, foraging, wintering, or other activities, resulting in a population-level effect. The action could result in direct injury or fatality of eagles, resulting in a population-level effect.
	Moderate	The action would result in some indirect loss of habitat or alterations that are expected to result in a measureable but moderate change in eagle use, including localized reductions in reproductive success or survival. The action could result in some direct injury or fatality of eagles, but would not result in population-level effects.
	Minor	The action could result in some indirect change to the amount or condition of habitat, but changes would have little risk of injury or fatality of eagles. The action would not be expected to result in any direct injury or fatality of eagles.
	No effect	The action would not result in any measureable or observable direct or indirect impacts on eagles or their habitat and would have no consequence.
Duration	Long-term	30 years (proposed project duration)
	Medium-term	5 years (permit term)
	Temporary	Lasting for the duration of construction
Potential to occur	Probable	More likely than not to occur
	Possible	Potential to occur

Impact Category	Intensity Type	Definition
	Unlikely	Not reasonably likely to occur
Geographic extent	Extensive	Within the two EMUs (for bald eagles) and four BCRs (for golden eagles)
	Regional	Within the 140-mile radius of the local area population for golden eagles
	Limited	Within 1 mile of Phase I development and infrastructure areas

3.8.3.1 Summary Comparison of Alternatives

Based on our environmental consequences analysis and using the evaluation criteria in Table 3-28, we identified the following key differentiators for eagles among the alternatives:

- The No Build scenario under Alternative 4 (No Action: Denial of ETPs) would impact eagles the least. Under this alternative, the proposed CCSM Phase I Project would not be built, an ETP would not be necessary, and the current direct and indirect impacts on eagles would continue.
- Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would result in the fewest impacts on eagles of any of the build alternatives, as only the Phase I Sierra Madre WDA would be developed. There would be 40 percent fewer turbines, 27 percent less habitat lost (Section 3.4.3.4.1), and fewer predicted eagle fatalities under this alternative than Alternatives 1 (Proposed Action), 2 (Proposed Action with Different Mitigation), and 4 (No Action: Denial of ETPs, Build Without ETPs scenario).
- Compensatory mitigation proposed under Alternative 1 (Proposed Action) to retrofit power poles and the different compensatory mitigation options under Alternative 2 (Proposed Action with Different Mitigation) would result in similar impacts from construction and operation. Different mitigation methods may vary in the certainty with which they would succeed, or with which their impacts could be measured, but each would result in no net loss.
- Under the Build Without ETPs scenario under Alternative 4 (No Action: Denial of ETPs), PCW would develop the CCSM Phase I Project without an ETP. Development of the project would include all avoidance and minimization measures, conservation measures, and BMPs described in Section 2.2.1.3, but would not include monitoring, adaptive management, advanced conservation measures, or compensatory mitigation. The Build Without ETPs scenario under Alternative 4 (No Action: Denial of ETPs) would result in the greatest impacts on eagles.

3.8.3.2 Alternative 1 – Proposed Action: Issue ETPs for Phase I Wind Turbine Development and Infrastructure Components

3.8.3.2.1 Construction

Direct and indirect impacts on eagles are possible from construction of the CCSM Phase I Project. Impacts on eagles may include injury or fatality due to collisions with construction equipment, including cranes or vehicles; habitat loss, alteration, and fragmentation; and displacement and disturbance. Construction activities may result in disturbance of nest sites, avoidance of foraging areas, and changes in prey distribution or abundance. Here we discuss the general impacts common to both eagle species, and the unique potential impacts on bald eagles and golden eagles are discussed separately below.

Injury and mortality of eagles associated with construction are unlikely because of the avoidance and minimization measures, BMPs, and other conservation measures as outlined in Section 2.2.1.4.2 and in the ECP, Appendix K (see Attachment A). These measures include the removal of large mammal carcasses and vehicle speed limits to prevent eagle-vehicle collisions. In addition, most construction equipment is stationary and is generally avoidable by eagles in flight.

Construction of the CCSM Phase I Project is anticipated to occur from June to October, with mobilization in May and demobilization in November each year, from 2016 to 2018. This construction season overlaps with bald and golden eagle nesting seasons, and disturbance of nesting pairs may occur as a result of construction. Construction would create high human activity levels and noise and light pollution, as well as increased traffic. Construction activities may displace resident eagles to adjacent, possibly lower-quality habitat. This may result in increased competition for resources or place other density-dependent limits on local populations. The National Bald Eagle Management Guidelines generally recommend 330- and 660-foot nest buffers (USFWS 2007b). However, these guidelines also recommend larger buffers in western states and open habitat. In Wyoming, our Wyoming Ecological Services office recommends a 0.5-mile buffer for both species to avoid disturbance (USFWS 2015e). These recommendations are for disturbance impacts, which are different from buffer recommendations for potential mortality from wind turbine strikes.

Construction would result in the loss or degradation of up to 4,465 acres of eagle habitat, which includes 850 acres of long-term modification areas (see Table 3-9). An additional 440 acres of activity areas would be temporarily cut or partially cut during construction, but clearing and grading would not occur in these areas. Additional direct and indirect impacts as discussed below may occur beyond the footprint of habitat loss. Included in the initial clearing and grading and long-term modification are 264 acres and 73 acres, respectively, which are currently altered or developed (see Table 3-9). These may or may not provide eagle habitat, such as cover or forage, for some species of eagle prey. Initial clearing and grading would result from installation of project components such as wind turbines, laydown areas, road surfaces, and related cuts and fills, and remedial grading. Eagles may avoid these areas during and after construction due to human activity and habitat loss. Construction activities and associated habitat loss, alteration, or fragmentation may also modify the eagle prey base by directly and indirectly impacting small and large mammal use of the Phase I

development and infrastructure areas (see Section 3.6.3.2). Construction activities after dark would be rare, but may create light pollution as a component of habitat degradation that extends beyond the direct footprint of habitat loss. Bald eagle foraging habitat and prey may also be affected due to water depletion, spills, or contamination of surface water, as discussed below. Furthermore, human activities may attract ravens that harass eagles and compete for carrion food sources (Kochert et al. 2002).

If issued, the standard ETP for construction of the CCSM Phase I Project would allow for the disturbance take of up to eight adult golden eagles (four nests) and two adult bald eagles (one nest), resulting in the need for a take permit for that level of eagle disturbance. These numbers are based on the presence of five eagle nests (four golden eagles and one bald eagle) that could potentially be disturbed during construction (see Section 2.2.1.3.3). The standard ETP would also cover take of eggs and eaglets at these nests, but we are not able to quantify this potential take because we cannot predict the number of eggs or eaglets at a nest or if it would even occur at all. The standard ETP would only cover disturbance take of eagles and if issued would only cover such take during CCSM Phase I Project construction. PCW has committed to avoidance and minimization measures, BMPs, and other conservation measures related to eagle impacts during construction, as discussed in Section 2.2.1.4.2 and in the ECP, Appendix K (see Attachment A).

Bald Eagles

Bald eagles would be at low risk of direct collision impacts during construction of the CCSM Phase I Project. Injuries or fatalities due to collisions with construction equipment, including cranes or vehicles, are unlikely. As discussed in Sections 2.1.2 and 3.8.2.3.1, the local bald eagle population is relatively small and, were impacts to occur, the effects would be minor in magnitude, temporary in duration, and limited in extent (see Table 3-28 for definitions of impact criteria). Any injuries or fatalities to bald eagles would be in excess of the standard ETP, which would cover only disturbance take of the one nesting pair if that were to occur, as discussed below (see Section 2.2.3.3).

Disturbance of nesting bald eagles may occur due to construction of the CCSM Phase I Project. In Wyoming, bald eagles begin nesting in January and February and fledging typically occurs from mid-June to mid-July. Juveniles remain near the nest for an additional 6 weeks after fledging (USFWS 2007b). Bald eagles are most sensitive to disturbance during the courtship and nest building phase, closely followed by the egg-laying phase, although individual bald eagles respond differently to human activity (USFWS 2007b). There would be no active construction in the Phase I development and infrastructure areas during the most sensitive nesting phases for bald eagles. However, construction activities in June to July could coincide with fledging. During this time, noise and activity near the nest could induce the young eagles to fledge too soon, which could affect their survival.

There are two Occupied bald eagle nests within 1 mile of the North Platte River Water Extraction Facility. One nest is located greater than 0.5 mile from the facility and is not considered for coverage under a standard eagle take permit for disturbance. The other nest is located within 530 feet of the facility. Traffic and activity associated with construction could be a source of disruption to this nesting pair. If a standard ETP is issued, it would include

requirements for monitoring eagle nests to determine if disturbance take from construction is occurring. If we determine that disturbance take has occurred, it would be afforded legal coverage under the standard ETP, if issued, and we may require additional conservation measures or compensatory mitigation that may be effective for offsetting the disturbance take. The definition of "disturb" considers not only the nest area, but also roosting sites and concentrated foraging areas (USFWS 2013b). However, it is only probable that construction could disturb nesting activities of this pair; therefore, the disturbance permit would cover only impacts on the pair's nesting activities, as we are not aware of the construction's likelihood to impact known foraging or roosting areas of this pair. This effect would be moderate in magnitude and limited in extent, and the impact would be temporary as this activity would occur only during construction (see Table 3-28 for definitions of impact criteria). There are an additional three Occupied bald eagle nests located along the North Platte River east of the Phase I Chokecherry and Phase I Sierra Madre WDAs (and within 5 miles of the Phase I development and infrastructure areas) and a single nest along Sage Creek, immediately east of the Phase I Sierra Madre WDA (see Figures 3-17 and 3-18). Bald eagles in these nests are not likely to hear or see the activities associated with construction in the Phase I development and infrastructure areas, which range in distance from about 3 to 5 miles from the nests.

Primary foraging areas for bald eagles in the vicinity of the Phase I development and infrastructure areas include the North Platte River corridor, Sage Creek, the Kindt Reservoir area, and the Bolten Road-Teton Reservoir area (see Figure 1-2). High levels of human activity (such as traffic on the haul road or laydown yard activity) could deter foraging or scavenging eagles, temporarily increasing the foraging time or decreasing success. Bald eagles' use of the WDAs during pre-construction eagle surveys was low (that is, 2 minutes by a single individual on a single day), suggesting that foraging deterrence due to construction would be unlikely. However, in the unlikely event eagles were to avoid foraging areas due to construction, this impact would be minor in magnitude, regional in extent (as it would not occur within 1 mile of the Phase I development and infrastructure area), and temporary in duration (see Table 3-28 for definitions of impact criteria).

Construction of the proposed project could affect fish and fish habitat by placing stream crossings along roads and extracting surface water from the North Platte River (see Section 3.5.2.1), which could result in increased foraging times or foraging distances for bald eagles in the vicinity of the CCSM Phase I Project. It is possible that impacts on fish and fish habitat could result in minor, temporary impacts on bald eagles that are regional in extent (see Table 3-28 for definitions of impact criteria).

Golden Eagles

Golden eagles are at low risk of direct collision impacts during construction of the CCSM Phase I Project. The stationary nature of most construction equipment makes collisions unlikely. Measures to reduce roadside carcasses and post speed limits should reduce the threat of vehicle-eagle collisions to the point they would be rare. Because carcasses might not always be removed promptly and because some drivers may not observe speed limits, there is still some risk of vehicle collisions. However, were direct impacts to occur, they would be moderate in magnitude, temporary in duration, and limited in extent (see Table 3-28).

Disturbance take of nesting golden eagles may occur during construction of the CCSM Phase I Project. There are 16 Occupied and 23 Unoccupied golden eagle nests within 5 miles of the Phase I development and infrastructure areas (see Figures 3-17 and 3-18) including two Occupied nests within the Phase I Chokecherry WDA and one within the Phase I Sierra Madre WDA. One Occupied and two Unoccupied golden eagle nests are located less than 0.5 mile from the proposed Phase I Haul Road (approximately 320 feet, 530 feet, and 0.4 mile), and one Occupied golden eagle nest is located 530 feet from the access road to the Road Rock Quarry. Although two of these nests are currently Unoccupied, the nest site and structure represent suitable locations for future nesting by golden eagles.

The four nests within 0.5 mile, of the Phase I Haul Road or access road could be subject to disturbance take and nest abandonment from construction activity. However, resident golden eagles in Wyoming often remain on nesting territories and maintain and repair nests year-round. A requirement of the standard ETP includes monitoring eagle nests to determine if disturbance take from construction is occurring. If we determine that disturbance take has occurred, it would be afforded legal coverage under the standard ETP, if issued and we may require additional conservation measures or compensatory mitigation that may be effective for offsetting the disturbance take. It is probable that construction of the infrastructure components would disturb the four golden eagle nests described above through noise, traffic, and human presence. It is possible that the other golden eagle nests within 5 miles of the proposed infrastructure also could be disturbed during construction (see Table 3-28 for definition of impact criteria). Each of the Occupied nests located within 1 mile of construction would be buffered from active construction disturbance between February 1 and July 15 either through our standard ETP or through BLM's 1-mile no disturbance buffer, as identified in the BLM FEIS. This impact would be moderate in magnitude, limited in extent, and temporary in duration because it would occur only during construction (see Table 3-28).

Golden eagle foraging behavior could be affected by construction activities in the Phase I development and infrastructure areas. The relatively high levels of human activity associated with construction could cause golden eagles to avoid suitable foraging habitat (Fischer et al. 1984). This may cause individuals to hunt in alternative areas of lower quality habitat, lower prey abundance, or increased competition for resources. These impacts may reduce golden eagle survival, reduce productivity, or result in abandonment of territories. However, the extent and quality of foraging areas in Carbon County may offset many of the impacts from construction. Golden eagles may switch prey in response to changing prey abundance, but rabbits and other small mammals are a major component of golden eagle prey items consumed. Small mammals are less likely than large mammals to change in abundance and distribution due to construction. Construction and human activities often coincide with increased numbers of nest predators, including common ravens, which may harass or compete with golden eagles for carrion. Golden eagles generally forage over large areas (Kochert et al. 2002) relative to the area of construction proposed for the CCSM Phase I Project. It is possible that avoidance of foraging areas due to construction may result in minor impacts on golden eagles. These impacts would be temporary in duration and regional in extent (see Table 3-28 for definitions of impact criteria).

In addition to avoidance of foraging areas, changes in the distribution and abundance of golden eagle prey may affect foraging success. Small mammals could be susceptible to

fatality from construction equipment and vehicles on roads, and habitat loss and fragmentation may reduce the carrying capacity for small and large mammals, or construction activities may cause mammals to avoid the Phase I development and infrastructure areas (see Section 3.6.3.2). Large mammal carrion is an important food source during winter and non-breeding seasons (Marr and Knight 1983; Goodwin 1977). Preston (2015) found that golden eagle nest success decreased when preferred prey species were less abundant. Impacts on small mammals and big game could result in reduced foraging success for golden eagles; however, avoidance and minimization measures, BMPs, and other conservation measures are designed to prevent direct impacts and limit indirect impacts due to construction. Impacts on golden eagle prey from construction of the CCSM Phase I Project would be possible, but minor in magnitude, regional in extent, and temporary in duration (see Table 3-28 for definitions of impact criteria).

Summary of Construction Impacts Under Alternative 1

Under Alternative 1 (Proposed Action), construction of the CCSM Phase I Project would result in the following impacts on bald and golden eagles (see Table 3-28 for definitions of impact criteria):

- Injuries and fatalities to eagles are unlikely to occur.
- Initial clearing and grading would result in the loss and degradation of up to 4,465 acres of eagle habitat as well as indirect impacts on an unknown number of acres of eagle habitat beyond this footprint.
- Moderate nest disturbance take is possible at one bald eagle nest and four golden eagle nests, and would last for the duration of construction activities.
- Construction activities could result in avoidance of foraging areas and decreased foraging success due to human activity, habitat loss, and fragmentation.
- Bald eagles could be impacted by temporary reductions in quality or quantity of fish habitat.
- Golden eagles could be affected by increased small mammal fatalities or displacement during construction, or by large mammal avoidance of Phase I development and infrastructure areas.

3.8.3.2.2 Operation

Direct and indirect impacts on eagles would occur due to operation of the CCSM Phase I Project. Injuries or fatalities would result from collisions with wind turbines, and may result from collisions with overhead power lines, meteorological and communication towers, buildings, or operation vehicles, as well as electrocutions at power lines. Additional direct and indirect impacts include habitat loss, degradation, and fragmentation carried over from construction; disturbance and displacement of eagles from preferred habitats due to operation and maintenance, which could lower foraging and nesting success; and displacement, disruption, and mortality of eagle prey species from operation and maintenance activities, which could affect eagle foraging success and nest success. The general impacts on eagles are discussed below, followed by more detailed discussions of potential impacts on each species separately.

PCW has proposed power pole retrofits as programmatic ETP compensatory mitigation for eagle take associated with the CCSM Phase I Project. Sufficient power pole retrofits would occur before operation and are intended to benefit the golden eagle population within the four BCRs. The potential benefits of power pole retrofits for eagles are discussed separately below.

Bald and Golden Eagles

Injury or Fatality

Eagle fatalities from wind turbines are well documented at some wind facilities in North America and Europe (Hunt 2002; Smallwood and Thelander 2008; Pagel et al. 2013; U.S. Department of Justice 2013, 2014). However, most wind facilities either seldom conduct fatality studies or do so to varying standards of quality and robustness, or they do not make the data publicly available (Pagel et al. 2013). Estimates of eagle fatality rates at wind generation sites vary depending upon several factors, including exposure estimates (that is, the estimated amount of time eagles spend flying in the WDA footprints and are exposed to collision with wind turbines; see Section 2.2.1.3.1), avoidance behavior, foraging habitat, prey base, geographic conditions, and habitat availability. Based on a sample of known eagle fatalities, approximately 93 percent of eagle fatalities documented at wind energy facilities in the United States, outside of the Altamont Pass Wind Resource Area, have been golden eagles (Pagel et al. 2013), and in the Phase I WDAs golden eagles are predicted to experience higher fatality rates than bald eagles (see Attachment C). Because of the difference in risks to each species for the project, we discuss the risk of turbine collisions for each species separately below.

Collisions with overhead power lines, meteorological towers, or operation vehicles may occur during operation of the CCSM Phase I Project. Eagles are agile fliers and collisions would be unlikely, but may occur while eagles are hunting or pursuing prey. Avoidance and minimization measures, discussed in Section 2.2.1.4.2 and the ECP, Appendix K (see Attachment A), would further reduce the potential for eagle collisions with power lines during operation. These measures include following APLIC guidelines for construction of overhead power lines and constructing meteorological towers without guy wires. Collisions with vehicles could occur while eagles are feeding on carrion or roadside carcasses, but measures to remove carcasses and vehicle speed limits would make vehicle-eagle collisions unlikely.

Electrocutions are a leading cause of eagle fatalities (Loss et al. 2014a; USFWS 2016c), and eagles accounted for the majority of bird electrocutions reported in several studies (Benson 1981; Harness and Wilson 2001). The large body size of eagles allows them to span the connection between different phases, or hot and grounded wires (Harness and Wilson 2001; Lehman et al. 2007; Dwyer et al. 2015). Transformers and substations also pose a risk of electrocution (Harness and Wilson 2001; Erickson et al. 2005). Low-voltage collection lines and transformers cause more electrocutions than high-voltage transmission lines (Dwyer et al. 2014). Power lines with voltages greater than 69 kV are generally lower risk because the lines are designed with sufficient spacing between conductors, making spanning connections unlikely (Lehman 2001; Lehman et al. 2007; APLIC 2006). There would be approximately

41.7 miles of 34.5-kV overhead collection lines and 33.5 miles of 230-kV overhead transmission lines constructed in the CCSM Phase I Project. Electrocution of eagles is positively associated with inclement weather, during winter, and is highest amongst juvenile eagles (Dwyer et al. 2014; Boeker and Nickerson 1975; Benson 1981; Harness and Wilson 2001; Lehman et al. 2010). APLIC (2006, 2012) has developed design recommendations for power poles and power lines to reduce eagle electrocutions and collisions, and PCW has committed to designing overhead power lines to meet APLIC recommendations and also to locating power lines underground to the extent practicable. However, it should be noted that APLIC recommendations are designed to prevent electrocution of eagles and larger birds when the feathers are dry, but they are generally not sufficient when feathers are wet (APLIC 2006). Therefore, even with proper implementation of APLIC recommendations, it may not be possible to prevent all electrocutions.

Disturbance and Displacement

The operation of the CCSM Phase I Project could cause displacement of eagles due to visual avoidance, noise pollution, and light pollution. Indirect impacts due to operation could include avoidance, or abandonment, of a nesting or foraging area, or both, because of the presence of the facility components and the associated human activity. Some studies have found no evidence of displacement of raptors from a wind energy facility (Schmidt et al. 2003; Johnson, Erickson, et al. 2000), while others have documented some avoidance (Hunt et al. 1995; Walker et al. 2005; Garvin et al. 2011). The only published report of avoidance of wind turbines by nesting raptors occurred at Buffalo Ridge, Minnesota, where no raptor nests were present within the immediate region of the wind energy facility, even though the habitat was similar to the surrounding landscape where raptor nests were relatively abundant (Usgaard et al. 1997). These observations suggest that there could be limited, long-term nesting displacement of eagles. However, PCW has agreed to spatial and temporal protections of bald and golden eagle nests to reduce disturbance at Occupied nest sites (see Attachment A).

Habitat Loss, Degradation, and Fragmentation

No additional habitat loss or degradation is expected to occur during operation of the CCSM Phase I Project; however, 850 acres of long-term habitat loss would persist throughout operation. Reclamation of the 3,615 acres of temporary habitat lost due to construction would occur during the beginning of operation. Successful reclamation to pre-construction conditions would be complicated by the arid environment and long-lived biology of native vegetation and could take 15 to 50 years (Bergquist et al. 2007). Vegetation in newly reclaimed areas would be at an earlier successional stage and may be of lower quality. These areas would not likely provide suitable habitat for the full suite of species or the density of these species that originally occupied the habitat, and reclaimed area would not provide full habitat function and values for the first several years of operation. Because there are numerous variables that affect the rate of reclamation success, it is not possible to quantify the number of acres of functional habitat loss or the rate of recovery over time.

The remnant impacts of habitat loss, degradation, and fragmentation as well as human activity during operation may reduce the abundance or alter the distribution of eagle prey

species, including small mammals, waterbirds and waterfowl, upland game birds, or big game. The effects of these perturbations are dynamic and sometimes unpredictable. Eagles may respond by shifting to less-suitable habitat or areas of increased competition for resources. Alternatively, altered areas may provide increased habitat for burrowing mammals, such as ground squirrels and white-tailed prairie dogs, which may attract eagles and increase the potential for collision. Potential spills, erosion, and sedimentation may affect the quality of surface waters, and continued water usage may reduce the quantity of surface water within and adjacent to the CCSM Phase I Project. These actions may affect fish habitat and indirectly impact bald eagle prey resources. Finally, the presence of overhead power lines and power poles may provide increased roosting and perching opportunities for eagles in the Phase I development and infrastructure areas. Although this may benefit eagles by providing additional perches in a generally treeless landscape, it may also put them at greater risk for collisions with turbines or collisions with, and electrocutions from, overhead power lines.

Bald Eagles

Direct and Indirect Impacts

The direct and indirect impacts on bald eagles from operation of the CCSM Phase I Project would be similar to those described above. However, because bald eagles exhibit different ecological characteristics, impacts on bald eagles may differ from those on golden eagles. Compared to golden eagles, bald eagles are less common in the WDAs and are concentrated near the North Platte River and Sage Creek, where open water and large cottonwoods provide foraging, roosting, and nesting habitat.

Injury or Fatality

During operation of the CCSM Phase I Project, we predict that one or two bald eagles would collide with wind turbines annually, depending on the blade diameter selected (see Table 2-2 and Attachment C). Eagle fatality data reported by Pagel et al. (2013) listed six bald eagle fatalities from wind turbines in Iowa, Maryland, and Wyoming between 1997 and 2012. Our USFWS eagle mortality database and the WGFD database reported a total of three bald eagle fatalities within the LAP analysis area between 2005 and 2014 due to collisions with wind turbines. However, this number of fatalities is considered a minimum. These two databases are not based on a statistically valid study, but instead contain information on fatalities that are reported voluntarily, along with data from incidents that are investigated by USFWS and WGFD personnel. Therefore, we assume that other bald eagle deaths occur that are not reflected in the databases.

Pre-construction eagle surveys conducted in the Phase I development and infrastructure areas reported low bald eagle activity (Johnson et al. 2009; SWCA 2012a, 2013a, 2013b, 2013c). However, the presence of nine nests along the North Platte River and one on Sage Creek suggest that bald eagles may collide with turbines, though this would occur infrequently. Lethal take of one bald eagle per year is slightly less than the 1 percent benchmark and well less than the 5 percent benchmark. The fatality of two bald eagles annually would exceed the 1 percent LAP benchmark, but is still less than the 5 percent LAP benchmark (see Section 2.1.2; USFWS 2013b).

Electrocution is a leading cause of bald eagle fatality in the United States among known bald eagle fatalities due to all anthropogenic causes (USFWS 2016c). As mentioned above, research has indicated that approximately 13 percent of bald eagle fatalities are due to electrocution, and electrocution is the third ranking cause of fatality behind poisoning and trauma. However, it is important to note that eagle fatalities in this study were submitted to the researchers opportunistically and do not represent a systematic sample (Russell and Franson 2014). Our USFWS eagle mortality database and the WGFD database reported a total of two bald eagle fatalities due to electrocution within the LAP analysis area between 2005 and 2014. PCW's commitment to construct poles following APLIC (2006) recommendations would also reduce the risk for electrocution of bald eagles.

Bald eagles may be attracted to the Phase I development and infrastructure areas, particularly power poles associated with overhead power lines. Bald eagles use power poles and transmission line towers for nesting, roosting, and perching (USFWS 2007b). The proposed project would maximize transmission line siting in topographic low areas (for example, valleys and ravines) to minimize visual impacts, and along roadways to minimize wildlife habitat effects. Bald eagle winter perch sites or roosts are important sources of protection from weather and are often found in ravines or hilly areas that provide additional shelter from prevailing winds. Some power poles may be built in sheltered areas, providing new winter roosting areas for bald eagles. While this may indirectly benefit bald eagles by providing hunting perches or protected roosting sites, it may also increase potential for collision with power lines and attract bald eagles closer to the turbines.

Overall, direct impacts on bald eagles due to operation of the Proposed Action are probable. The programmatic ETP, if issued, would authorize up to one or two bald eagle fatalities per year, depending on turbine blade diameter, which would not exceed calculated management unit take thresholds (USFWS 2009). The impact on bald eagles would be of moderate magnitude, would be long-term in duration, and would occur over an extensive geographic area (see Table 3-28 for definitions of impact criteria).

Disturbance Take at Nests

Based on the results of pre-construction raptor nest surveys, there is no bald eagle nesting activity within the Phase I Chokecherry or Phase I Sierra Madre WDAs (Johnson, Rintz, and Strickland 2008a; SWCA 2011, 2012a, 2013a, 2014i). It is unlikely that nesting bald eagles would be displaced by the operation of the CCSM Phase I Project. However, the long-term displacement of a single nesting pair is possible, as described in Section 3.1.1.2.1. Continued water extraction from the North Platte River during operation may continue to disturb this nest site. This would depend on whether PCW requests to continue water extraction during operation and the outcome of ESA consultation (see Section 3.3.3.2.2). It is possible that this disturbance would deter further use of the nest for the life of the project. If water extraction were to continue during operation, the emigration of this pair of nesting eagles could result in adverse impacts on the local population of bald eagles that are limited in extent, medium-term in duration, and moderate in magnitude (see Table 3-28 for definitions of impact criteria).

Impacts on Aquatic Prey

As discussed above, bald eagles preferentially prey on fish over other prey species; therefore, bald eagles typically forage near waterbodies, such as inland lakes, reservoirs, and waterways (Buehler 2000). Impacts on fish habitat resulting from stream crossings, potential spills, and sedimentation or contamination of waterways within the Phase I development and infrastructure areas are unlikely, given the implementation of conservation measures and BMPs discussed in Section 2.2.1.4.2 and in the ECP, Appendix K (see Attachment A). Impacts on aquatic prey due to water use during operation would also be unlikely (see Table 3-28). With implementation of conservation measures and BMPs, we do not anticipate that impacts on fish or fish habitat would rise to a level that would impact bald eagles; therefore, operation of the CCSM Phase I Project would have no effect on aquatic prey for bald eagles.

Compensatory Mitigation

As mentioned above, research has suggested that between 10 and 13 percent of recorded bald eagle fatalities are caused by electrocution, although there are uncertainties in this study due to a biased sample (Russell and Franson 2014). Two bald eagle fatalities have occurred in the LAP analysis area due to electrocution. Relative to golden eagles, bald eagles normally inhabit forested riparian areas and are less likely to use artificial perches. Nonetheless, compensatory mitigation measures to retrofit power poles for golden eagles could prevent future bald eagle fatalities at off-site locations within the four BCRs contiguous with the CCSM Phase I Project. It is probable that power pole retrofits would result in benefits to bald eagles that are moderate in magnitude, long-term in duration, and occur over an extensive area (see Table 3-28 for definitions of impact criteria).

Golden Eagles

Direct and Indirect Impacts

The direct and indirect impacts on golden eagles from operation under Alternative 1 (Proposed Action) would be similar to those described above. However, because golden eagles exhibit different ecological characteristics, impacts on golden eagles may differ from those of bald eagles. Golden eagles are common and widespread throughout the sagebrush steppe habitat of the Intermountain West (Kochert et al. 2002). Numerous golden eagle nests have been identified in the Phase I development and infrastructure areas and ample prey resources (white-tailed prairie dog, waterbirds, waterfowl, and greater sage-grouse) are also present (see Table 3-26). Golden eagles were consistently one of the most common raptors observed during pre-construction studies (Johnson et al. 2009; SWCA 2012d, 2013a, 2013b, 2013c).

Injury or Fatality

Golden eagle injury and fatality from wind facilities is well documented (Hunt 2002; Smallwood and Thelander 2008; Pagel et al. 2013; Russell and Franson 2014; Lovich 2015) and has resulted in changes in the design and operation of some wind facilities over time. Golden eagles are more susceptible than most avian species to population-level effects due to

wind energy development and operation (Beston et al. 2016). High golden eagle fatality rates have been recorded at wind facilities in California, particularly Altamont Pass Wind Resource Area. Published fatality estimates at the Altamont Pass Wind Resource Area have ranged as high as 67 to 75 golden eagles per year in 2005 through 2007 (Smallwood and Thelander 2008; Drewitt and Langston 2006), although these were primarily at turbines with lattice structure towers. The lattice structures provide perching sites for golden eagles, which attracts them to the turbines and increases risk for collision. Excluding the Altamont Pass Wind Resource Area, Pagel et al. (2013) reported 79 golden eagle fatalities at 28 facilities, including 29 fatalities at 7 facilities in Wyoming. Reviews of our USFWS eagle mortality database and the separate WGFD database indicated there were 97 golden eagle fatalities due to wind turbine collision between 2005 and 2014 within the golden eagle LAP analysis area.

We estimated golden eagle fatality rates for the CCSM Phase I Project following recommendations in the ECP guidance (USFWS 2013b) and methods as described in Section 2.2.1.3.3. This estimate considered all avoidance and minimization measures proposed for the CCSM Phase I Project. We predict that either 10 or 14 golden eagle fatalities would occur annually during operation of the CCSM Phase I Project, depending on the turbine blade diameter used (see Table 2-2). The take of 14 golden eagles would represent 0.7 percent of the population in the golden eagle LAP (see Section 4.4.6). Many of the predicted golden eagle fatalities are likely to be eagles nesting in close proximity to the CCSM Phase I Project because these eagles are likely to spend more time near the turbines. Some fatalities may also include other local non-breeding eagles (such as adult floaters and immature eagles) as well as juveniles that fledge from nests near the CCSM Phase I Project. We also acknowledge that some fatalities may consist of eagles that are migrating through or over-wintering in or near the CCSM Phase I Project. However, the best available data suggest this area is not a substantial migration corridor or wintering area for golden eagles.

According to available information, golden eagles are electrocuted more than any other bird species in the United States, accounting for 50 to 93 percent of reported fatalities in some studies (Lehman et al. 2007). In the western United States, golden eagles have appeared in available power line mortality records more than any other species, and electrocutions may be a limiting factor for the species (Lehman et al. 2010). A combination of biological, behavioral, and pole design factors may increase their susceptibility to electrocution (Hunting 2002). Power poles are attractive perches to golden eagles in the treeless sagebrush-steppe habitat of southern Wyoming (Lehman et al. 2007) and golden eagles are known to hunt from power pole perches (Dunstan et al. 1978). The primary cause of golden eagle electrocution is inadequate spacing between different phases and between phase and ground structures (Loss et al. 2014a; Dwyer et al. 2015). There are numerous different power pole and transformer designs and configurations, and many different procedures to prevent electrocutions, which are outlined in APLIC (2006). It is important to note that these guidelines are not completely effective in preventing all eagle electrocutions (such as when feathers are wet), but provide important steps to substantially reduce the potential for electrocution.

Past studies have found that golden eagles are electrocuted more frequently than bald eagles in the western United States (Harness and Wilson 2001). Between 1975 and 2013, 27 percent of golden eagle remains brought to the National Wildlife Health Center were found to have

died by electrocution (Russell and Franson 2014). As much as 90 percent of golden eagle fatalities are juveniles, and 80 percent occurred during winter in the western United States (Boeker and Nickerson 1975; Benson 1981; Harness and Wilson 2001; Lehman et al. 2010). However, while these sources of electrocution fatalities are the best available at this time, the eagles discussed in these studies were found by chance or opportunistically and may not accurately reflect true fatality rates.

The USFWS eagle mortality and WGFD databases reported 217 eagle fatalities due to electrocution within the golden eagle LAP analysis area between 2005 and 2014. The best available electrocution rate estimates for the intermountain west come from a study in northeast Utah and northwest Colorado. Lehman et al. (2010) estimated a minimum eagle electrocution rate of 0.0036 electrocutions per pole per year and a maximum rate of 0.0066 electrocutions per pole per year. Loss et al. (2014a) concluded that not enough rigorous studies have been conducted to quantify fatality rates on power lines by species, season, or geographic area. PCW has committed to avoidance and minimization measures that include adherence to APLIC (2006) recommendations for design of power lines. These measures would reduce the potential for golden eagle electrocutions at overhead power lines associated with operation of the CCSM Phase I Project. As discussed above and in Section 2.2.1.3.3, the programmatic ETP would allow for 10 or 14 golden eagle fatalities annually during operation of the CCSM Phase I Project, depending on turbine blade diameter. Avoidance and minimization measures, which are required under an ETP, were included in these take estimates and are outlined in Section 2.2.1.3. Despite the avoidance and minimization measures required by the ETP and committed to by PCW, golden eagle fatalities due to operation of the proposed project are probable. This number of golden eagle fatalities would represent a moderate effect on the eagle management unit populations, would occur over the long-term, and would have extensive impacts throughout the golden eagle LAP and possibly throughout the four BCRs (see Table 3-28 for definitions of impact criteria).

Nest Disturbance

PCW and the BLM have documented multiple golden eagle nesting territories within the Phase I development and infrastructure areas (see Figures 3-17 and 3-18). Due to the proximity of some golden eagle nests to proposed project infrastructure, long-term displacement from nest sites is possible. The displacement of golden eagles from the Phase I development and infrastructure areas could increase competition with other eagles for nest sites and prey, and could reduce regional (that is, LAP) productivity. As described in Section 2.2.1.3.2 and in further detail in the ECP (see Attachment A), PCW has agreed to curtail operation of turbines within 2.2 miles of Occupied nest sites during the breeding season and promote nest establishment by curtailing operation within 1 mile of Unoccupied nest sites between February 1 and April 30. Impacts on golden eagle nest sites and nesting golden eagles from operation of the CCSM Phase I Project are possible, and could result in adverse effects that are moderate in magnitude, long-term in duration, regional in extent (see Table 3-28 for definitions of impact criteria).

Disturbance of Foraging Areas

Golden eagles tend to avoid areas of high human activity (Fischer et al. 1984). Operation of the CCSM Phase I Project could cause behavioral avoidance of foraging habitat within the Phase I development and infrastructure areas. Grassland and shrubland habitats within the Phase I development and infrastructure areas are regularly used by eagles for foraging. Displacement of golden eagles to adjacent, potentially lower quality foraging areas could increase competition for resources, increase the energy required for hunting, and decrease foraging success. This could subsequently result in lower nestling and fledgling feeding rates (Coates et al. 2014). A benefit of avoidance of the Phase I development areas would be reduced potential for collision fatalities (Madders and Whitfield 2006). However, there is no guarantee that avoidance would occur (Schmidt et al. 2003; Johnson, Erickson, et al. 2000). In fact, power poles may attract golden eagles to the area to use while foraging (Craig et al. 1986), particularly in a landscape generally devoid of perching structures. Overall, it is probable that the displacement and disturbance of golden eagles from foraging areas due to operation of the CCSM Phase I Project would result in impacts that are regional in extent, long-term in duration, but minor to moderate in magnitude (see Table 3-28 for definitions of impact criteria).

Impacts on Small Mammal Prey

Habitat loss, degradation, and fragmentation could result in impacts on golden eagle prey species, including a reduction in habitat quality, decrease in survival and abundance, displacement and avoidance, or low levels of small mammal mortality. The prey species commonly found within the Phase I WDAs are white-tailed jackrabbit, desert cottontail, and mountain cottontail (see Section 3.6.2.1). All three species tend to inhabit areas with moderate shrub densities for use as cover from predators. In addition to rabbit species, white-tailed prairie dogs are also an important prey source during the spring and early summer (Kochert et al. 2002). However, prairie dog densities are low across the project site relative to densities of rabbits and other small mammals, with the highest densities along the Bolten Rim region of the Phase I Chokecherry WDA (SWCA 2012a, b, c, d).

The presence and operation of wind turbines, access roads, power lines, and substations would result in the long-term, permanent loss of 850 acres of habitat for prey species as well as impacts on additional acres such as habitat fragmentation and other indirect effects which we are unable to quantify. In addition to direct habitat loss, small mammals and grouse would likely avoid roads and structures as well as activity associated with operation and maintenance. Although initial clearing and grading and activity areas would be re-vegetated, some areas would continue to be susceptible to invasion by weeds, resulting in degraded habitat, including increased potential for wildfires. We expect grass and forb communities to become established within the first several years following reclamation; however, shrub re-establishment to pre-construction levels would not be achieved for at least 15 to 50 years (depending on the species), delaying the return of suitable habitat for some species. The increased human activity associated with operation and maintenance may result in mortality of golden eagle prey due to vehicle collisions. A full discussion of project effects on small mammal populations is included in Section 3.6.3.2.1. The positive correlation between prey abundance and golden eagle nest occupancy and productivity is well documented (Watson et

al. 1992; Bates and Moretti 1994; Steenhof et al. 1997; Moss et al. 2012). Therefore, adverse or beneficial effects on the eagles' prey base could result in changes to eagle productivity (that is, the number of fledglings produced) or whether or not a nesting pair will breed in a given year (Steenhof et al. 1997). Golden eagle small mammal prey populations are resilient to perturbations in their environment (Steenhof et al. 1997), suggesting they could withstand impacts from habitat loss, degradation, and fragmentation as well as associated minor levels of mortality. It is probable that adverse impacts on golden eagles due to impacts to their prey populations would be long-term in duration, regional in extent, but minor in magnitude (see Table 3-28).

Impacts on Big Game Prey

Another important prey base for the golden eagle is big game species such as mule deer and pronghorn, which provide golden eagle foraging opportunities throughout the year. During spring and summer months, big game calving areas are important as golden eagles prey on young (Deblinger and Alldredge 1996; Kochert et al. 2002). During the winter, carrion remains from natural big game mortalities or hunter-left gut piles are an important food source for golden eagles (Steenhof et al. 1997). Early coordination and siting efforts have avoided or minimized project effects on big game calving areas. Therefore, indirect effects on golden eagles from impacts on big game species are unlikely to occur; however, if they were to occur they would be minor in magnitude, long-term in duration, and regional in extent (see Table 3-28 for definitions of impact criteria).

Increase in Raven Abundance

In addition to a potential increase in competition from other raptor species, the addition of transmission lines in the Phase I development and infrastructure areas may increase the abundance of common ravens. Recent studies of raven response to anthropogenic and natural landscape change indicated that raven abundance increases with increasing disturbance and anthropogenic structures (Coates et al. 2014; Howe et al. 2014). The common raven is a generalist with a diverse diet, including eggs and nestlings of other birds as well as carrion (Boarman and Heinrich 1999). An increase in the abundance of ravens in the landscape could possibly increase raven harassment of golden eagles and nestling fatality or increase competition for winter carrion (Kochert et al. 2002). An increase in common raven abundance is possible and could result in adverse impacts to golden eagle productivity that are minor in magnitude, regional in extent, and long-term in duration (see Table 3-28 for definitions of impact criteria).

Compensatory Mitigation

We have determined that golden eagle populations in the United States may not be able to sustain any additional, unmitigated mortality and the threshold for take of this species is zero (USFWS 2009). Therefore, any take of golden eagles for the CCSM Phase I Project must be equally offset by compensatory mitigation (USFWS 2009). The compensatory mitigation included under Alternative 1 (Proposed Action) would be designed to prevent future potential golden eagle electrocutions at some off-site locations. As described in Section 2.2.1.4.5, PCW would retrofit high-risk power poles to compensate for golden eagle fatalities from operation of the CCSM Phase I Project. Retrofitting could take place anywhere throughout

the four BCRs contiguous with the CCSM Phase I Project (see Figure 2-2) in general landscape areas we have identified as priority sites for power pole retrofits. PCW would then work with utilities and USFWS to identify high-risk electric power poles that pose potential risks to eagles. We would require that all retrofits occur on high-risk power poles that were not already planned and scheduled to be implemented. We are currently developing predictive models that will assist with identification of the best retrofit locations. At this time, power pole retrofitting is the only option that we accept as providing a credible and quantifiable fatality offset for eagles (USFWS 2013b).

Most studies evaluating the efficacy of retrofitting power poles for eagle mortality are based on opportunistic discoveries of eagle remains versus controlled studies that include bias trials and statistically valid study designs. However, these studies provide the best available data on power pole retrofits. Lehman et al. (2007) reported that power pole retrofitting reduced fatalities in four of five monitoring studies completed before and after mitigation. Benson (1981) monitored four power line segments retrofitted to minimum APLIC guidelines and found no avian fatalities. In another study, perch guards and artificial perches did not reduce fatalities, but lowering cross-arms and installing taller poles reduced fatalities by 75 percent (Garrett 1993, as cited in Lehman et al. 2007). A long-term capture-recapture program of Bonelli's eagles in France indicated that insulation of power lines has a strong beneficial impact on juvenile eagles and the mitigation was responsible for a sharp increase in survival rate (Chevallier et al. 2015).

As described in Section 2.2.1.4.5, we used the Resource Equivalency Analysis (USFWS 2012b) to quantify the number of power pole retrofits needed to offset golden eagle take from the CCSM Phase I Project. We calculated the credit owed for a 5-year permitted take of golden eagles based on the relative productivity of electric pole retrofitting as defined in the Resource Equivalency Analysis (see Table 2-4). For a permitted take of 50 or 70 golden eagles (10 or 14 golden eagles per year for a 5-year period depending on wind turbine blade diameter), the number of power poles to be retrofitted to achieve no-net-loss of golden eagles for the CCSM Phase I Project would be 2,778 or 3,778 poles (depending on turbine blade diameter) assuming the measures taken to retrofit poles lasts for 5 years (that is, 5 years of avoided loss). If the measures taken to retrofit poles would last for 10 years (that is, 10 years of avoided loss), the number of power poles to be retrofitted would be 1,492 or 2,029, as described in Section 2.2.1.4.5.

It is probable that power pole retrofits would offset impacts on the golden eagle population that are long-term in duration and occur over an extensive area (see Table 3-28 for definitions of impact criteria). Because compensatory mitigation is performed to offset eagle injury and fatality, assigning a magnitude is not appropriate.

Summary of Operation Impacts Under Alternative 1

Under Alternative 1 (Proposed Action), operation of the CCSM Phase I Project would result in the following impacts on eagles (see Table 3-28 for definitions of impact criteria):

- The direct injury or fatality of 10 or 14 golden eagles and 1 or 2 bald eagles, depending on turbine blade diameter, due to collision with wind turbines.

- Continued disturbance of 4 golden eagle pairs and 1 bald eagle pair at nest sites due to operation and maintenance activities.
- Potential injuries or fatalities due to collision with wind turbines, meteorological and communication towers, buildings, and operation vehicles, in addition to collisions and electrocutions with overhead power lines.
- Potential displacement of golden eagles from foraging areas within the Phase I development and infrastructure areas.
- Potential impacts on water quality and quantity due to sedimentation, erosion, and extractive water use which could indirectly impact bald eagle foraging habitat and prey.
- Potential displacement, fatality, or reduction in density of small mammal prey for golden eagles, which could lead to a reduction in productivity.
- Potential displacement and disruption of big game, which could alter the abundance and distribution of prey for golden eagles.

3.8.3.3 Alternative 2 – Proposed Action with Different Mitigation

Under Alternative 2 (Proposed Action with Different Mitigation), the Phase I development and infrastructure areas would be developed as proposed by PCW, but the compensatory mitigation for golden eagle take would be different. Instead of PCW's proposed power pole retrofits, we would require different compensatory mitigation, as described in Section 2.2.2. To be accepted as compensatory mitigation, the mitigation would be required to achieve no-net-loss of golden eagles as a result of operation of the CCSM Phase I Project. One or more compensatory mitigation measures could be selected. Below, we discuss how each compensatory mitigation option could reduce eagle fatalities, how it compares to the proposed power pole retrofit compensatory mitigation, and the unique challenges involved in successful implementation of each option.

3.8.3.3.1 Construction

Under Alternative 2 (Proposed Action with Different Mitigation), construction of the Phase I Chokecherry and Phase I Sierra Madre WDAs would be occur as proposed by PCW. However, the compensatory mitigation for golden eagle take would be different than that described in PCW's ETP application. Compensatory mitigation is a component of the programmatic ETP and is therefore a part of operation. Therefore, construction impacts on eagles would be consistent with those described under Alternative 1 (Proposed Action) in Section 3.8.3.2.1.

3.8.3.3.2 Operation

Under Alternative 2 (Proposed Action with Different Mitigation), predicted operation impacts on golden eagles described in Section 3.8.3.2.2 would be mitigated by one or more compensatory mitigation options, as discussed in Section 2.2.2.1. The impacts from operation of the CCSM Phase I Project would be identical to those described under Alternative 1 (Proposed Action), except for the compensatory mitigation. However, rather than require PCW to retrofit power poles, one or more different mitigation measures would be required to compensate for predicted golden eagle take. To be accepted as compensatory mitigation, the

measures would need to achieve no-net-loss of golden eagles due to operation of the CCSM Phase I Project. At present quantitative methods have not been developed for any of the alternative mitigation options that document how many eagles would be conserved per unit of mitigation measure applied. Hence, USFWS has not yet accepted any of these alternative mitigation measures as viable in the context of eagle take permitting. Additionally, these measures would benefit bald eagles to varying degrees. The viability of each compensatory mitigation option is discussed separately for bald and golden eagles below.

Bald Eagle

Predicted recurring bald eagle take associated with the CCSM Phase I Project would not exceed calculated bald eagle management unit take thresholds; therefore, no compensatory mitigation would be required for bald eagles at this time. However, bald eagles would benefit indirectly from compensatory mitigation of golden eagles. All of the potential compensatory mitigation measures would be beneficial to bald eagles, but at varying magnitudes depending on specific details of the mitigation strategies.

Mitigation of Existing Wind Facilities

The mitigation of existing wind facilities could benefit bald eagles by curtailing operation of turbines during daytime hours or decommissioning high risk turbines. Mitigation efforts could include the daytime curtailment or decommissioning of off-site turbines where golden eagle fatalities have occurred or risk is known to be high. These efforts could all benefit bald eagles, but their effectiveness in preventing bald eagle fatalities would depend on the location of the turbines as well as the surrounding habitat and bald eagle abundance. Given the information available, and depending on the location, the beneficial impacts on bald eagles from mitigation of existing wind facilities could be less than those from power pole retrofits (Alternative 1 [Proposed Action]). It is possible that the mitigation of existing wind facilities would reduce impacts on bald eagles and result in moderate benefits that are long-term in duration and occur over an extensive area (see Table 3-28 for definitions of impact criteria).

Lead Abatement

Poisoning was attributed to 26 percent of bald eagle fatalities in the United States and lead is the culprit in a majority of fatalities from poisoning (Russell and Franson 2014). It is important to note that the sample in this study was obtained opportunistically and is prone to biases, but does suggest that poisoning is an important cause of bald eagle fatalities. Bald eagles may be exposed to lead through consumption of fishing gear and predation on waterfowl that had ingested lead from ammunition, though bans on lead shot in waterfowl hunting has had some success in reducing this source of contamination. Bald eagles may also be exposed to lead through consumption of lead in hunter-killed big game carcasses and gut piles left in the field. There is a strong positive association between big-game hunting seasons and lead contamination levels in bald eagles throughout western North America (Clark and Scheuhammer 2003; Wayland et al. 2003; Stauber et al. 2010; Cruz-Martinez et al. 2012; Franson and Russell 2014). For instance, in Wyoming, 24 percent of bald eagles tested between 2005 and 2010 (excluding 2008) had lead levels indicating at least clinical exposure (in other words, a blood lead level greater than 0.6 milligram per liter at which

clinical signs consistent with lead poisoning can be observed) during the hunting season, while no eagles had levels this high outside of the hunting season (Bedrosian et al. 2012). After providing non-lead ammunition to local hunters during the 2009 and 2010 seasons, lead exposure in bald eagles showed a statistically significant reduction (Bedrosian et al. 2012). Based on a sample of eagle remains received by the National Wildlife Health Center, poisoning may cause fewer fatalities in golden eagles than bald eagles (Russell and Franson 2014).

Reducing the prevalence of lead shot used by hunters through voluntary programs and reducing the number of gut piles left in the field through hunter education could reduce the number of bald eagle fatalities due to lead poisoning. The WGFD has commented that non-lead ammunition alternatives are becoming more common in the market place and more hunters are using non-lead shot in consideration of their own health. However, in large portions of the western United States, there remains considerable social resistance among hunters and shooters to switch from lead shot to non-toxic shot. It is probable that lead abatement measures would result in moderate benefits to bald eagles that are long-term in duration and occur over an extensive area (see Table 3-28 for definitions of impact criteria).

Carcass Removal and Carcass Avoidance

Compensatory mitigation measures to remove or prevent the presence of roadside carcasses could benefit bald eagles. Bald eagles primarily consume fish, followed by waterbirds, waterfowl, and shorebirds, but carrion from big game and livestock is also locally important (Travsky and Beauvais 2004). Bald eagle fatalities due to vehicle collisions represented approximately 5.8 percent of all fatalities in a study in the United States (Tetra Tech 2011, as cited in Allison 2012). As with most eagle fatality studies, this was likely based on an opportunistic sample that is prone to biases. There were three reported bald eagle fatalities due to vehicle collision within the LAP analysis area between 2005 and 2014, which accounts for 27.3 percent of all bald eagle fatalities in our USFWS eagle mortality database and the WGFD database. Again, these data are based on opportunistic observations and may not accurately reflect actual mortality rates. As compared to the compensatory mitigation proposed under Alternative 1 (Proposed Action), the beneficial impacts from carcass removal and prevention efforts to bald eagles might be similar to beneficial impacts from power pole retrofits; however, we currently lack data to fully evaluate the differences. It is possible that carcass removal and avoidance efforts would moderately benefit bald eagles over the long-term and occur on a regional extent (see Table 3-28 for definitions of impact criteria).

Wind Conservation Easement

A wind conservation easement could prevent future potential injuries and fatalities of bald eagles due to operation of wind turbines, overhead power lines, meteorological and communication towers, buildings, and operation vehicles. However, it would not necessarily protect bald eagles from impacts associated with other potential land uses permitted under the easement. The exact location of the easement, current or potential future use of the land, and amount of suitable habitat in that area would determine the potential for and magnitude of beneficial impacts on bald eagles. This alternative mitigation option is unproven and lacks a credible method for quantification of benefits. As compared to the mitigation proposed

under Alternative 1, we predict the beneficial impacts on bald eagles from a wind conservation easement could be less than those from power pole retrofits, depending on location. It is possible that a wind conservation easement would result in minor benefits to bald eagles that are long-term in duration and regional in extent (see Table 3-28 for definitions of impact criteria).

Habitat Enhancement

Although bald and golden eagles differ in habitat and prey preferences, improvements to golden eagle habitat and prey resources may result in subsequent improvements to bald eagle habitat. Therefore, habitat enhancements within conservation banks, increases in golden eagle prey availability, and sagebrush vegetation improvements, including prevention and removal of noxious or invasive weeds, could result in some benefits to bald eagles. As compared to the compensatory mitigation proposed under Alternative 1 (Proposed Action), the beneficial impacts on bald eagles from golden eagle habitat enhancements would likely be less than those from power pole retrofits. It is possible that golden eagle habitat enhancements may result in some minor benefits to bald eagles. If benefits did result, they would be long-term in duration and occur over an extensive area (see Table 3-28 for definitions of impact criteria).

Rehabilitation of Injured Eagles

Increasing the number of golden eagles in the region that are rehabilitated and reintroduced to the wild would primarily only benefit golden eagles, as that would be the focus of the additional funds. However, providing funds for golden eagle rehabilitation to rehabilitation centers that also care for bald eagles may modestly increase the number of bald eagles that benefit. This mitigation option is unproven and its applicability is currently unknown (see below). As compared to the mitigation proposed under Alternative 1 (Proposed Action), the beneficial impacts on bald eagles from increased funding of eagle rehabilitation centers would be less than those from power pole retrofits. It is unlikely that this mitigation option would result in minor benefits to bald eagles, but were they to occur, the benefits would be long-term in duration and occur over an extensive area (see Table 3-28 for definitions of impact criteria).

Golden Eagle

Currently, before any compensatory mitigation can be accepted when issuing an ETP, a credible, quantitative analysis needs to support the conclusion that implementing the compensatory action would achieve the desired no-net-loss in the golden eagle population through an offset in mortality or carrying capacity (USFWS 2009). This means that we would need to provide a credible prediction of golden eagle survival or productivity to establish the validity of the compensatory mitigation. This proves challenging because the empirical data needed to make these predictions is currently available only for power pole retrofitting.

We will require “a relatively high degree of confidence in the effectiveness of compensatory mitigation” for the CCSM Phase I Project. The following paragraphs review the scientific

evidence available for each mitigation option and the potential viability of each compensatory mitigation option in achieving no-net-loss of golden eagles.

Mitigation of Existing Wind Facilities

The mitigation of existing wind facilities could reduce golden eagle fatalities due to collisions with wind turbines and associated infrastructure. Funding the decommissioning or daytime curtailment of high risk turbines could prevent future fatalities. Curtailment of wind turbines can result in high costs and lost revenue to operators, but if supported by reliable data and proven to be financially sound, it could be effective at reducing golden eagle fatalities.

Identifying facilities or turbines where there is a high risk for golden eagle collisions may prove difficult. A lack of post-construction monitoring at most wind facilities, and the proprietary nature of the information collected (Katzner et al. 2016), make it difficult to select specific mitigation sites. Furthermore, where known golden eagle fatalities have occurred, such as at PacifiCorp and Duke Energy facilities in Wyoming, court-ordered settlement agreements have resulted in implementation of avoidance and minimization measures (including curtailment) that have already reduced fatality rates. We are uncertain of the practical applicability of this alternative compensatory mitigation option due to the challenges described above.

Lead Abatement

Lead poisoning is a documented source of fatality for golden eagles in Wyoming and across North America (Schuehammer and Norris 1996; Russell and Franson 2014; Langner et al. 2015). Poisoning was the cause of death for 8.2 percent of the 1,427 golden eagles submitted to the National Wildlife Health Center and over 58 percent of those deaths were caused by lead poisoning (Russell and Franson 2014); however, the eagles evaluated in this study were not from a random sample and the actual impact of lead poisoning on eagle populations is unknown, though this is the best estimate available. Another study listed poisoning as the second highest cause of anthropogenic mortality for golden eagles, accounting for 13.3 percent of fatalities (Tetra Tech 2011, as cited in Allison 2012). Schuehammer and Norris (1996) estimated 10 to 15 percent of post-fledgling bald and golden eagle fatalities in Canada and the United States were due to lead poisoning. Langner et al. (2015) found that 58 percent of golden eagles captured in western Montana had increased blood lead levels, 10 percent were clinically exposed (greater than 0.6 milligram per liter), and 4 percent were lethally exposed (greater than 1.2 milligrams per liter). In the same study, golden eagles captured while feeding on carrion had higher blood lead levels than those captured using live bait, suggesting that the major source of lead poisoning is from gut piles left behind by big game hunters. Fatalities from lead poisoning due to scavenging shot animals across North America were estimated between 2 and 3 percent and climbed to 3.2 percent during big game hunting in Wyoming (Cochrane et al. 2015).

The implementation of voluntary programs designed to reduce the use of lead bullets and shot or reduce gut piles left by hunters could reduce impacts on golden eagles in the region. Programs to reduce lead exposure have had measurable results, but variable success. Kelly

et al. (2014) found that elevated blood lead levels in golden eagles dropped from 83 percent to zero following a lead ammunition ban in California. A voluntary program in Wyoming to use non-lead rifle ammunition and remove gut piles had 24 to 83 percent participation and researchers documented a decline in mean seasonal blood lead levels, despite an increase in total game harvested (Bedrosian et al. 2012). However, in large portions of the western United States, there remains considerable social resistance among hunters to switch from lead shot to non-toxic shot, and it may be difficult to successfully implement a voluntary program over a large enough area to achieve the level of eagle mortality reduction required under the permit.

Although lead abatement is currently an unproven approach, our interpretation of the BGEPA allows for innovative compensatory mitigation measures (USFWS 2009). The Cochrane et al. (2015) model incorporates golden eagle density and big game harvest levels to calculate the percentage of hunters switching to non-lead ammunition that would be necessary to reduce eagle fatalities by the number required for compensatory mitigation. According to this model, a relatively high proportion of hunters would need to voluntarily switch to non-lead ammunition to achieve no-net-loss of golden eagles using this mitigation measure alone (Cochrane et al. 2015).

Based on a limited number of studies with small sample sizes and biased data collection methods, a higher proportion of golden eagle fatalities occur from electrocution than poisoning. If the studies are accurate they suggest that a greater effort would be required to achieve no-net-loss of golden eagles through lead abatement. Public outreach and education require considerable effort and have a high level of uncertainty. However, given a robust monitoring program designed to track success, this option could meet the criteria for a credible and quantifiable analysis. While lead abatement efforts could result in offsets to golden eagles, there are substantial challenges to achieving no-net-loss of golden eagles using this mitigation measure.

Carcass Removal and Carcass Avoidance

Removing road kill carcasses from roadways or installing road kill prevention measures could reduce golden eagle fatalities caused by collisions with vehicles. Trauma was the most common cause of fatality for golden eagles submitted to the National Wildlife Health Center between 1982 and 2013 (Russell and Franson 2014), but the proportion of these deaths caused by vehicle collision is unknown. Another nationwide study reported that 4.5 percent of fatalities are from vehicle collisions (Tetra Tech 2011, as cited in Allison 2012). Within the LAP analysis area, there were 60 golden eagle fatalities due to collisions with vehicles between 2005 and 2014, which represents 14 percent of all fatalities. Vehicle-eagle collision rates are often overestimated because eagle remains along roadways are easier to find than elsewhere (Russell and Franson 2014).

As discussed in Section 2.2.2.4.3 and 2.2.2.4.4, if there were sufficient evidence that carcass removal or carcass avoidance would result in quantifiable and verifiable benefits to golden eagles, PCW may be able to pursue this type of compensatory mitigation. Removal of carcasses or installation of wildlife crossing structures could be most effective in the high-density carcass areas shown in Figure 2-7. Currently there are no estimates for the number of

golden eagle fatalities occurring along roadways in the region, nor how golden eagle-vehicle collision fatalities are related to the presence or absence of big game carcasses on major roadways. Scientifically credible studies to quantify eagle fatality rates on roadways related to carcass abundance would be necessary before carcass removal or carcass avoidance could be considered further as a possible compensatory mitigation measure.

This compensatory mitigation option would require additional study to determine its effectiveness. The financial costs associated with carcass removal, or wildlife deterrence or crossing structures or both, would be far greater, per golden eagle fatality prevented, than the costs associated with power pole retrofits.

Wind Conservation Easement

A wind conservation easement could prevent potential future detrimental impacts on golden eagles at an off-site location. As described in Section 2.2.2.4.5, under this mitigation option, PCW would establish an easement on undeveloped, privately owned land inside the LAP with high wind power potential. This land would also need to have a high likelihood for future wind development, and we would require an estimate of the number of turbines and predicted golden eagle fatalities that would result—but that would be avoided—through an easement. A conservation easement of this type could allow other land uses, so long as these uses did not pose a risk of golden eagle fatalities, unless this risk was compensated through additional easements or other mitigation.

Several wind facilities across the United States have directly or indirectly purchased conservation easements as compensatory mitigation for impacts. The Sweetwater River Conservancy was established as the first conservation bank for wind energy mitigation in Wyoming (Jakle 2012). As compared to a traditional conservation easement, we would require a credible and quantifiable account of golden eagle losses prevented.

As described, a wind conservation easement could be a successful form of compensatory mitigation; however, there are challenges to achieving this goal. The CCSM Phase I Project is itself a large potential wind energy facility. Finding a parcel or parcels of land that would offset the number of eagles needed for the CCSM Phase I Project could prove challenging. If the site were found, coordinating with one or more private landowners that would be willing to enter into an agreement of this nature and forfeit the potential long-term financial profits from wind energy development could be difficult (Doherty et al. 2011). If these obstacles were overcome, we would require reliable pre-construction studies indicating the level of risk for golden eagles, which would require additional time and resources to complete. Despite the challenges, this option has the potential to be a successful form of compensatory mitigation.

Habitat Enhancement

Numerous studies agree that habitat loss and alteration is the largest factor contributing to a decline in golden eagle populations (Katzner et al. 2012; Preston 2013; Zimmerling et al. 2013; Tack and Fedy 2015). Conservation banks could be used to enhance and permanently protect golden eagle nesting and foraging habitat. If determined necessary, artificial perch or

nesting structures could be placed in these same areas and in areas with low current or potential development. Prey enhancement activities could increase prey availability to golden eagles. However, these actions would need to occur in the timeframe needed to meet mitigation requirements. In the arid intermountain west, improvements in vegetation structure and function may require longer time periods (American Wind Wildlife Institute [AWWI] 2014b). The benefits to golden eagles could potentially be quantified through a resource equivalency analysis model. However, a robust and scientifically credible quantification of golden eagle fatalities prevented, or population increased, as a result of this mitigation may be difficult to achieve.

Rehabilitation of Injured Eagles

Providing additional funds to increase the number of injured golden eagles rehabilitated could directly benefit golden eagles throughout the four BCRs. Rehabilitation centers acquire sick, injured, and debilitated, or orphaned wildlife to provide necessary treatment so that the wildlife may be returned to the wild or transferred to a zoo or other educational institution.

Statistics concerning the success of golden eagle rehabilitation and subsequent reintroduction into the wild are difficult to find. Sweeney et al. (1997) evaluated morbidity and survival in rehabilitated and wild peregrine falcons and found survival rates of 20 percent for rehabilitated peregrines up to 3 months after release, 14 percent survival up to 1 year, and survival rates similar to wild falcons beyond 1 year. Fajardo et al. (2000) had similar results when they compared local wild populations of barn owls to rehabilitated and released individuals and found that released individuals showed greater fatality rates due to starvation and lower life expectancy.

This compensatory mitigation strategy would be effective only if there currently are eagles that are turned away or not treated due to lack of funds. While this is the case for at least one rehabilitation center in Colorado, permitting challenges and other factors are also important considerations when turning away eagles. Funding could be used to build flight cages, which allow rehabilitation centers to comply with federal permits and house eagles for a longer duration, during which time suitable treatment or relocation can be arranged. Estimates of costs per eagle rehabilitated are wide ranging and dependent on numerous factors, but are estimated at $100 to $200 per bird on top of $35,000 to $40,000 annual in operating costs per rehabilitation center. Four rehabilitation centers in Colorado and Wyoming were interviewed, and over the last year (2015) had received a total of 31 bald and golden eagles. Of these eagles, 12 were released to the wild and 14 were euthanized or died in care (with 5 still in care). This alternative mitigation method is currently unproven and is not reliably quantifiable as the survival rate of reintroduced golden eagles in Wyoming is currently unknown. Given the small number of rehabilitation centers, the relatively small number of eagles assisted through these centers, the small number of eagles released, and the unclear success rate, there would be inhibitive challenges to making this a successful mitigation option. Funding for eagle rehabilitation could have other benefits, such as cultural benefits to Native American tribes for whom eagles are an important cultural resource (see Section 3.9.3.3). However, if the strategy does not result in no-net-loss, it could not be used as compensatory mitigation.

3.8.3.3.3 Summary of Construction and Operation Impacts Under Alternative 2

Alternative 2 considers seven alternate compensatory mitigation measures to offset predicted golden eagle fatalities due to operation of the CCSM Phase I Project. Impacts due to construction and operation of the CCSM Phase I Project would be identical to those described under Alternative 1 (Proposed Action). However, rather than retrofitting power poles, PCW would perform a different type of compensatory mitigation. The following is a brief comparison of the alternate mitigation options:

- None of the alternative compensatory mitigation options have been endorsed by the USFWS, although we are open to considering each as a possible substitute for power pole retrofits.
- Recent peer-reviewed studies have identified models to quantify eagle productivity per hunter switching to non-lead ammunition; however, successful implementation of this compensatory mitigation measure is uncertain given public resistance and the number of hunters required to switch ammunition to achieve no-net-loss of golden eagles.
- There may be some difficulty in identifying existing wind facilities with unmitigated high risk to golden eagles, and curtailment of turbines would be met with considerable resistance due to the financial drawbacks.
- More study is needed to evaluate the efficacy of carcass removal and avoidance on mitigating impacts on eagles.
- A wind conservation easement would prevent future wind energy development and associated impacts on eagles within a certain geographic area; however, it may not fully protect eagles from impacts due to other permitted land uses within or near this area.
- Because of the length of time required to fully implement habitat enhancements, it is unlikely that this type of compensatory mitigation would be successful within the time period that would be required for the CCSM Phase I Project.
- There currently are insufficient data available to evaluate the efficacy of rehabilitating injured eagles.

3.8.3.4 Alternative 3 – Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project

Under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), only the Phase I Sierra Madre WDA and the associated infrastructure components would be developed as proposed by PCW. Alternative 3 would result in impacts on eagles as described in Section 3.7.3.2 under Alternative 1 (Proposed Action), except impacts associated with construction and operation of the Phase I Chokecherry WDA would not occur. The discussion of impacts from construction and operation under Alternative 3, below, are addressed for both bald and golden eagles combined.

3.8.3.4.1 Construction

The types of direct and indirect impacts on eagles that would occur during construction would not differ between Alternative 1 (Proposed Action) and Alternative 3 (Issue ETPs for

Only the Sierra Madre Portion of the CCSM Phase I Project). However, the magnitude and likelihood of these impacts would probably be less under Alternative 3. Construction of the Phase I Sierra Madre WDA and infrastructure components would result in the temporary loss of up to 3,262 acres of eagle habitat. This would be 1,203 acres less than under Alternative 1, or a reduction of approximately 27 percent. Long-term habitat loss would total about 658 acres, and is about 192 acres (about 22 percent) less than under Alternative 1, but would not be realized until during operation. In addition to habitat loss, human activity could result in displacement of eagles and impacts on eagles beyond the project footprint, as discussed further below.

Under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), impacts on the four golden eagle nests and one bald eagle nest located within the secondary disturbance zone may still occur. Construction activities near these nests and potential impacts on the nests would generally be similar to those described under Alternative 1 (Proposed Action).

The standard ETP for construction of only the Phase I Sierra Madre WDA portion of the CCSM Phase I Project would allow for the disturbance take of eight golden eagles and two bald eagles. These numbers are the same as under Alternative 1 (Proposed Action) and are based on the presence of five eagle nests (four golden eagle and one bald eagle) that could potentially be disturbed during construction (see Section 2.2.1).

Although the impacts on eagles from construction of the CCSM Phase I Project under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would generally be less, the intensity of these impacts would not change from those described under Alternative 1 (Proposed Action).

3.8.3.4.2 Operation

Direct and indirect impacts on eagles would occur due to operation of the CCSM Phase I Project under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project). The types of direct and indirect impacts on eagles would not differ from those described under Alternative 1 (Proposed Action); however, the magnitude of these impacts would generally be less under Alternative 3. Under Alternative 3, long-term habitat loss would total about 658 acres, and is about 192 acres (about 22 percent) less than under Alternative 1. In addition, human activity could result in direct and indirect impacts on eagles beyond the project footprint, as discussed below. From a landscape perspective, restricting project impacts on one area rather than two would reduce edge effects (which decrease the value of adjacent habitats) and would limit the direct and indirect impacts on eagles (Jones et al. 2015). A total of 298 turbines would be developed in the Phase I Sierra Madre WDA, which is 202 fewer than under Alternative 1, or a reduction of about 40 percent in the number of turbines. However, this 40 percent reduction in the number of turbines results in only a 28 to 30 percent reduction in predicted golden eagle fatalities (7 or 10 golden eagle fatalities per year, depending on turbine blade diameter chosen) because the Phase I Sierra Madre WDA represents a greater fatality risk to golden eagles than the Phase I Chokecherry WDA. The estimated annual programmatic bald eagle take from operation of the CCSM Phase I Project under Alternative 3 would be 1.

Although the impacts on eagles from operation of the CCSM Phase I Project under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would generally be less, the intensity of these impacts would not change from those described under Alternative 1 (Proposed Action).

Summary of Operation Impacts Under Alternative 3

The type of direct and indirect impacts on eagles due to operation of the CCSM Phase I Project under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would be similar to the direct and indirect impacts described under Alternative 1 (Proposed Action). However, the magnitude and likelihood of those impacts would be less because development would be restricted to the Phase I Sierra Madre WDA. The intensity of those impacts, however, would not change.

3.8.3.5 Alternative 4 – No Action: Denial of ETPs

Under Alternative 4 (No Action: Denial of ETPs), standard and programmatic ETPs would not be issued because the permits would be denied or because the permit applications would be withdrawn. If no ETPs are issued for the CCSM Phase I Project, PCW may decide not to build the proposed project or may decide to move forward with the proposed project without ETPs. The following discussion of impacts from Alternative 4, below, are addressed for both bald and golden eagles combined.

3.8.3.5.1 No Build

If PCW decides not to build the project, there would be no direct or indirect impacts on eagles from development of the WDAs, construction of the infrastructure areas, or operation of the Phase I wind turbines. The current environmental conditions and existing direct and indirect impacts on eagles would continue. The conservation measures proposed in PCW's sage-grouse conservation plan would not be implemented. The offset to golden eagles and benefits to bald eagles due to compensatory mitigation, as described under Alternatives 1 (Proposed Action) and 2 (Proposed Action with Different Mitigation), would not need to occur.

3.8.3.5.2 Build Without ETPs

If PCW decides to move forward with the CCSM Phase I Project without ETPs, we assume that the company would construct and operate the proposed project as outlined in its SPODs and as permitted by the BLM. However, we assume that none of the measures described in the ETP application and the ECP and as outlined in Section 2.2.1.4 would be implemented, including EACPs, monitoring, adaptive management, and compensatory mitigation. In addition, stipulations we would include with the ETPs would not be implemented. However, we would expect all conservation measures and stipulations in the BLM documents and in the sage-grouse plan would be implemented, some of which would benefit eagles. Constructing and operating the CCSM Phase I Project without standard and programmatic ETPs would at least result in all of the adverse impacts described under Alternative 1 (Proposed Action) in Section 3.8.3.2. If the CCSM Phase I Project were built without ETPs, eagle fatality and nest monitoring, adaptive management intended to correct unexpected

impacts, and any EACPs that may be agreed upon by us and PCW would not be implemented, which could have detrimental impacts on eagles. Also, under this alternative, compensatory mitigation would not be implemented and the potential benefits to eagles, as described in under Alternatives 1 (Proposed Action) and 2 (Proposed Action with Different Mitigation), would not be realized.

Under this alternative, PCW would still be subject legally to all take prohibitions under the MBTA and BGEPA. The avoidance and minimization measures, conservation measures, and BMPs described in Section 2.2.1.3.2 are unlikely to be implemented. These measures include numerous actions to reduce detrimental impacts on eagles that could avoid or minimize impacts on both bald and golden eagles.

Overall, building the CCSM Phase I Project without an ETP would result in impacts on eagles greater than those described under Alternative 1 (Proposed Action) because measures in the ECP would not be implemented. The primary difference under this alternative would be the lack of compensatory mitigation, which would result in golden eagle take above the management unit thresholds and could have detrimental impacts on the golden eagle population in the LAP. Additionally, it is realistic to assume that violations of BGEPA and the MBTA would occur, which could lead to prosecution against PCW, potentially resulting in substantial curtailment or shutdowns of operations and the requirement to seek an ETP.

3.8.3.6 Summary of Impacts under Each Alternative

Impacts on eagles from construction and operation of the CCSM Phase I Project would be as follows:

- **Alternative 1 (Proposed Action) –** Impacts would include injury or fatality of bald and golden eagles from collisions with wind turbine blades and other project infrastructure, disturbance during construction, habitat loss and degradation, displacement from habitats, and impacts on prey species. Injury and fatality impacts would be offset by compensatory mitigation (power pole retrofits) that would result in no-net-loss of golden eagles that also would benefit bald eagles.
- **Alternative 2 (Proposed Action with Different Mitigation) –** Impacts would be similar to those under Alternative 1 (Proposed Action). Compensatory mitigation would be different under Alternative 2 (Proposed Action with Different Mitigation), and although there would still have to be no-net-loss of golden eagles with any of the different mitigation actions if they were accepted, the benefits to eagles would vary depending on the compensatory mitigation option selected.
- **Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) –** Impacts would be similar to those under Alternatives 1 (Proposed Action) and 2 (Proposed Action with Different Mitigation), but most impacts would be reduced under Alternative 3 because the number of wind turbines would be reduced. The amount of compensatory mitigation (such as the number of required power pole retrofits) that we would require also would be reduced commensurate with the reduction in eagle fatalities.
- **Alternative 4 (No Action: Denial of ETPs)**

- The No Build scenario would result in no impacts on eagles, and the existing impacts on eagles would continue.
- The Build Without ETPs scenario would result in impacts greater than Alternatives 1 (Proposed Action), 2 (Proposed Action with Different Mitigation), and 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) if PCW decides to move forward with the proposed project without ETPs. Under this scenario, the potential beneficial effects associated with ETP stipulations would not occur, and the monitoring, adaptive management, and compensatory mitigation measures required for the programmatic ETP would not be implemented.

3.9 Cultural Resources

3.9.1 Approach

Cultural resources are discussed because issuing standard and programmatic ETPs may affect the role and value of eagles within American and Native American cultures. Potential impacts may disproportionately affect Native American tribes for whom eagles, particularly golden eagles, have a central role in their beliefs, traditions, and worldview. This potential for disproportionate impacts requires consideration as an environmental justice issue as well as a cultural issue. The consideration of environmental justice as a part of cultural resource impacts, as presented in this section, is separate from and in addition to the consideration of environmental justice impacts as part of the socioeconomic impacts, which were dismissed from further evaluation (see Section 3.2.13).

For our analysis of cultural resources, we reviewed the BLM FEIS and ROD, EA1, and EA2. The study area for cultural resources comprises the four BCRs containing eagle populations that could potentially be affected by the CCSM Phase I Project. After dismissing historic resources and historic and scenic trails from further evaluation (see Sections 3.2.4 and 3.2.6, respectively), we narrowed our focus to the potential impacts of our decision to be made on groups with a cultural affiliation with eagles. In consideration of these impacts, we invited 71 Native American tribes to participate in government-to-government consultation and are in ongoing consultation with 8 tribes that accepted this invitation.

New information gathered since the publication of the BLM documents and information on cultural resources and the environmental justice component of cultural resources that is relevant to our analysis was included in the resource description. Public, agency, and tribal input regarding cultural resources received during the scoping process and tribal consultation was included in the analysis of this resource.

3.9.2 Affected Environment

We are incorporating into this EIS by reference information about cultural resources from the following documents that we have found to be adequate for our analysis:

- BLM FEIS – Section 3.2, found on pages 3.2-1 through 3.2-9
- EA1 – Section 3.2, found on pages 3-4 through 3-6

- EA2 – Section 3.1

We have found the cultural resources data in the BLM NEPA documents to be generally adequate for our analysis. However, new data regarding the presence, absence, distribution of, and potential risk to bald and golden eagles (Section 3.8) are available since publication of the BLM NEPA documents. A summary of information on cultural resources from these documents, with updated information incorporated, is provided below.

3.9.2.1 Eagles as a Cultural Resource

Eagles are both a biological and a cultural resource. For some cultures, eagles are integrated to varying degrees into the shared beliefs, values, assumptions, and practices that a group of people passes on to subsequent generations. As is discussed below, eagles in the vicinity of the CCSM Phase I Project are cultural resources in three different cultural contexts. Bald eagles are a national symbol for the United States and are associated with national identity and patriotism (see Section 3.9.2.1.1). Bald eagles have also come to represent aspects of the environmental movement due to their decline and later recovery in the twentieth century (see Section 3.9.2.1.2). Both bald and golden eagles are also deeply rooted in many Native American in belief systems, worldviews, and cultural and religious practices (see Section 3.9.2.1.3).

In discussing the relative cultural value of eagles to varying groups, it is important to recognize that the definition of "objects" is subjective and culturally derived (Mills and Walker 2008). Some cultures perceive a strict division between "people" and "objects," whereby objects are managed, acted upon, and do not have agency (that is, the ability to act out of free will). For other cultures, this distinction is less clear: "objects" may interact with or act upon other elements of the environment, including people.

3.9.2.1.1 A National Symbol

For many Americans, bald eagles are a symbol of national identity. Bald eagles represent the concepts Americans associate with the nation's foundation and purpose, such as independence, freedom, and liberty. The United States chose the bald eagle as the national symbol when the Great Seal was adopted in 1782. The eagle and its configuration with other elements on the seal were consciously designed to represent key values of the newly independent United States. Congress again recognized bald eagles as an important cultural resource when passing BGEPA, which states, "Whereas, by that act of Congress [adopting the Great Seal] and by tradition and custom during the life of this Nation, the bald eagle is no longer a mere bird of biological interest but a symbol of the American ideals of freedom" (16 U.S.C. 668).

These symbolic associations remain integral to national identity today. Not only does the bald eagle symbolize national values, but the bird is also used to represent the nation itself, much like the national flag. For many, bald eagles are a symbol of patriotism; that is, bald eagles are used to express the loyalty individuals feel to the United States and its ideals.

Just as Americans have instilled cultural meaning in national symbols such as bald eagles or the flag, so too do interactions with these symbols carry cultural meaning. One comment received during public scoping compared eagle takes with the burning or desecration of the national flag, an action variously seen as unpatriotic, hostile, or contemptuous.

3.9.2.1.2 The Environmental Movement

In addition to being a national symbol, the bald eagle symbolizes ecological consciousness and the environmental movement to some people. Whereas the bald eagle was consciously developed and adopted as a national symbol, the bald eagle's identification as an environmental symbol is associative. This association evolved through the experience of severe bald eagle population decline in the twentieth century; recognition of adverse human impacts on bald eagles, particularly use of harmful chemical pesticides such as dichlorodiphenyltrichloroethane (DDT); and successful intervention and population recovery (King 2008). When considered as an environmental symbol, the bald eagle simultaneously represents ecological awareness, environmental protection, and the potential for success.

3.9.2.1.3 Native Americans

Many Native American tribes identify bald eagles and golden eagles as sacred, and for some tribes, eagles are important to their worldview, religion, and cultural practices. The exact cultural value of eagles to tribes is nuanced, varied, and in some cases confidential. Some tribes have strict rules about who may possess eagle knowledge, and how, when, and with whom they share that knowledge. Rather than discussing the eagle's cultural context for each tribe, the following discussion attempts to characterize the nature of eagles as a cultural resource, drawing on specific examples where appropriate. Research for this discussion is derived from public scoping comments, comments on our Draft EIS, tribal consultation, scholarly articles, news articles, ethnographies, and presentations and conversations from Eagle Summits that we have held with tribes over the past 4 years.

Many tribes perceive eagles not simply as objects, but as having agency, or free will, with the potential to act in ways that impact tribes, tribal individuals, and the surrounding environment. Comments received during public scoping, the Draft EIS comment period, and tribal consultation, and information from published articles and ethnographies suggest that for some tribes, eagles mediate the tribe's relationship with and access to their physical and spiritual environments (Murray 2011; Thackeray 2012). As one ethnographer of the Mandan, Hidatsa, and Arikara noted, "the agency of the eagle is not restricted to its own body, but extends to the things and places its parts inhabit, and the moments and landscapes where its power is given or transferred" (Murray 2011). That is, not only does an eagle have the ability to effect change, but its power, intent, or purpose also extends to its feather and parts (such as wings, bones, or talons), and even to the places where people interact with eagles.

Eagles, feathers, and eagle parts feature prominently in many Native American ceremonies and cultural practices. These ceremonies and practices are an important venue where the actions of and with eagles create cultural meaning for tribes and individuals. Eagle feathers and parts are often intrinsic to ceremonies, and ceremonies cannot be performed without them. Such ceremonies include graduations, coming of age, the Sun Dance, and rituals

related to veterans and military service. Ceremonies also function to preserve cultural knowledge, systems, and identity through continued practice and enculturation of subsequent generations. Native American traditions and ceremonies are recognized as important to cultural identity and religious freedom, and are specifically protected through the American Indian Religious Freedom Act of 1978 and the Religious Freedom Restoration Act of 1993.

The principles behind these laws are recognized in BGEPA and the implementing regulations that allow the permitted possession or take of eagles, eagle parts, nests, or eggs for traditional religious purposes by members of federally-recognized tribes. We prioritize these religious use permits above other interests, such as non-emergency public health and safety, programmatic take, and renewal of programmatic take permits (50 CFR 22.26).

We also operate the National Eagle Repository, which receives eagle remains, feathers, and parts, and distributes them to recognized tribal members. However, the waiting list for certain items, such as whole immature golden eagles, can be quite long, with an interval of several years before requests are fulfilled. This remains problematic for tribes who cannot perform their ceremonies without the required materials.

Another contentious issue surrounding the repository derives from the incongruence between the administrative process and traditional cultural practices. To quote from a news article accompanying a scoping comment and a comment on our Draft EIS, “We don’t know that ceremony where you go into the lodge and you pray for your eagle, then you go in the house and you fill out your paperwork for the [federal eagle] repository, and sometime over the next year or two the UPS gods bring you an eagle” (Fladager 2014). Furthermore, many tribes and ceremonies have strict rules concerning the acquisition and use of eagles, feathers, and eagle parts, and how and by whom these are used in ceremony. These rules can include definitions of what constitutes a “ceremonially clean” bird and proper treatment of eagle remains.

3.9.2.2 Environmental Justice

Environmental justice is considered here as a component of cultural resources. We are analyzing the potential for tribal communities to be at risk for disproportionate effects due to the integral nature of eagles in tribal belief systems and practices as opposed to the largely symbolic role eagles have in the broader American society.

The cultural value of eagles is not limited to the vicinity of the CCSM Phase I Project or even to the United States because these values are internal to the members of these cultural groups who move within and beyond geographic boundaries. However, for the purposes of this analysis, we have focused on tribal communities in the two bald eagle EMUs and the four golden eagle BCRs with eagle populations potentially moving through the Phase I development and infrastructure areas: the Northern Rocky Mountains EMU, the Rocky Mountains and Plains EMU, BCR 10 (Northern Rockies), BCR 16 (Southern Rockies/Colorado Plateau), BCR 17 (Badlands and Prairies), and BCR 18 (Shortgrass Prairie). This area extends from Washington east to the Dakotas and Montana south to Arizona, as shown in Figure 2-2. Eagles travelling through the Phase I development and

infrastructure areas could conceivably travel in any one of these BCRs and have a relationship with any of the tribes and tribal lands therein.

We have a responsibility to consult with Native American tribes on a government-to-government basis when considering an action that could affect tribal rights, lands, resources, cultural and religious practices, or access to traditional areas of cultural or religious importance. The tribal consultation efforts are described in detail in Chapter 5.0; however, a synopsis of the consultation efforts and tribal concerns is presented below.

3.9.2.3 Traditional Cultural Properties

Traditional cultural properties (TCPs) are those properties that have significance to a community of people, including Native Americans, based on beliefs and customs passed on over time. As part of tribal consultation (discussed below in Section 3.9.2.4), information was exchanged regarding whether any documented TCPs are within the cultural resources study area. We have also communicated with the BLM regarding their investigation into any TCPs. To date, no TCPs for the CCSM Project have been identified by the BLM or during our consultation with tribes.

3.9.2.4 Consultation

Our government-to-government consultation was undertaken independent from the BLM's consultation for its FEIS, EA1, and EA2. During the BLM's consultation, the consulting parties developed the *Programmatic Agreement Among the Bureau of Land Management, Wyoming State Historic Preservation Officer, the Advisory Council on Historic Preservation, and Power Company of Wyoming, LLC Regarding Adverse Effects to Historic Properties Resulting from the Chokecherry and Sierra Madre Wind Energy Project in Carbon County, Wyoming*, executed on August 16, 2012. On June 1, 2016, we became a consulting party to the Programmatic Agreement, which designates the BLM as the lead agency for compliance with Section 106 of the National Historic Preservation Act and stipulates the BLM's obligations for identifying and evaluating historic properties and resolving adverse impacts on those properties. The BLM consulted with six tribes during development of the documents listed above: the Eastern Shoshone Tribe/Eastern Shoshone Business Council, Fort Peck Assiniboine and Sioux Tribes, Northern Arapaho Tribe/Northern Arapaho Business Council, Northern Cheyenne Tribe of the Northern Cheyenne Indian Reservation, and Northern Ute Tribe. BLM consultation with Native American tribes is ongoing and will continue through CCSM Phase I Project construction.

Although the BLM invited tribes to consult on any concerns with the CCSM Project, to include impacts on eagles, we have engaged with tribes further on this issue to fulfill our independent fiduciary responsibility to consult on PCW's application for an ETP and to address potential concerns under environmental justice. This consultation fulfills our obligations under American Indian Religious Freedom Act of 1978; NEPA; the Memorandum on Government-to-Government Relations with Native American Tribal Governments, dated April 29, 1994; and EO 13175, Consultation and Coordination with Indian Tribal Governments. Our consultation also considers the principles and obligations of

EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, and the Religious Freedom Restoration Act of 1993.

Consultation, according to U.S. Department of the Interior (DOI) policy, "is built upon government-to-government exchange of information and promotes enhanced communication that emphasizes trust, respect, and shared responsibility" (USFWS 2013g). We invited tribes to consult on tribal perspectives on the eagle take permits, the potential for the proposed action to affect cultural resources (particularly eagles), and how issuing eagle take permits may affect the tribes. Seventy-two tribes were invited to participate in government-to-government consultation, of which nine have engaged in ongoing consultation. These tribes are the Cheyenne River Sioux Tribe of the Cheyenne River Reservation, Chippewa Cree Indians of the Rocky Boy's Reservation, Comanche Nation, Eastern Shoshone Tribe/Eastern Shoshone Business Council, Northern Arapaho Tribe/Northern Arapaho Business Council, Northern Cheyenne Nation, Pueblo of San Felipe, Santa Clara Pueblo, and Shoshone-Bannock Tribes of the Fort Hall Reservation.

Native American tribes and commenters identified the following concerns during tribal consultation and in comments received during the scoping process and our Draft EIS review period:

- Consultation and Exchange of Information
    - Request for tribal roundtable as part of ongoing consultation
    - Request for TCP study
    - Request for tour of Phase I development and infrastructure areas
    - Request for reports on eagle studies and data, including baseline data and eagle monitoring
    - Request for tribal notification of eagle fatalities in the Phase I Chokecherry and Phase I Sierra Madre WDAs
    - Concern regarding timely and meaningful consultation with all interested tribes

- Effects on Eagles
    - Number of eagles taken each year
    - Permit duration
    - Effectiveness of USFWS monitoring for compliance and reliability of self-reported eagle fatalities
    - Eagle habitat loss
    - Requirement for eagle protection systems with a goal of zero eagle fatalities
    - Number of existing wind energy facilities without eagle take permits

- Effects on Cultural and Religious Resources and Traditions
    - Availability and approval of religious use permits
    - Sacred sites near Phase I development and infrastructure areas, especially those associated with eagles
    - Timely retrieval and ceremonial handling of injured or killed birds

    - Acquisition of feathers and parts from eagles killed on ancestral homelands as a result of the CCSM Phase I Project
    - Continued national distribution of eagle feathers and parts through National Eagle Repository
    - Healthy eagle populations to sustain tribal and eagle interactions necessary to continue traditional cultural and religious practices and life ways
    - Environmental justice impacts unique to Native American people

- Opportunities and Mitigation
    - Tribal aviaries and rehabilitation clinics as preferred recipients for injured eagles
    - Establishment of tribally run repository in Wyoming
    - Funding for the Northern Arapaho Tribe's eagle rehabilitation program with the potential for rehabilitated eagles at the facility to count toward PCW's compensatory mitigation requirements
    - Establishment of tribally run aviary in Wyoming
    - Development of educational programs centered on traditional Native American ceremonies
    - Partnerships between tribes and PCW for developing mitigation, addressing cultural resource and environmental justice concerns, and providing an avenue for tribal participation in mitigation efforts
    - Completion of compensatory mitigation and habitat improvements on tribal land

We are engaged in ongoing tribal consultation for the CCSM Phase I Project. Additional concerns that arise during the permitting process will be addressed in consultation with tribal members. Information provided by tribal members concerning historic properties of traditional, cultural, or religious importance remains confidential to the extent applicable under 54 USC 307103. Additional information about tribal consultation is presented in Section 5.2.2.1 and Section 5.4.

3.9.3 Environmental Consequences

For our analysis of environmental consequences, we considered two categories of cultural resources: TCPs and the intangible cultural value attributed to eagles by various cultural groups. The groups considered in this EIS are Native American tribes and segments of the American population ascribing symbolic value to bald eagles as either a national or environmental symbol. In addition, we considered effects on cultural resources under environmental justice and must determine if the action will result in disproportionately high and adverse impacts on tribal communities.

We have determined the information to be adequate for our analysis and we are incorporating into this EIS by reference information about impacts on TCPs from the following documents:

- BLM FEIS – Section 4.2.13, found on pages 4.2-7 through 4.2-8
- BLM ROD – Appendix E
- EA1 – Section 4.2.2, found on pages 4-7 through 4-9
- EA2 – Section 4.2.1

The sections listed above discuss the BLM's tribal consultation efforts and the potential for the CCSM Project and the CCSM Phase I Project to impact TCPs. Although no TCPs have been identified, TCPs may yet be identified during ongoing consultation or during construction. Tribes in consultation with the USFWS have expressed that some of their sacred places are specifically tied to eagles. Therefore, impacts on eagles also have the potential to affect the character and integrity of these potential TCPs. The Programmatic Agreement among the BLM, Wyoming State Historic Preservation Office, the Advisory Council on Historic Preservation, and PCW outlines the BLM's responsibilities to identify and evaluate cultural resources for the CCSM Phase I Project, including TCPs, and resolve adverse impacts in accordance with Section 106 of the National Historic Preservation Act. We became a consulting party to this Programmatic Agreement on June 1, 2016, with the BLM designated as the lead agency for compliance with Section 106. Potential impacts on sacred sites and other TCPs are not discussed further in this EIS.

In addition to the impact analysis in the BLM's NEPA documents, we reviewed the SPODs, scoping comments, comments on our Draft EIS, tribal consultation comments, published ethnographies, and historical information on cultural relationships with eagles. These data form the basis of our analysis in this section, which uses the impact criteria described in Table 3-29 to evaluate the level of impact of the Proposed Action and alternatives on eagles as a cultural resource.

Table 3-29. Impact Criteria for Eagles as a Cultural Resource for the CCSM Phase I Project in Wyoming

Impact Category	Intensity Type	Definition
Magnitude	Major	The action would clearly change resource conditions. Adverse impacts would result in blocked or greatly reduced access to eagles, feathers, or parts, or would alter the relationship between eagles and a cultural group's practices and beliefs to the extent that the survival of those practices and beliefs would be jeopardized. The impacts would substantially deteriorate or destabilize eagles' condition or culturally valued elements. These conditions and elements may be tangible, such as the stability of local eagle populations, or intangible, such as the perception of eagles' ability to give power to tribal members. Beneficial impacts would facilitate access,

Impact Category	Intensity Type	Definition
		empower groups in their traditional practices or beliefs, or substantially improve the quality of the resource.
	Moderate	The action would result in some change to resource conditions. Adverse impacts would result in reduced access to eagles, feathers, or parts, or would alter the relationship between eagles and the cultural group's practices and beliefs, although those practices and beliefs would survive. Beneficial impacts would encourage access or contribute to the relationship between eagles and cultural groups' traditional practices or beliefs.
	Minor	The action could result in some change to the resource. Adverse impacts would not appreciably alter access to eagles, feathers, or parts, or the relationship between eagles and the affiliated group's practices and beliefs. Beneficial impacts would temporarily or slightly improve access to eagles or the relationship between eagles and cultural groups' practices and beliefs.
	No effect	Any change to the resource would be barely perceptible and would not appreciably alter access to eagles, feathers, or parts, or the relationship between eagles and cultural groups' practices and beliefs.
Duration	Long-term	30 years (proposed project duration)
	Medium-term	5 years (permit term)
	Temporary	Lasting for the duration of construction
Potential to occur	Probable	More likely than not to occur
	Possible	Potential to occur
	Unlikely	Not reasonably likely to occur
Geographic extent	Extensive	Within the two EMUs and four BCRs
	Regional	Within the 140-mile radius of the local area population for golden eagles
	Limited	Within 1 mile of Phase I development and infrastructure areas

Regarding environmental justice, a disproportionately high and adverse impact would exist if a major impact, as defined above, affects a minority, low-income, or tribal community but is absent or lesser in magnitude in other communities.

3.9.3.1 Summary Comparison of Alternatives

Based on our analysis of environmental consequences, discussed below, and using the evaluation criteria described in Table 3-29, we identified the following key differentiators for the cultural value of eagles and the environmental justice component of cultural resources among the alternatives:

- The principal factor is the number of golden eagle takes.
- None of the alternatives under consideration would adversely impact the symbolic value of bald eagles to Americans.
- With the exception of the Build Without ETPs scenario under Alternative 4 (No Action: Denial of ETPs), none of the alternatives would adversely impact Native American access to eagles, feathers, and parts for religious use or access to religious use permits for eagle takes for members of federally recognized tribes.
- Native American cultural relationships with eagles are with individual eagles, populations of eagles, and eagles as a species; therefore, individual eagle fatalities may impact tribes regardless if compensatory mitigation achieves no-net-loss. Furthermore, bald eagle take would not require compensatory mitigation.
- The No Build scenario under Alternative 4 (No Action: Denial of ETPs) would have the least adverse impacts on the cultural value of eagles. Of the remaining alternatives, Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would have the least adverse impacts due to the lower number of permitted golden eagle takes compared to other alternatives.
- Impacts on the cultural value of eagles are similar under Alternative 1 (Proposed Action) and Alternative 2 (Proposed Action with Different Mitigation) because both would permit the same number of eagle takes and would result in no-net-loss. However, the habitat enhancements and rehabilitation of injured eagles' mitigation options under Alternative 2 (Proposed Action with Different Mitigation) could have a potential beneficial impact on tribes.
- The Build Without ETPs scenario under Alternative 4 (No Action: Denial of ETPs) would have the greatest impact on the cultural value of eagles because eagle takes would not be mitigated, which would result in moderate detrimental impacts on golden eagles. This in turn would probably have major, extensive impacts on Native American tribes regarding their cultural relationship with eagles and access to eagles, feathers, and parts.
- Due to the nature of the cultural relationship many tribes have with eagles, the alternatives would have disproportionate impacts on those tribes. However, in consideration of environmental justice, these impacts would not be high and adverse except in the case of Alternative 4 (No Action: Denial of ETPs), under which the Build Without ETPs scenario could have major impacts on tribes if it leads to increased, unmitigated eagle take.

3.9.3.2 Alternative 1 – Proposed Action: Issue ETPs for Phase I Wind Turbine Development and Infrastructure Components

3.9.3.2.1 Construction

Construction of the CCSM Phase I Project and infrastructure components under Alternative 1 (Proposed Action) may result in the disturbance take of up to eight golden eagles and two bald eagles per year, which would be covered by the standard ETP during Project construction. Tribes have expressed concern over nest disturbance and eagle habitat loss that may result from construction (Cheyenne River Sioux Tribe of the Cheyenne River Reservation 2015; Santa Clara Pueblo 2015; Shoshone-Bannock Tribes of the Fort Hall Reservation 2015). Nest disturbance could result from noise or traffic impacts near eagle nests. Temporary displacement of eagles could result from initial clearing and grubbing of up to 4,465 acres and temporary cutting or partial cutting of 440 acres of activity areas. Habitat loss would result from the long-term modification of 850 acres. However, these impacts are not expected to appreciably alter the cultural value of eagles.

Tribes are also concerned about eagle fatalities, as described in Section 3.9.3.2.2. Although the standard ETP would be for eagle disturbance and not fatalities, eagle fatalities resulting from construction are unlikely. PCW would implement BMPs to limit vehicle speeds and remove carcasses within the Phase I development and infrastructure areas. These BMPs would reduce the potential for eagle-vehicle collisions. Therefore, construction under Alternative 1 (Proposed Action) would have no effect on eagles as a cultural resource.

3.9.3.2.2 Operation

Impacts on the cultural value of eagles from operation of the CCSM Phase I Project under Alternative 1 (Proposed Action) include (1) impacts on segments of the American population ascribing symbolic value to bald eagles either as a national or environmental symbol, (2) impacts on the cultural relationship between Native American tribes and eagles, and (3) impacts on Native American access to eagles, feathers, and parts. These impacts are not limited in geographic scope due to the intangible nature of cultural values; therefore, the impacts discussed below are considered extensive unless otherwise noted (see Table 3-29 for definitions of impact criteria). Additionally, the impacts are considered long-term because they are associated with eagle take in general, which would continue throughout the duration of the CCSM Phase I Project (see Table 3-29).

American Symbolic Value of Bald Eagles

Approval of a programmatic ETP for operation of the CCSM Phase I Project under Alternative 1 (Proposed Action) has potential implications for the symbolic value of bald eagles to Americans, both as a national symbol and as an environmental symbol, as discussed in Sections 3.9.2.1.1 and 3.9.2.1.2. We received several scoping comments related to bald eagle symbolism. One comment compared killing bald eagles with desecrating the national flag. Other comments cited the bald eagle's status as a national symbol in the context of protection and preservation. These comments reflect current cultural, and in some cases individual, definitions of the bald eagle as a national symbol.

The way people perceive take of eagles can be tied to their cultural beliefs. The symbolic value of bald eagles is dynamic and is partially defined in relation to other influences and trends in cultural beliefs (Lawrence 1990). Bald eagles were widely trapped, poisoned, and killed in the 1800s and early 1900s due to perceptions that the birds threatened livestock and commercial fishing, despite their status as a national symbol. Bounties were paid for over 120,000 bald eagles in Alaska between 1917 and 1953 (DeArmond 2008). Similarly, a group of Wyoming ranchers killed about 770 bald and golden eagles in 1971, believing the birds threatened their livestock and livelihood (Lawrence 1990). This perception can be common among ranchers, yet anthropologist Elizabeth Atwood Lawrence found that such "anti-eagle" ranchers could also be found displaying bald eagle iconography highlighting the positive metaphoric attributes Americans associate with their national symbol, such as freedom, strength, and majesty (1990). American pride and respect for the bald eagle as the national symbol was embodied in the passage of BGEPA in 1940 and again in the 1960s and 1970s as the bald eagle became the symbol of the environmental movement. However, although BGEPA protects bald and golden eagles, it also provides for individual take of birds with a permit from USFWS for scientific, religious, and other purposes (16 U.S.C. 668–668d).

This history demonstrates that American cultural investment in bald eagles is complex, with multiple meanings that are not mutually exclusive (Lawrence 1990). One may value the symbolic meaning instilled in bald eagles while simultaneously perceiving them as dangerous threats. This history also suggests that American symbolic investment is primarily in the bald eagle as a species rather than individual birds. Issuing a programmatic ETP under Alternative 1 (Proposed Action) would have no effect on the symbolic value of bald eagles because the take of one or two bald eagles per year would not exceed bald eagle management unit take thresholds, which are consistent with conservation standards for the species (USFWS 2009). Bald eagle take at CCSM would not alter the cultural relationship between eagles and the American public.

Cultural Relationship between Native American Tribes and Eagles

Eagle take from operation of the CCSM Phase I Project under Alternative 1 (Proposed Action) has potential to directly and indirectly impact the relationship between Native American tribes and eagles, particularly golden eagles. During tribal consultation, tribes have expressed concern that the number of golden eagle takes would be too high and the interval between permit cycles would be too long. Tribes are concerned about our ability to monitor the ongoing effects of the CCSM Phase I Project on eagles; the effectiveness of advanced conservation practices (ACPs), adaptive management, and mitigation; and our ability to take timely action, especially if opportunities arise to further reduce eagle takes. Some tribes have stated that eagles are of extreme importance to everything they do and are important to their spirituality, religion, and ceremonial practices. Some tribes have also expressed concern over the respectful treatment of eagle remains (Cheyenne River Sioux Tribe of the Cheyenne River Reservation 2015; Chippewa Cree Indians of the Rocky Boy's Reservation 2015; Eastern Shoshone Tribe/Eastern Shoshone Business Council 2015; Northern Arapaho Tribe/Northern Arapaho Business Council 2015; Santa Clara Pueblo 2015; Shoshone-Bannock Tribes of the Fort Hall Reservation 2015).

For some tribes, eagles are able to influence their tribe and the world around them (Murray 2011). Individual eagles may act to link tribes and their members to their spiritual environments (Murray 2011; Thackeray 2012). Tribes, their members, ceremonies, and sacred sites have relationships with eagles as a species, as individual animals, and as populations. Therefore, even though compensatory mitigation required by the programmatic ETP should result in no-net-loss, this would not mitigate all impacts on tribes. The level of impact is difficult to quantify, and most tribes have not indicated the extent to which eagle take during the CCSM Phase I Project would alter their relationship with eagles or otherwise impact their cultural beliefs, values, and practices. However, some tribes have indicated that eagle take, especially at the predicted level of 10 or 14 golden eagles and 1 or 2 bald eagles per year, is unacceptable and that the health and well-being of eagles is directly related to the health and well-being of tribes and their members.

Alternative 1 (Proposed Action) would probably result in direct and indirect adverse impacts ranging from minor to moderate in magnitude and regional to extensive in geographic scope (see Table 3-29 for definitions of impact criteria). An example of a direct impact could be the take of an eagle to which a tribe or tribal member has a direct spiritual connection. An example of an indirect impact could be the perception that the effectiveness of ceremonial beliefs and practices is reduced because of eagle takes during the CCSM Phase I Project. Impacts resulting from operation of the CCSM Phase I Project could be moderated slightly in the long-term because adaptive management and EACPs could reduce eagle take below the initial level of 11 or 16 total eagle fatalities per year.

Native American Access to Eagles, Feathers, and Parts

Alternative 1 (Proposed Action) also has potential to directly impact tribes' access to eagles, feathers, and parts by impacting eagle populations and the availability of religious use permits. Access is important to tribes who rely on eagles, feathers, and parts to perform ceremonies, maintain cultural relationships, and pass on cultural knowledge and values to subsequent generations (Murray 2011; Thackeray 2012). Some tribes have expressed concern about the availability of religious use and continued access to live eagles in their ceremonies (that is, the ability for live eagles to continue to visit them during their ceremonies). Furthermore, some tribes have stated that regulations and procedural requirements for acquiring eagle feathers and parts remains a burden on their traditional and religious practices. Some tribes expressed that they have a claim to eagles killed on tribal land or on ancestral home lands and prefer that eagles killed in these areas be sent to the tribes rather than the National Eagle Repository. One the other hand, other tribes have expressed support for the existing rules for distributing eagle feathers and parts. Some tribes indicated they would like tribal aviaries to receive eagles injured at the CCSM Phase I Project (Cheyenne River Sioux Tribe of the Cheyenne River Reservation 2015; Chippewa Cree Indians of the Rocky Boy's Reservation 2015; Eastern Shoshone Tribe/Eastern Shoshone Business Council 2015; Northern Arapaho Tribe/Northern Arapaho Business Council 2015; Santa Clara Pueblo 2015; Shoshone-Bannock Tribes of the Fort Hall Reservation 2015).

Although we understand that access to eagle feathers and the rules regarding the distribution of eagle feathers and parts are extremely important to tribes and we encourage such discussion, these issues are outside the scope of the decision to be made in this EIS. The

analysis below focuses instead on the potential impacts on the availability of religious use permits and access to live eagles. The cultural implications of national eagle policy and the repository system are considered in the analysis of cumulative impacts in Chapter 4.0. Although we note tribes' preference to receive injured eagles for treatment, as opposed to non-tribal rehabilitation facilities, we do not have the regulatory authority to require this of the Applicant.

Alternative 1 (Proposed Action) would not impact the number of religious use permits available to tribes because religious use is factored into baseline populations and therefore permits for religious use do not count against regional take thresholds. Therefore, approval of a programmatic ETP for the CCSM Phase I Project would not prevent tribes from obtaining religious use permits. In addition, Alternative 1 would have no effect on access to live eagles through ceremony and prayer because mitigation would result in no-net-loss to golden eagle populations. Alternative 1 would have no effect on access to eagles, feathers, and parts through the National Eagle Repository. Eagle fatality monitoring during the first 5 years could slightly increase the number of eagle remains sent to the repository by 0.5 to 0.7 percent because eagle remains would be identified before they are scavenged or environmentally degraded (USFWS 2014b). These percentages are based on an estimated 2,400 eagles received by the National Eagle Repository in 2014 and an estimated take of 11 or 16 eagles per year (USFWS 2014b). However, this marginal increase would not perceptibly alter access to eagles, feathers, or parts. Alternative 1 would not change the quality or suitability of eagles, feathers, or parts available to tribes.

3.9.3.2.3 Summary of Construction and Operation Impacts Under Alternative 1

Alternative 1 (Proposed Action) would probably result in adverse impacts that would be minor to moderate in magnitude, regional to extensive in geographic scope, and long-term in duration on Native American tribes and their cultural relationship with eagles. Alternative 1 would have no effect on Native American access to eagles, feathers, or parts or on segments of the American population attributing symbolic value to bald eagles (see Table 3-29 for definitions of impact criteria). Alternative 1 would not result in major impacts on Native American tribes (see Table 3-29); therefore, there would not be disproportionately high and adverse impacts in consideration of environmental justice.

3.9.3.3 Alternative 2 – Proposed Action with Different Mitigation

3.9.3.3.1 Construction

Under Alternative 2 (Proposed Action with Different Mitigation), the Phase I Chokecherry and Phase I Sierra Madre WDAs would be developed as proposed by PCW, but the mitigation for eagle take would be different. Construction impacts would be consistent with those described under Alternative 1 (Proposed Action) in Section 3.9.3.2.1.

3.9.3.3.2 Operation

Under Alternative 2 (Proposed Action with Different Mitigation), operation impacts described under Alternative 1 (Proposed Action) in Section 3.9.3.2.2 would be mitigated by one or more different mitigation options, as discussed in Section 2.2.2.1. With the exception

of the habitat enhancement and rehabilitation of injured eagles options, the compensatory mitigation options considered under Alternative 2 are unlikely to change the magnitude, duration, potential to occur, or geographic extent of impacts described under Alternative 1 (Proposed Action) because impacts on eagles as a cultural resource are related to either individual eagle fatality or overall eagle populations. Because we require that compensatory mitigation result in no-net-loss for golden eagles, each type of mitigation should affect overall eagle populations in the same manner. Therefore, impacts on cultural groups attributing cultural value to eagles should be consistent across the different mitigation options. The habitat enhancement and rehabilitation of injured eagles' mitigation options were identified as having potential beneficial impacts on tribes and their cultural relationship with eagles.

In a comment on our Draft EIS, the Northern Arapaho Tribe expressed interest in habitat enhancement projects to benefit eagles on the Wind River Indian Reservation. Improvements to habitat or prey base on or near tribal communities could benefit those communities by strengthening or re-establishing local eagle populations and engaging the communities in eagle conservation. This mitigation option would possibly result in a minor, regional to extensive, long-term beneficial impact on tribes' relationships with eagles (see Table 3-29 for definitions of impact criteria).

Under the rehabilitation of injured eagles option, PCW would provide funding for expanding eagle rehabilitation services. Several tribes in consultation with us have established or are interested in establishing tribal eagle rehabilitation programs and expressed an interest in this mitigation option (Cheyenne River Sioux Tribe of the Cheyenne River Reservation 2015; Eastern Shoshone Tribe/Eastern Shoshone Business Council 2015; Santa Clara Pueblo 2015; Northern Arapaho Tribe/Northern Arapaho Business Council 2016). The types of projects that would be funded, and the manner in which funds would be distributed under this mitigation option would be determined upon selection of Alternative 2 (Proposed Action with Different Mitigation). If rehabilitation funding through this mitigation option were made available to tribes, such as for the creation or improvement of rehabilitation facilities, that funding could improve tribes' involvement in eagle rehabilitation and could subsequently improve their cultural relationship with eagles and access to naturally molted feathers while eagles are in their care. This mitigation option would possibly result in beneficial impacts on tribes' relationships with eagles, feathers, and parts that would be moderate in magnitude, regional to extensive in geographic scope, and long-term in duration (see Table 3-29 for definitions of impact criteria).

3.9.3.3.3 Summary of Construction and Operation Impacts Under Alternative 2

Alternative 2 (Proposed Action with Different Mitigation) would probably result in adverse impacts on Native American tribes and their cultural relationship with eagles that would be minor to moderate in magnitude, regional to extensive in geographic scope, and long-term in duration (see Table 3-29 for definitions of impact criteria). Alternative 2 could possibly have a beneficial impact on tribes' relationships with eagles that would be minor to moderate in magnitude, regional to extensive in geographic scope, and long-term in duration if habitat enhancements or eagle rehabilitation were conducted in conjunction with tribes (see Table 3-29). Eagle rehabilitation could similarly have a possible beneficial impact on Native

American access to eagles, feathers, or parts that would be moderate in magnitude, regional to extensive in geographic scope, and long-term in duration (see Table 3-29). Alternative 2 would have no effect on segments of the American population attributing symbolic value to bald eagles. Alternative 2 would not result in major impacts on Native American tribes (see Table 3-29); therefore, there would not be disproportionately high and adverse impacts in consideration of environmental justice.

3.9.3.4 Alternative 3 – Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project

3.9.3.4.1 Construction

Under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), only the Phase I Sierra Madre WDA and the infrastructure components would be developed as proposed by PCW. Construction impacts would result in nest disturbance and habitat loss as described under Alternative 1 (Proposed Action) in Section 3.9.3.2.1, except that displacement from initial clearing and grading would be reduced to up to 3,262 acres and long-term modifications (and associated habitat loss) would be reduced to 658 acres. Nest disturbance, displacement, and habitat loss during construction under Alternative 3 would have no effect on the cultural value of eagles.

3.9.3.4.2 Operation

Under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project), operation impacts would be the same as those described under Alternative 1 (Proposed Action) in Section 3.9.3.2.2, except that fewer individual eagles would be taken (7 or 10 golden eagles and 1 bald eagle) because 202 fewer wind turbines would be built. A total of 298 turbines would be constructed in the Phase I Sierra Madre WDA. As with Alternative 1, Alternative 3 would have no effect on Americans attributing national and environmental symbolic value to eagles. Impacts on Native American tribes and their relationships to eagles would also be similar to Alternative 1. Although fewer eagles would be taken each year, the level of take would still probably result in adverse impacts that would be minor to moderate in magnitude, regional to extensive in geographic scope, and long-term in duration (see Table 3-29 for definitions of impact criteria). We did not received comments regarding impacts specific to the Phase I Sierra Madre WDA. Alternative 3 would not appreciably change the number of eagles sent to the National Eagle Repository and would have no effect on Native American access to eagles, feathers, and parts (USFWS 2014b). The number of eagles sent to the repository would increase a maximum of 0.3 to 0.4 percent based on an estimated 2,400 eagles received by the repository in 2014 and an estimated take of 8 or 10 eagles per year at the Phase I Sierra Madre WDA (USFWS 2014b). Alternative 3 would not change the quality or suitability of eagles, feathers, or parts available to tribes.

3.9.3.4.3 Summary of Construction and Operation Impacts Under Alternative 3

Alternative 3 would probably result adverse impacts on Native American tribes and their cultural relationship with eagles that would be minor to moderate in magnitude, regional to extensive in geographic scope, and long-term in duration (see Table 3-29 for definitions of impact criteria). Alternative 3 would have no effect on Native American access to eagles,

feathers, or parts or on segments of the American population attributing symbolic value to bald eagles (see Table 3-29). Alternative 3 would not result in major impacts on Native American tribes (see Table 3-29); therefore, there would not be disproportionately high and adverse impacts in consideration of environmental justice.

3.9.3.5 Alternative 4 – No Action: Denial of ETPs

Under Alternative 4 (No Action: Denial of ETPs), standard and programmatic ETPs would not be issued because the permit would be denied or because the permit application would be withdrawn. If no ETPs are issued for the CCSM Phase I Project, PCW may decide not to build the proposed project or may decide to move forward with the proposed project without standard and programmatic ETPs.

3.9.3.5.1 No Build

If PCW decides not to build the CCSM Phase I Project, no direct or indirect impacts would occur on the cultural value of eagles and associated cultural groups from construction or operation of the CCSM Phase I Project.

3.9.3.5.2 Build Without ETPs

If PCW decides to move forward with the CCSM Phase I Project without ETPs, we assume that the company would construct and operate the proposed project as outlined in its SPODs and as permitted by the BLM. However, we assume that none of the measures described in the ETP application and the ECP and as outlined in Section 2.2.1.4 would be implemented, including EACPs, monitoring, adaptive management, and compensatory mitigation. In addition, stipulations we would include with the ETPs would not be implemented. Constructing and operating the CCSM Phase I Project with no ETPs would result in all of the adverse impacts described under Alternative 1 (Proposed Action) in Section 3.9.3.2.2. Some adverse impacts from operation of the CCSM Phase I Project would increase, as described below.

American Symbolic Value of Bald Eagles

Construction and operation of the CCSM Phase I Project without ETPs would result in no effect on the symbolic value of bald eagles and associated segments of the American population because bald eagle populations are stable enough to withstand the level of take that would result from project construction and operation.

Cultural Relationship between Native American Tribes and Eagles

Without compensatory mitigation, operation of the CCSM Phase I Project could result in the annual net loss of at least 1 or 2 bald eagles and 10 or 14 golden eagles from eagle populations with which Native American tribes have important cultural relationships. Operation of the CCSM Phase I Project without avoidance and minimization measures could result in higher numbers of eagle fatalities because the eagle fatality prediction incorporated those measures in the USFWS eagle fatality prediction model. The take of 1 or 2 bald eagles per year is consistent with regional take thresholds and the goal of maintaining stable or

increasing populations (USFWS 2009); however, operation of the CCSM Phase I Project without the programmatic ETP could have extensive impacts on golden eagles, as discussed in Section 3.8.3.4.5 (see Table 3-29 for definitions of impact criteria). Because this action could substantially impact eagle populations at the LAP level, then it could have a moderate impact on Native American cultural relationships with bald and golden eagles (see Table 3-29). The magnitude of this impact would be more intense for tribes in areas where golden eagle populations are most affected or tribes with ancestral ties to the CCSM Phase I Project area. The magnitude would increase over time as local eagle populations become strained. However, PCW would still be subject to legal requirements under BGEPA that prohibit take and could be referred to the U.S. Department of Justice for prosecution for unpermitted take of bald or golden eagles. Successful prosecution and cessation of unmitigated eagle take resulting from the CCSM Phase I Project could moderate the impacts described above and limit them to the short term (see Table 3-29).

Native American Access to Eagles, Feathers, and Parts

Operation of the CCSM Phase I Project without a programmatic ETP under Alternative 4 (No Action: Denial of ETPs) would probably have an extensive impact on eagle populations, and could threaten the stability of eagle populations throughout the LAP area. In turn, this could have an extensive impact on access to eagles (live or deceased), feathers, and eagle parts for religious use (see Table 3-29 for definitions of impact criteria). This impact would be minor to moderate in the short term but would increase in magnitude over time as local eagle populations become strained (see Table 3-29). Major impacts could result if eagle populations diminish to the point that tribes have greatly reduced access to live eagles in their area or if fewer eagles are available through the National Eagle Repository (see Table 3-29). However, as discussed above, successful prosecution and cessation of unmitigated eagle take at the CCSM Phase I Project could moderate these impacts and would likely limit them to the short term (see Table 3-29).

3.9.3.5.3 Summary of Construction and Operation Impacts Under Alternative 4

Construction and operation of the CCSM Phase I Project without standard and programmatic ETPs would probably result in adverse impacts on Native American tribes and their cultural relationship with eagles that would be major in magnitude, regional to extensive in geographic scope, and long-term in duration (see Table 3-29 for definitions of impact criteria). Unmitigated eagle take would probably have an adverse impact on Native American access to eagles (live and deceased), feathers, or parts for religious use that would be minor to major in magnitude, regional to extensive in geographic scope, and long-term in duration (see Table 3-29). Alternative 4 (No Action: Denial of ETPs) would have no effect on segments of the American population attributing symbolic value to bald eagles. Alternative 4 would result in major impacts on Native American tribes (see Table 3-29), resulting in an environmental justice situation with disproportionately high and adverse impacts on these populations compared to segments of broader American society.

3.9.3.6 Summary of Impacts under Each Alternative

Impacts on bald and golden eagles as cultural resources and to groups ascribing value to eagles would be as follows:

- **Alternative 1 (Proposed Action)** – Impacts would include changes to cultural relationships between Native American tribes and eagles, particularly golden eagles. These changes could result from impacts on eagles and eagle populations with which tribes have cultural relationships, including injury and fatality, displacement from habitat, and impacts on prey species. Impacts would be partially offset by compensatory mitigation that provide for no-net-loss of golden eagles. No impacts would be expected on American symbolic value of eagles or Native American access to eagles.
- **Alternative 2 (Proposed Action with Different Mitigation)** – Impacts would be similar to those under Alternative 1 (Proposed Action). Compensatory mitigation would be different under Alternative 2, which would result in different levels of impacts and benefits to eagles as a cultural resource (see Table 3-30).
- **Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project)** – Impacts would be similar to those under Alternatives 1 (Proposed Action) and 2 (Proposed Action with Different Mitigation), but impacts would be reduced because the number of wind turbines, and therefore the number of eagle takes, would be reduced.
- **Alternative 4 (No Action: Denial of ETPs)**
    - The No Build scenario would result in no impacts on eagles as a cultural resource.
    - The Build Without ETPs scenario would result in greater impacts than those under Alternatives 1 (Proposed Action), 2 (Proposed Action with Different Mitigation), and 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) if PCW decides to move forward with the CCSM Phase I Project and eagle takes are not mitigated.

Table 3-30. Comparison of Compensatory Mitigation Measures for Eagles as a Cultural Resource for the CCSM Phase I Project in Wyoming

Compensatory Mitigation Measure	Effects on Eagles as a Cultural Resource
Power pole retrofits	No effect on eagles as a cultural resource
Mitigation of existing wind facilities	No effect on eagles as a cultural resource
Lead abatement	No effect on eagles as a cultural resource
Carcass removal and carcass avoidance	No effect on eagles as a cultural resource
Wind conservation easement	No effect on eagles as a cultural resource
Habitat enhancement	Potential benefits to tribes, enhancing their cultural relationship with eagles, if habitat enhancements were conducted at or near tribal communities and reservations.
Rehabilitation of injured eagles	Potential benefits to tribes, enhancing their cultural relationship with eagles, if funding to create or expand eagle rehabilitation services is made available to tribes

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Chapter 4.0
Cumulative Impacts

4.1 Introduction

A cumulative impact, as defined in 40 Code of Federal Regulations (CFR) 1508.7, is "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" by federal, state, or local agencies or by individuals. To make informed decisions, agencies should consider cumulative impacts resulting from actions that have already occurred, projects under construction, actions that are proposed, and actions that are anticipated to be implemented in the reasonably foreseeable future. Reasonably foreseeable future actions consist of activities that are generally in the planning stage and can be evaluated with respect to their impacts.

The discussion of cumulative impacts assumes that the avoidance, minimization, mitigation, and other conservation measures discussed in Chapters 2.0 and 3.0 would be applied to the Chokecherry and Sierra Madre (CCSM) Phase I Project alternatives, and that each of the alternatives would comply with all applicable federal, state, and local regulations and permit requirements. Because the primary purpose of this Environmental Impact Statement (EIS) is to analyze the effects on eagles of issuing Eagle Take Permits (ETPs) for construction and operation of the CCSM Phase I Project, we, the U.S. Fish and Wildlife Service (USFWS), have focused our analysis of cumulative impacts on eagles and those resources that directly impact eagles (that is, habitat and prey). However, we have also assessed the cumulative impacts on other resources evaluated in detail in Chapter 3.0.

The Bureau of Land Management (BLM) analyzed cumulative impacts of the CCSM Project in the BLM Final Environmental Impact Statement (FEIS) and in BLM's site-specific environmental assessments (EA1, and EA2), and we are incorporating that information that we have determined to be adequate for our analysis by reference. Where applicable for resources evaluated in detail in this EIS, we have included and cited relevant information from the BLM NEPA documents. However, new information or new analysis provided herein supplements the BLM's analyses.

4.2 Approach

The study area for each resource evaluated in Chapter 3.0 and considered for cumulative impacts in this chapter is dependent on the potential for impact, with some resources having larger study areas than other resources. For example, the physical boundaries of the study area for wetlands and vegetation consist of the Phase I development and infrastructure areas, but the study area for cultural resources comprises the four Bird Conservation Regions (BCRs) containing eagle populations that could potentially be affected by the CCSM Phase I Project. Additionally, because of the cultural importance of eagles to Native American tribes,

an even broader study area exists to account for tribal interests outside of the four BCRs. See Section 3.9.2.1 for further information on tribal interest in this area and project.

Our approach to evaluating cumulative impacts on eagles considers the effects of programmatic take on eagle populations at three scales: (1) eagle management unit (EMU); (2) local area population (LAP), and (3) project vicinity. This approach is consistent with our Eagle Conservation Plan (ECP) guidance (USFWS 2013b). These three scales are defined as follows:

- EMU: For the CCSM Phase I Project, the EMUs for bald eagles are the Northern Rocky Mountains EMU and the Rocky Mountains and Plains EMU, as described in Section 2.1.2.1 (USFWS 2013b); Figure 2-1 shows the bald eagle EMUs. The EMUs for golden eagles are the four BCRs described in Section 2.1.2.2 and shown in Figures 2-2 and 4-1. These four BCRs are the Northern Rockies (BCR 10), Southern Rockies/Colorado Plateau (BCR 16), Badlands and Prairies (BCR 17), and Shortgrass Prairie (BCR 18).
- LAP: The LAP for bald eagles is the population within a 43-mile radius around the CCSM Phase I Project, and the LAP for golden eagles is the population with a 140-mile radius around the CCSM Phase I Project, as described in Section 2.1.2.3. Figure 2-1 shows the radius of the bald eagle LAP boundary superimposed on EMU boundaries, and Figure 2-2 shows the radius of the golden eagle LAP boundary superimposed on the BCR boundaries). The size of the LAP is based on the median distance to which eagles are thought to disperse from the nest where they are hatched to where they settle to breed, known as the natal dispersal distance.
- CCSM Phase I Project vicinity: The CCSM Phase I Project and the infrastructure boundaries are as shown in Figures 2-3, 2-4 and 2-5. As described in Section 2.2.1, this area encompasses the Phase I wind turbine development and the infrastructure components that would be covered by the standard and programmatic ETPs (the Phase I Haul Road and Facilities, West Sinclair Rail Facility, and Road Rock Quarry).

The goal of this cumulative impacts analysis is to qualitatively assess cumulative eagle take within the EMUs by discussing broad landscape-level changes, to quantitatively assess take of bald and golden eagles within the LAPs by discussing specific activities and projects, and to assess cumulative impacts on other resources evaluated in detail in Chapter 3.0. The larger the area of analysis, the more variables and uncertainty will exist. Consequently, a quantitative analysis would not be reasonable at the EMU scale. As noted in Chapter 3.0, we are focusing primarily on evaluating potential impacts on eagles, and secondarily on other key resources that directly and indirectly affect eagles.

Although the EMU, LAP, and project vicinity boundaries described above have been defined for the purposes of this analysis, an inherent challenge of assessing cumulative impacts of eagle take is the lack of specific data on where eagles nest and how they migrate when considering all three scale levels. Section 3.8.2.3.2 describes seasonal use of the Phase I development and infrastructure areas by golden eagles.

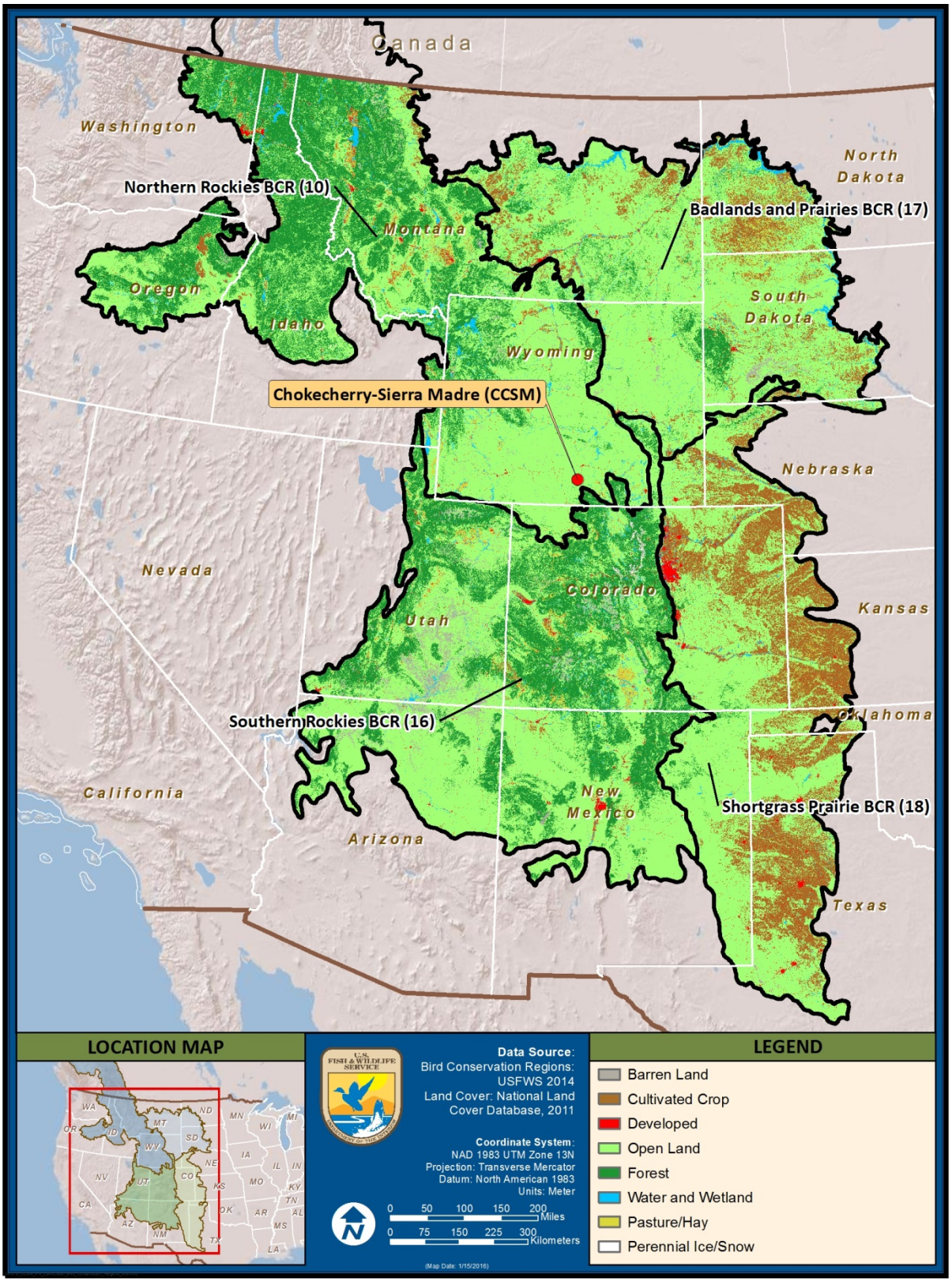

Figure 4-1. Land Cover Categories in the Four Bird Conservation Regions (BCRs) Contiguous to the CCSM Phase I Project in Wyoming

To assess cumulative impacts on eagles, we followed the methods outlined in our ECP guidance, Appendix F (USFWS 2013b), and we used our cumulative effects tool developed to complete an LAP analysis. We also used eagle mortality records available to us in a USFWS eagle mortality database and an additional set of eagle mortality records available from the Wyoming Game and Fish Department (WGFD). It is important to note that our eagle mortality records are based on opportunistic or incidental reporting of eagle fatalities, and they were not obtained from regular or systematic survey efforts to detect eagle mortality using a statistically valid protocol or sampling methodology. Except for some of the wind energy industry mortality records, no searcher efficiency or carcass persistence trials are associated with any of these records, so we cannot apply a bias correction factor as we could for studies conducted using statistically valid sample designs. Also, some industries that impact eagles conduct self-reporting of eagle fatalities at a higher rate than other industries, and some types of eagle fatalities lend themselves better to discovery and reporting. Hence, there are types of bias associated with these records. Still, we elected to use the eagle mortality records in the USFWS database and WGFD database because this is the best scientific information available to us regarding eagle mortality within the LAPs for both bald and golden eagles.

We used eagle mortality records from our database for only the most recent 10 full years (2005 through 2014). We used this dataset because work on the Environmental Assessment (EA) for the new 2009 Bald and Golden Eagle Protection Act (BGEPA) regulations for non-purposeful take of eagles included estimates of eagle populations and mortality levels that are now about 8 years old. Also, the 2009 BGEPA regulations themselves were issued about 7 years ago, and there has likely been an increase in reporting of eagle fatalities to USFWS since these went into effect, which provides us with a more accurate estimate of eagle mortality compared to the preceding 20 or 30 years. Last, most wind energy facilities operating in Wyoming became functional within the last 10 years, and some of these facilities have voluntarily reported eagle fatalities to us.

In summary, we are focusing the analysis of cumulative impacts on the LAP scale for resources other than birds (other than eagles), eagles, and cultural resources. Cumulative impact analysis for birds (other than eagles), eagles, and cultural resources considers not only the LAP scale, but larger areas.

4.3 Past, Present, and Reasonably Foreseeable Future Actions

This section begins with a description of the environments at the EMU scale at the four-BCR scale, and then discusses past, present, and reasonably foreseeable future actions within the individual BCRs. The section continues with a more detailed description of the environment within the LAP scale for eagles and of key activities that affect eagles within the LAP. Potential cumulative effects are more reasonably predictive at an LAP scale based on a smaller area, more available data, and fewer unknowns. However, a qualitative review of potential cumulative impacts within EMUs is needed to account for potential mitigation occurring outside the median natal dispersal distance.

4.3.1 Eagle Management Unit Scale (Four-BCR Scale)

The North American Bird Conservation Initiative has established BCRs as ecologically distinct regions in North America with similar bird communities, habitats, and resource management issues (U.S. NABCI Committee 2015). To meet the North American Bird Conservation Initiative's goal of conserving important migratory bird habitat, migratory bird joint ventures were formed throughout North America. Migratory bird joint ventures are collaborative, regional partnerships of agencies, non-profit organizations, corporations, tribes, and individuals. Although BCRs are located within designated Joint Venture units, these units do not play any direct role in management of eagle populations.

Land cover in the four BCRs is shown in Figure 4-1; land cover and respective land uses in each BCR based on information provided by the migratory bird joint ventures are discussed further below.

4.3.1.1 Bird Conservation Region 10 (Northern Rockies)

Approximately half of BCR 10 lies within the Northwestern Forested Mountains ecoregion, and the remainder lies within the North American Deserts ecoregion. The Northwestern Forested Mountains ecoregion "contains many of the highest mountains of North America" and includes bird habitats "ranging from alpine tundra to dense conifer forests to dry sagebrush and grasslands" (Intermountain West Joint Venture [IWJV] 2013). The North American Deserts ecoregion encompasses the southeastern half of the ecological setting within BCR 10, and is also within BCR 16. The ecoregion "is distinguished from the adjacent forested mountain ecoregions by its aridity and associated landscapes dominated by shrubs and grasses" (IWJV 2013). Although the mountainous portions of BCR 10 are dominated by a variety of coniferous forest habitats, the BCR includes the intermontane Wyoming basin, which is characterized by sagebrush shrubland and shrub-steppe habitat (Wiken et al. 2011; Chapman, Bryce, et al. 2004; U.S. NABCI Committee 2015). The CCSM Phase I Project would be located in the southern portion of BCR 10. Golden eagles present in the northern areas of BCR 10 may also migrate south to the Phase I development and infrastructure areas during winter months.

Human activities in the North American Deserts ecoregion have had substantial impacts on the natural resources of the region. These human activities include resource extraction (forestry, mining, and oil and gas production), agriculture (ranching and cropland), urbanization, and energy production. In addition to human activities, bird populations are also being affected by climate change, invasive species, and changes in water quality and quantity (IWJV 2013).

Commercial forest operations have been established in many areas of the North American Deserts ecoregion, particularly in the northern portions of the region (IWJV 2013). Other common activities include mining, oil and gas production, and tourism (IWJV 2013). Mining is also an important economic factor in the North American Deserts ecoregion within BCR 10 (IWJV 2013). Oil and gas production affects habitat throughout much of Wyoming (Chapman, Bryce, et al. 2004). Tourism and recreation are also becoming increasingly important contributors to local and regional economies (IWJV 2013).

Cattle grazing over the past 100 years has contributed to the ecosystems present within the boundaries of the CCSM Phase I Project and throughout the North American Deserts ecoregion, as well as in many of the surrounding mountainous regions (IWJV 2013). Many lower mountain valleys have been converted to range and agricultural uses. Although only a small fraction of the region's land base is cultivated, irrigated agriculture is the largest user of water resources (IWJV 2013). These water resources originate largely outside the ecoregion as winter snow pack (IWJV 2013). Water rights allocated to agriculture are increasingly being converted to domestic water use, limiting conservation opportunities and potentially altering wildlife resource availability by reducing the extent of cropped acreage (IWJV 2013).

Though there are adverse impacts on bird populations and habitat from agriculture, properly managed agriculture can improve habitat conditions compared to traditional practices (IWJV 2013; Krausman et al. 2009; Pool and Austin 2006). Agricultural land uses can provide some level of protection from urbanization and can, in some cases, present opportunities for future habitat restoration. Urbanization, including the conversion of agricultural land to urban uses, poses a threat to wildlife habitat; however, within BCR 10, human population density remains relatively low outside large population centers (IWJV 2013).

Development of alternative energy resources is expanding throughout BCR 10. As with conventional energy extraction practices, the development of infrastructure associated with development of alternative and renewable energy facilities increases threats of habitat fragmentation (IWJV 2013).Climate change poses a broad threat to water and wetland resources of the region (IWJV 2013). Changes in temperatures and precipitation (timing and quantity) can affect vegetation and the availability of water. Alterations to the distribution and volume of snow pack in conjunction with increased evaporation rates have the potential to impact wetlands, even within areas that are otherwise well protected (IWJV 2013). Climate change can also affect food supply, disease rates, and the concentrations of contaminants in water (IWJV 2013).

Degradation of water quality and changes in water quantity are pervasive threats to many bird populations and habitat conservation in BCR 10. "Hydrologic modifications, salinization, sedimentation, pesticide contamination, and declining water quantity and quality" are particular concerns in the BCR (IWJV 2013). Timing and availability of water in the Intermountain West (an area between the Rocky Mountains, and the Cascade Range and Sierra Nevada mountains) is also important (IWJV 2013). Water quantity issues are further exacerbated by periodic drought cycles and can lead to a substantial impact on the availability of water during important stages of birdlife cycles (IWJV 2013).

Invasive species (both plant and animal species) adversely affect bird habitat and populations. Invasive species are pervasive in many grassland, wetland, and riparian areas and threaten habitats associated with these systems, causing loss of habitat by replacement of native species or foraging pressure by non-native herbivores. Invasive predators exert additional pressure on bird species (IWJV 2013).

Historic causes of eagle population declines include loss of habitat, shooting and trapping, and toxic effects of pesticides and heavy metal (mercury and lead) contamination (USFWS

1983). Specific causes of eagle population decline in Wyoming include disease, loss of large old trees, residential development, energy production, and recreation near rivers and lakes (WGFD 2010b).

Though the region faces threats and challenges to bird populations and habitat, much of the land in BCR 10 is protected to various degrees through federal and state ownership (for example, national and state parks; national and state forests; and other federally owned land, such as land owned by the BLM, USFWS, U.S. Bureau of Reclamation, and U.S. Department of Defense) and through U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) conservation programs (U.S. Geological Survey [USGS] 2005a; Wyoming Office of State Lands and Investments 2016; NRCS 2016).

4.3.1.2 Bird Conservation Region 16 (Southern Rockies/Colorado Plateau)

BCR 16 is topographically complex and "includes the Wasatch and Uinta Mountains to the west and the Southern Rocky Mountains to the east, separated by the rugged tableland of the Colorado Plateau" (U.S. NABCI Committee 2015). A range of habitats is contained in this BCR, including coniferous forest interspersed with aspen at higher elevations, piñon-juniper woodlands on lower plateaus, and shortgrass prairies in the high arid plains (U.S. NABCI Committee 2015). Golden eagles from this BCR may migrate north to the Phase I development and infrastructure areas during summer months.

Within BCR 16, there are three ecoregions: Northwestern Forested Mountains, North American Deserts, and Temperate Sierras. Characteristics of the Northwestern Forested Mountains and North American Deserts are discussed above, in Section 4.3.1.1. The Temperate Sierras ecoregion occurs in the mountains of New Mexico and Arizona, and consists of extensive volcanic and fault-block mountain chains and plateaus separated by wide valleys and plains (IWJV 2013). Surface water is limited, and flow in many streams and arroyos is intermittent at middle and lower elevations. Soils are variable, encompassing shallow soils of alpine sites and nutrient-poor forest soils of the mountain slopes, as well as soils suitable for agriculture and those rich in calcium that support natural dry grasslands (IWJV 2013).

Commercial forestry operations have been established in some areas of the Temperate Sierras ecoregion, but have been less intensive than those conducted in more northerly forests. Past fire suppression policies of the U.S. Department of Agriculture, Forest Service have altered forest density and structure over much of the region. Shifts in forest densities have reduced productivity of understory grasses and increased the risk of catastrophic fires. Other land uses in the Temperate Sierras ecoregion include mining, oil and gas production, recreation, and tourism. Large areas of this ecoregion are in public forests and rangelands (Wiken et al. 2011). "Long-term and poorly managed grazing on public and private lands have degraded rangeland productivity and severely impacted riparian resources in the region. Climate change poses the broadest threat to water and wetland resources of the region" (IWJV 2013).

While large urban areas (Denver, Colorado Springs, and Salt Lake City) are located just outside BCR 16, urbanization of the region is increasing across central and western Colorado and northern New Mexico (U.S. Census Bureau 2015), leading to habitat loss and

fragmentation. Challenges and threats to bird populations and habitat identified by Colorado Parks and Wildlife include habitat conversion; habitat degradation from fragmentation, forestry, altered fire regimes, and wetland filling; pollution; collisions with powerlines; and invasive species. Specific threats to bald and golden eagles have been identified as poisoning, collision with powerlines, habitat conversion, pollution, disturbance by flight paths of aircraft, and habitat degradation (Colorado Parks and Wildlife 2006).

Though the region faces threats and challenges to bird populations and habitat, much of the land in BCR 16 is protected to various degrees through federal and state ownership (for example, national and state parks; national and state forests; and other federally owned land, such as land owned by the BLM, USFWS, U.S. Bureau of Reclamation, and U.S. Department of Defense) and through NRCS conservation programs (USGS 2005a, 2005b; Wyoming Office of State Lands and Investments 2016; Colorado State Land Board 2016; NRCS 2016).

4.3.1.3 Bird Conservation Region 17 (Badlands and Prairies)

BCR 17, Badlands and Prairies, is a semi-arid rolling plain dominated by a mixed-grass prairie that lies west and south of the glaciated Prairie Pothole region, east of the Rocky Mountains, and north of the true shortgrass prairie (U.S. NABCI Committee 2015). Golden eagles from this BCR may migrate to the Phase I development and infrastructure areas, especially during winter months.

The economy in BCR 17 is dominated by natural resource-based industries such as ranching, farming, recreation, hunting, and fishing. The rugged living conditions of these arid grasslands create the social and cultural structures of the northern Great Plains communities, most notably ranching, which help to maintain the grassland-dominated landscape (Pool and Austin 2006). Much of the area is drained by the Missouri River through its various tributaries. “Development of irrigation systems and more drought-tolerant crops has resulted in some westward expansion of cropland agriculture, although it remains limited by soils, topography, and precipitation” (Pool and Austin 2006).

Climate, grazing, and fire have been the dominant forces shaping the ecological communities of the Northern Great Plains (Pool and Austin 2006). More recently, agriculture and other human development associated with European settlement have increasingly influenced the region’s soils, landscape, flora, and fauna. The original forces of climate, grazing, and fire, remain critical factors influencing the landscape and communities of the Northern Great Plains because they are intimately linked to the ecology of native communities (Pool and Austin 2006).

Several trends in the United States population are indicative of changes that are occurring in the Northern Great Plains. The fraction of Americans living in cities increased from 40 percent in 1900 to more than 75 percent in 2005 (Pool and Austin 2006). Most rural areas in BCR 17 are losing population to regional cities and other states (Pool and Austin 2006). Ranching and farming are the major economic activities in the region, but urban areas provide housing and employment for a significant percentage of the region’s population (Pool and Austin 2006).

Livestock production, consisting mostly of cattle, is prevalent on private, tribal, and public lands (Pool and Austin 2006). A substantial amount of land in the region "is used for production of cash and forage crops" (Pool and Austin 2006). Another cultural trend in the region is that the numbers of farms continue to decline and that the average farm size continues to expand. For example, according to the Montana Agricultural Statistics Service, there were 37,200 farms with an average size of 1,747 acres in Montana in 1950; while in 1997, the number of farms declined to 23,000 and the average size increased to 2,591 acres (Pool and Austin 2006). This trend combined with a rapidly aging rural population favors the transfer of a large number of acres to new owners (Pool and Austin 2006).

Energy exploration and development have had major impacts on lands within the region. The region is a major supplier of coal for consumption in the United States. Recently, more interest in oil and gas development has occurred (Pool and Austin 2006). Coal mining (especially in northeastern Wyoming) and oil and gas production (especially in western North Dakota) affect much of this region by fragmenting habitat and proliferating invasive plant species (Pool and Austin 2006).

Many of the grasslands in this region have remained intact. However, threats to grasslands include invasive species and habitat fragmentation, pollution, development of infrastructure, and suppression of fire, resulting in encroachment of woody species and loss of native diversity (Dyke et al. 2015).

Though the region faces threats and challenges to bird populations and habitat, much of the land in BCR 17 is protected to various degrees through federal and state ownership (USGS 2005a; NRCS 2016).

4.3.1.4 Bird Conservation Region 18 (Shortgrass Prairie)

BCR 18, the Shortgrass Prairie region, lies in the rain shadow of the Rocky Mountains, where arid conditions greatly limit the stature and diversity of vegetation (U.S. NABCI Committee 2015). Numerous broad, braided rivers drain to the east out of the Rockies and cross through the shortgrass prairie (U.S. NABCI Committee 2015). Golden eagles from BCR 18 may migrate north to the Phase I development and infrastructure areas during summer.

This region is dominated by agricultural land uses such as crop cultivation and livestock grazing with over half of the area in cropland (Playa Lakes Joint Venture [PLJV] 2015). Grasslands are the dominant bird habitat in the landscape. Short grass prairie primarily consists of low-growing, warm-season grasses such as blue grama and buffalo grass. Sandsage prairie is found where sandy soils occur, and consists primarily of sandsage, sand bluestem and prairie sand-reed grasses (PLJV 2015). Mixed-grass species such as needle-and-thread and side-oats grama, and some tall grasses such as big bluestem, little bluestem and switchgrass become more dominant farther east (PLJV 2015).

Although grasslands and shrublands are the primary native habitats in the region, there are a variety of other water-associated habitats including playas (that is, shallow, temporary wetlands that lie in the lowest point of a closed watershed), rivers and streams, wet meadows,

and saline lakes (PLJV 2015). Major rivers in the region include the Arkansas, Canadian, North and South Platte, Red, and Republican. These rivers provide habitat for a variety of migratory birds, including species of conservation concern such as the whooping crane, least tern, and piping plover. In the southern portion of the region, many river and stream (riparian) areas go through wet-dry cycles, receiving brief surges of water only after heavy rains (PLJV 2015). Major threats to riparian areas are loss or change of water periods; fragmentation due to developments such as diversions, dams, and roads; invasion of exotic species such as salt cedar and grasses; and lack of cottonwood regeneration (PLJV 2015).

Though the region faces threats and challenges to bird populations and habitat, much of the land in BCR 18 is protected to various degrees through federal and state ownership (USGS 2005a; NRCS 2016).

4.3.1.5 Past, Present, and Reasonably Foreseeable Future Actions in the Bird Conservation Regions

Key bird habitats in the four BCRs include forests, wetlands, grasslands, and sagebrush. Activities that have cumulative impacts on these habitats are discussed below.

4.3.1.5.1 Habitat Conversion

There is substantial variation in the type of land and impacts among the four BCRs being evaluated. Figure 4-1 identifies the current land cover categories in these BCRs. Vegetative composition has undergone tremendous changes over the past 150 years but is highly variable across the four BCRs. The introduction of domestic livestock grazing (sheep and cattle) in the mid- to late-nineteenth century has had significant ecological and hydrological effects (IMJV 2013). The economies and culture of these regions and their communities evolved with, and as a result of, agriculture.

Where conditions are suitable, native grasslands and sagebrush have experienced large-scale conversion to cropland, particularly in the Badlands and Prairies (BCR 17) and Shortgrass Prairie (BCR 18). The loss of wetlands and grasslands on private land is partly due to conversion of habitat to croplands but varies significantly among the four BCRs. From the 1950s until about the 1980s, land managers actively eradicated sagebrush on public and private lands to increase livestock forage (Boyle and Reeder 2005; Connelly et al. 2000). Poorly managed livestock grazing can result in changes to vegetation composition and structure, which can alter small mammal communities (Davies et al. 2014).

Conversion of grasslands, sagebrush, and wetlands to agriculture has slowed considerably since the mid- to late-twentieth century (Boyle and Reeder 2005; Dahl 2014); however, conversion of habitat continues in certain areas. A study from the U.S. Department of Agriculture's Economic Research Service found that 770,000 acres of grassland in the northern plains was converted from grassland to cropland between 1997 and 2007 (Classen et al. 2011). The primary consequence of conversion to cropland is large-scale habitat loss for many raptor prey species.

Presently, programs such as the North American Wetland Conservation Act, Wetland Reserve Program, Conservation Reserve Program, and other programs that encourage restoration or reestablishment of native habitats have contributed to conservation efforts and continue to promote cropland and grazing management practices that are beneficial to wildlife species (Dahl 2014; Pool and Austin 2006). Practices such as rotational grazing, low density grazing, no-till cropping, and conservation tillage increase diversity, reduce erosion and water use, and improve habitat for birds and other wildlife by increasing ground cover and forage (Krausman et al. 2009; Pool and Austin 2006). These programs and practices are likely to be used in the foreseeable future. Additionally, agricultural uses can provide protection from urbanization and thus more realistic opportunities for future habitat restoration (IMJV 2013).

Agriculture is a major source of groundwater and surface water use, accounting for as much as 90 percent of water consumption in parts of the western United States (NRCS 2015). However, water rights allocated to agriculture are increasingly being converted to domestic water use, limiting conservation opportunities and potentially altering wildlife resource availability by reducing the extent of cropped acreage (IWJV 2013).

Historically, the intermountain valleys were populated by humans at low density and typically centered on agricultural production, namely ranching. Over the past 2 decades, the Intermountain West has experienced unprecedented human population growth, with rural intermountain valleys also witnessing substantial population growth (IMJV 2013). The habitat converted to agriculture is now being converted to rural urbanization. This trend looks to continue in the foreseeable future.

Sage-grouse and sagebrush ecosystems are the focus of many conservation efforts throughout the west. For the foreseeable future, programs such as the Sage Grouse Initiative led by the NRCS work to conserve and proactively manage lands for healthier rangelands. Additionally, hundreds of thousands of acres of expanding conifers have been removed to reclaim core sage-grouse habitat (NRCS 2015). The new ‘Sodsaver’ provision in the 2014 Farm Bill reduces the federal crop insurance subsidies on cropland recently converted from native sagebrush habitats, making conversion of marginal lands less economically viable and conserving habitat (Smith and Goodwin 2013).

4.3.1.5.2 Fire Suppression and Wildfire

Although large fires occasionally occur in portions of the region, the frequency and overall area burned during the last 100 years have departed substantially from the historic range of variation. The implementation of fire suppression measures was concurrent with the introduction of livestock and establishment of permanent settlements throughout the four BCRs (Pool and Austin 2006). This, coupled with the past fire suppression policies of the U.S. Department of Agriculture, Forest Service, has altered forest density and structure over much of the region. Shifts in forest densities have reduced productivity of understory grasses and increased the risk of catastrophic fires. When wildfire does occur, particularly in low elevation Wyoming big sagebrush systems, it has resulted in substantial habitat loss primarily because of subsequent invasion by cheatgrass and other noxious weeds and invasive plant species (Miller et al. 2011).

In portions of the region where habitat has been substantially fragmented by cropland, fire has been essentially eliminated from the landscape (Pool and Austin 2006). Fire suppression contributes to the expansion of coniferous woodland into former grassland habitat, and it may also be allowing for the expansion of deciduous vegetation along ephemeral drainages (Pool and Austin 2006). Within coniferous woodlands, density and volume of trees per area has greatly increased, making these areas more susceptible to stand replacing fires. Increased forest cover also intercepts water, and trees have higher evapotranspiration rates than native grasslands. Together, both of these changes likely decrease water run-off to feed stream flows. In grasslands, lack of fire may be affecting plant community dynamics, altering cycling of carbon and other nutrients and species composition (Pool and Austin 2006).

As noted in the previous section, sage-grouse and sagebrush ecosystems conservation efforts reduce the threat of invasive grasses and wildfire by managing for healthier rangelands. By removing encroaching conifers, the fuel load is reduced by half and can decrease the negative impacts resulting from catastrophic wildfire (Chambers et al. 2014).

4.3.1.5.3 Water Diversion

In the arid portions of the four BCRs, issues of water supply and demand from continued expansion of human development (that is, urbanization, agriculture, mining, and energy extraction) places significant strains on water supplies (IWJV 2013). Many areas are already over-allocated, contributing to continued loss of some wetland types (IWJV 2013). An example of past over-allocation is the Colorado River, which supplies water to Colorado, Wyoming, Utah, New Mexico, Nevada, Arizona, California, and Mexico. The Colorado River and its tributaries are controlled by 29 major dams and hundreds of miles of canals. About 90 percent of the flow of the Colorado River is diverted to provide irrigation water to 4 million acres of cropland and municipal water supply for almost 40 million people both inside and outside the watershed (Gupta 2007).

Long-term wetland loss from water diversions throughout the four BCRs means that remaining wetland habitats are critically important because they must provide most of the resources required to sustain bird and other wildlife populations. Because water is so important to both people and birds, remaining wetland resources are at considerable risk of loss and degradation (IWJV 2013).

Rapid human population growth is one of the most significant present and foreseeable threats to wetland water supplies in the western portions of the four BCRs (IWJV 2013). Population growth has placed increased demands and competition on water for urban, municipal, industrial, and agricultural irrigation uses. Urbanization can alter wetland hydrology directly but it also results in indirect impacts such as the depletion of water tables and diminishing of aquifer recharge rates required to sustain functional wetland environments (IWJV 2013). Further competition among water users for increasingly limited water resources prolongs the effects of periodic droughts on wetland systems and makes those droughts worse (IWJV 2013). Additionally, expansion of development can increase habitat fragmentation rates, alter hydrologic patterns, diminish water table recharge rates, and reduce habitat suitability for many plant and animal communities, especially wetland-dependent birds (IWJV 2013).

4.3.1.5.4 Mineral and Energy Development

Mineral and energy development have been occurring in the four BCRs for many decades, but this development reached a new intensity over the last decade, largely as a result of increased interest in some forms of energy. In the past, the oil and natural gas industry considered resources locked in tight, impermeable formations, such as shale, uneconomical to produce. Advances in directional well drilling and reservoir stimulation have changed this perspective dramatically and oil and gas exploration and drilling activities in the four BCRs increased dramatically between 2008 and 2015 (U.S. Energy Information Administration [EIA] 2016). From 2008 to 2013, crude oil production in the United States increased 32 percent (from 5.0 million to 7.4 million barrels per day), while annual dry natural gas production grew 17 percent (from 20.2 to 24.3 trillion cubic feet) (EIA 2015). Additionally, oil production in the Powder River basin increased 48 percent between 2009 and 2014 (EIA 2015). Despite a decline in oil and gas drilling over the last year, oil and gas production is projected to rebound and continue to increase at a moderate pace in the reasonably foreseeable future (EIA 2016). Predictions of oil and gas production show that growth in the Rocky Mountains and Dakotas is expected to continue. Major oil- and gas-producing formations in the four BCRs include the Niobrara, Lewis, Hilliard-Baxter-Mancos, Cody, and Green River formations (EIA 2015).

Coal mining has occurred for many years in the four BCRs, particularly in northeastern Wyoming, southeastern Montana, central Utah, western Colorado, and the four corners area (where Colorado, Utah, New Mexico, and Arizona share a border). Nine of the 10 largest coal mines in the United States are surface mines in the Powder River basin, which is a 25,800-square-mile basin extending from northeastern Wyoming into southeastern Montana. The Powder River basin is the largest coal mining region in the United States, accounting for approximately 40 percent of all coal currently mined in the nation (EIA 2015). The amount of coal produced from the Powder River basin and the western United States more generally has been increasing over the last 20 years, even as nationwide coal production has decreased slightly (coal mining decreased a total of 3.1 percent between 2012 and 2013) (EIA 2015). Coal production in the western United States is expected to begin declining in the next several years as a result of increased competition from natural gas and renewable energy, coal plant retirements, equipment retrofits, and implementation of the Clean Power Plan (EIA 2016).

Risks to wildlife from oil, gas, and mining activities include habitat loss and fragmentation; increased spread of invasive species; disturbance of wildlife during road construction, drilling, and operation; water depletions; contamination of water and soils; spread of disease; and direct mortality in oil and gas pits if they are not covered with netting (Pool and Austin 2006).

Renewable energy development in the four BCRs includes hydroelectric, biomass, wind, geothermal, and solar energy facilities. Due to western drought conditions, conventional hydropower generation is forecasted to decrease by 10.4 percent in the foreseeable future (EIA 2015). Conversely, non-hydropower renewable power generation is forecasted to increase by 3.2 percent over the next 5 years, due primarily to the projected growth of utility-scale solar power generation and wind power generation (EIA 2015). Renewable energy

developments can carry many of the same risks and impacts associated with fossil fuel development, including habitat loss, degradation, and fragmentation. Additionally, new transmission line and transportation infrastructure associated with renewable energy development can be extensive. Transmission lines and towers can impact wildlife by direct mortality (collisions), and both transmission line and transportation infrastructure contribute to habitat fragmentation (Franson et al. 1995; Kochert et al. 2002; Wayland et al. 2003; Tetra Tech 2011, as cited in Allison 2012).

4.3.1.5.5 Climate Change

Global climate change refers to long-term fluctuations in temperature, precipitation, wind, and other elements of the Earth's climate system. Natural processes such as variations in solar irradiance, cyclical changes in the Earth's orbital parameters, ocean circulation changes, and volcanic activity can produce variations in climate and weather patterns. However, recent discussions of the Earth's climate system have highlighted the influence of the changes in concentrations of various gases in the atmosphere—specifically those gases referred to as greenhouse gases that affect the Earth's absorption of solar radiation (Zahniser et al. 2009). Greenhouse gases such as carbon dioxide, methane, and nitrous oxide trap heat in the atmosphere, thereby affecting the Earth's climate and contributing to the gradual warming of the earth (Ren 2010). The United Nations' Intergovernmental Panel on Climate Change's (IPCC's) *Climate Change 2014: Synthesis Report* indicates that about 40 percent of anthropogenic greenhouse gas emissions released between 1750 and 2011 have remained in the atmosphere; the rest has been removed from the atmosphere and is stored on land (in plants and soils) and in the ocean (IPCC 2014).

Economic and population growth continued to be the most important drivers of increases in greenhouse gas emissions from fossil fuel combustion (IPCC 2014). Specific human activities that contribute to greenhouse gas emissions include burning of fossil fuels (for example, coal, natural gas, and oil), land use changes (for example, conversion of forests to agricultural land), generation of waste, and farming practices (Zahniser et al. 2009).

Information is published on an almost daily basis regarding the projected future affected environment due to climate change in any given area. Accordingly, climate change is considered and characterized as a predicted future state of the affected environment in Chapter 3.0 of this EIS.

Within the four BCRs, evidence of present climate-change impacts includes changing precipitation patterns; more frequent hot and fewer cold temperature extremes; and shifting geographic ranges, seasonal activities, migration patterns, and abundances of terrestrial and aquatic species (IPCC 2014). Projected future effects due to climate change include declines in soil moisture; increases in catastrophic events, including landslides and fires; and altered surface water flows, water quality, and water quantity (Zahniser et al. 2009).

Climate change may also have an effect on wind. Wind is caused by the interaction of the uneven heating of the atmosphere with the uneven surface of the Earth. There has been little research around the increasing global average surface temperatures due to climate change and its impacts on the amount of wind energy available for electricity production. Across

North America, average wind speeds have decreased slightly over the past 40 years (Ren 2010; Rahim et al. 2012). Impacts will depend on how wind and cloud cover patterns change, which is difficult to project using current climate models. One study found substantial differences between several global climate models, but concluded that the predicted changes in the mean annual wind speed in North America is small. However, seasonal changes would likely be greater, with wind speed values likely to increase over the winter months and decrease over the summer months in northern North America (Eichelberger et al. 2008).

Use of wind energy minimizes greenhouse gas emissions that may contribute to climate change, when compared to combustion of fossil fuels. The United States is increasingly shifting away from fossil fuel use to renewable energy sources as part of a long-term strategy to reduce greenhouse gas emissions. Section 4.3.2.2 documents several existing and planned wind energy projects within the local area. The planned development of wind energy facilities in the local area could have the potential to decrease the severity of wildlife and habitat impacts associated with climate change.

4.3.2 Local Area Scale for Eagles

The local area scale for bald eagles is a 43-mile radius around the CCSM Phase I Project, and is located wholly within the local area scale for golden eagles, which is a 140-mile radius around the CCSM Phase I Project (see Section 2.1.2.3). Figure 2-1 illustrates the radius of the local area for bald eagles; Figure 2-2 illustrates the radius of the local area for golden eagles. The local area scale for golden eagles includes all or part of the following counties:

- In Wyoming: Carbon, Sweetwater, Albany, Laramie, Goshen, Platte, Niobrara, Converse, Natrona, Fremont, Sublette, Hot Springs, Washakie, Johnson, and Campbell Counties
- In Colorado: Moffat, Routt, Jackson, Larimer, Rio Blanco, Garfield, Eagle, Summit, Grand, Boulder, and Weld Counties
- In Utah: Daggett and Uintah Counties

Because the LAP scale for bald eagles is located entirely within the LAP scale for golden eagles, we focused this discussion on the past, present, and reasonably foreseeable future actions in the local area for golden eagles that may result in eagle take. Within the 140-mile radius, eagles could be affected by electrocution and collision with power lines; wind turbine collisions; vehicular collisions; illegal shooting and trapping, and poisoning; habitat loss and degradation; habitat fragmentation; and displacement and behavioral changes that lead to a loss of fecundity.

The public scoping meetings provided an opportunity for public input into the National Environmental Policy Act (NEPA) process. In total, 11 commenters provided considerations for the cumulative impacts assessment in this EIS. Commenters recommended assessment of the cumulative impacts of climate change; other sources of eagle take; the CCSM Phase II Project (which could be renamed or split into multiple projects in the future, but will be referred to as the CCSM Phase II Project throughout the cumulative impacts analysis); and projects in the area, such as transmission lines (including the TransWest Express Transmission Project) and oil and gas drilling and associated infrastructure (including the

Atlantic Rim Natural Gas Project as well as the proposed Continental Divide-Creston Natural Gas Development Project).

The following sections describe actions in the 140-mile local area that, when considered with the Phase I wind turbine development and the infrastructure components of the CCSM Phase I Project, may cause cumulative impacts on those resources analyzed in this EIS. These actions could occur in the past or present, or be reasonably foreseeable projects. Reasonably foreseeable projects include any projects that have been publicly disclosed to be in the proposal or planning stage.

4.3.2.1 Power Lines

Power lines include various categories of transmission lines based on the range of voltage. Transmission lines are organized into two categories in this discussion: high-voltage transmission lines are usually considered to be those lines carrying electricity with voltages of roughly 69 kilovolt (kV) and above, and distribution lines have voltages less than 69 kV. Transmission lines and towers can impact wildlife by direct mortality from electrocutions and collisions and indirectly by fragmentation of habitat and increased raptor perching. Eagles and other raptor species that perch on utility and transmission poles are vulnerable to electrocution and collisions when avian-safe spacing, wire marking, and insulating hardware are absent (Franson et al. 1995; Kochert et al. 2002; Wayland et al. 2003).

Numerous studies indicate that electrocution from contact with power lines is the leading, or one of the leading, causes of death for bald and golden eagles in the United States (Franson et al. 1995; Kochert et al. 2002; Wayland et al. 2003; Tetra Tech 2011, as cited in Allison 2012; USFWS 2016c). Electrocution occurs when a bird comes into contact with two energized parts (such as two wires) or between an energized and a grounded metal part (such as when a bird perches on a metal structure and comes into simultaneous contact with a wire). Most commonly, birds are electrocuted where conducting wires (conductors) are placed closer together than the wingspan of the bird. Because conductors on distribution lines are placed closer together than high voltage transmission lines, birds are more frequently electrocuted on distribution lines, despite their lower voltage (Kochert et al. 2002; Tetra Tech 2011, as cited in Allison 2012).

In Wyoming, at least 60 golden eagle fatalities per year from electrocution with power lines were recorded over a 21-year period. Studies by Franson et al. (1995) and Wayland et al. (2003) reported similar numbers of golden eagle fatalities associated with electrocution. Most studies indicate that numbers of electrocution deaths are actually higher than reported in western states where power poles provide the majority of perches (Benson 1981; Harness and Wilson 2001). It is important to note that these types of studies are prone to numerous biases due to non-systematic sampling. Immature and juvenile eagles appear to be the most susceptible to electrocution. Risk of collision increases during high winds, and risk of electrocution increases during wet weather, when rain wets and increases the conductivity of eagle feathers (Avian Power Line Interaction Committee [APLIC] 1996, 2006).

Numerous rural electric associations own and operate distribution lines within the local area; these include, in Wyoming: High Plains Power, Carbon Power & Light, Wheatland Rural

Electric Association, High West Energy, and Bridger Valley Electric Association; in Colorado: Yampa Valley Electric Association, White River Electric Association, Mountain Parks Electric, and Poudre Valley Rural Electric Association; and in Utah: Moon Lake Electric. These associations collectively own and operate more than 20,000 miles of distribution lines in the local area.

In the reasonably foreseeable future, several major transmission lines may be developed within the local area, including the TransWest Express and Gateway West Projects. The TransWest Express Transmission Project (BLM 2015b) would consist of an approximately 725-mile-long, 600-kV, direct current transmission line; a northern terminal located near Sinclair, Wyoming; and a southern terminal approximately 25 miles south of Las Vegas, Nevada. The project would provide transmission infrastructure and capacity to deliver approximately 3,000 megawatts (MW) of electric power from renewable and other energy resources in south-central Wyoming, including the CCSM Phase I Project, to a substation hub in southern Nevada. The Gateway West Project is comprised of 230- and 500-kV transmission lines in 10 segments from the Windstar Substation near Glenrock, Wyoming, to the Hemingway Substation near Melba, Idaho, with a total length of approximately 1,000 miles (BLM 2015c).

Known present and reasonably foreseeable transmission lines within the 140-mile local area are summarized in Table 4-1.

Table 4-1. Transmission Lines in the Local Area for the CCSM Phase I Project in Wyoming

Project	Owner/Applicant	County (State)	Status
Bridger to Borah	PacifiCorp	Lincoln, Sweetwater (WY)	Present. 345 kV.
Bridger to Goshen	PacifiCorp	Lincoln, Sweetwater (WY)	Present. 345 kV.
Bridger to Kinport	PacifiCorp	Lincoln, Sweetwater (WY)	Present. 345 kV.
Difficulty to Dave Johnston	PacifiCorp	Carbon, Natrona (WY)	Present. 230 kV.
Gateway South Transmission Line Project	PacifiCorp doing business as Rocky Mountain Power	Aeolus Substation near Medicine Bow, WY, to the Clover Substation near Mona, UT (total distance of approximately 400 to 425 miles)	Reasonably foreseeable 500-kV transmission line. FEIS anticipated to be published in winter 2016.

Project	Owner/Applicant	County (State)	Status
Gateway West Transmission Line Project	Idaho Power and Rocky Mountain Power	Converse, Natrona, Albany, Carbon, Sweetwater, Lincoln (WY) and west into Idaho	Reasonably foreseeable. Line segments are scheduled to be completed in phases through 2018.
High Plains Express	Various	Various	Reasonably foreseeable. Planned as a 500-kV AC transmission line.
Johnston to Casper	PacifiCorp	Converse, Natrona (WY)	Present. 230 kV.
Medicine Bow to Seminoe	Western Area Power Administration	Carbon (WY)	Present. 115 kV.
Medicine Bow Coal Co. to Miners	PacifiCorp	Carbon (WY)	Present. 115 kV.
Mustang to Bridger	PacifiCorp	Sweetwater (WY)	Present. 230 kV.
Oasis to Kortes	Western Area Power Administration	Carbon (WY)	Present. 115 kV.
Overland Transmission Project	Jade Energy Associates, LLC	Carbon, Sweetwater (WY)	Delayed but reasonably foreseeable.
Platte to Miners	PacifiCorp	Carbon (WY)	Present. 230 kV.
Platte to Point of Rocks	PacifiCorp	Carbon, Sweetwater (WY)	Present. 230 kV.
Platte to Trowbridge	Tristate Generation and Transmission	Carbon (WY)	Present. 115 kV.
Rock Springs to Atlantic City	PacifiCorp	Fremont, Sweetwater (WY)	Present. 230 kV.
Rock Springs to Bridger	PacifiCorp	Sweetwater (WY)	Present. 230 kV.
Spence to Johnston	PacifiCorp	Converse, Natrona (WY)	Present. 230 kV.
Spence to Mustang	PacifiCorp	Converse, Fremont, Sweetwater (WY)	Present. 230 kV.
Tap to Casper North	Western Area Power Administration	Natrona (WY)	Present. 115 kV.

Project	Owner/Applicant	County (State)	Status
TransWest Express Transmission Line Project	TransWest Express LLC	From Carbon County, WY, through Colorado and Utah (total distance is roughly 725 miles)	Reasonably foreseeable 600-kV transmission line. Record of Decision (ROD) anticipated in winter 2016.
Wyoming-Colorado Intertie	LS Power and Wyoming Infrastructure Authority	Various	Reasonably foreseeable. Proposed 345-kV electric transmission facility between southeast Wyoming and northeast Colorado.
Zephyr Transmission Line Project	Duke American Transmission	Carbon, Sweetwater (WY)	Delayed but reasonably foreseeable.

Sources: BLM 2012a, 2013, 2015a, 2015b, 2016b; EIA 2015.

Newer (post-2006) high-voltage transmission lines are generally, but not always, constructed in accordance with recommendations and standards outlined in APLIC's *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006* and *Reducing Avian Collisions with Power Lines: The State of the Art in 2012* (APLIC 2006, 2012). When transmission lines are designed and constructed in accordance with suggested practices in the APLIC manuals (APLIC 2006, 2012), the risk of electrocution for birds should generally be low. However, high-voltage transmission lines can continue to cause impacts on avian species from the risk of collisions and other indirect impacts such as habitat fragmentation and increased wildfire risk.

Comprehensive geospatial data on transmission lines are difficult to obtain for a number of reasons, including confidentiality clauses and lack of a nationwide clearinghouse for the lines. Data on distribution lines are even more difficult to compile due to the sheer number of lines. Based on available geospatial data, major high-voltage transmission lines (voltages of 69 kV and up) in the local area are depicted in Figure 4-2.

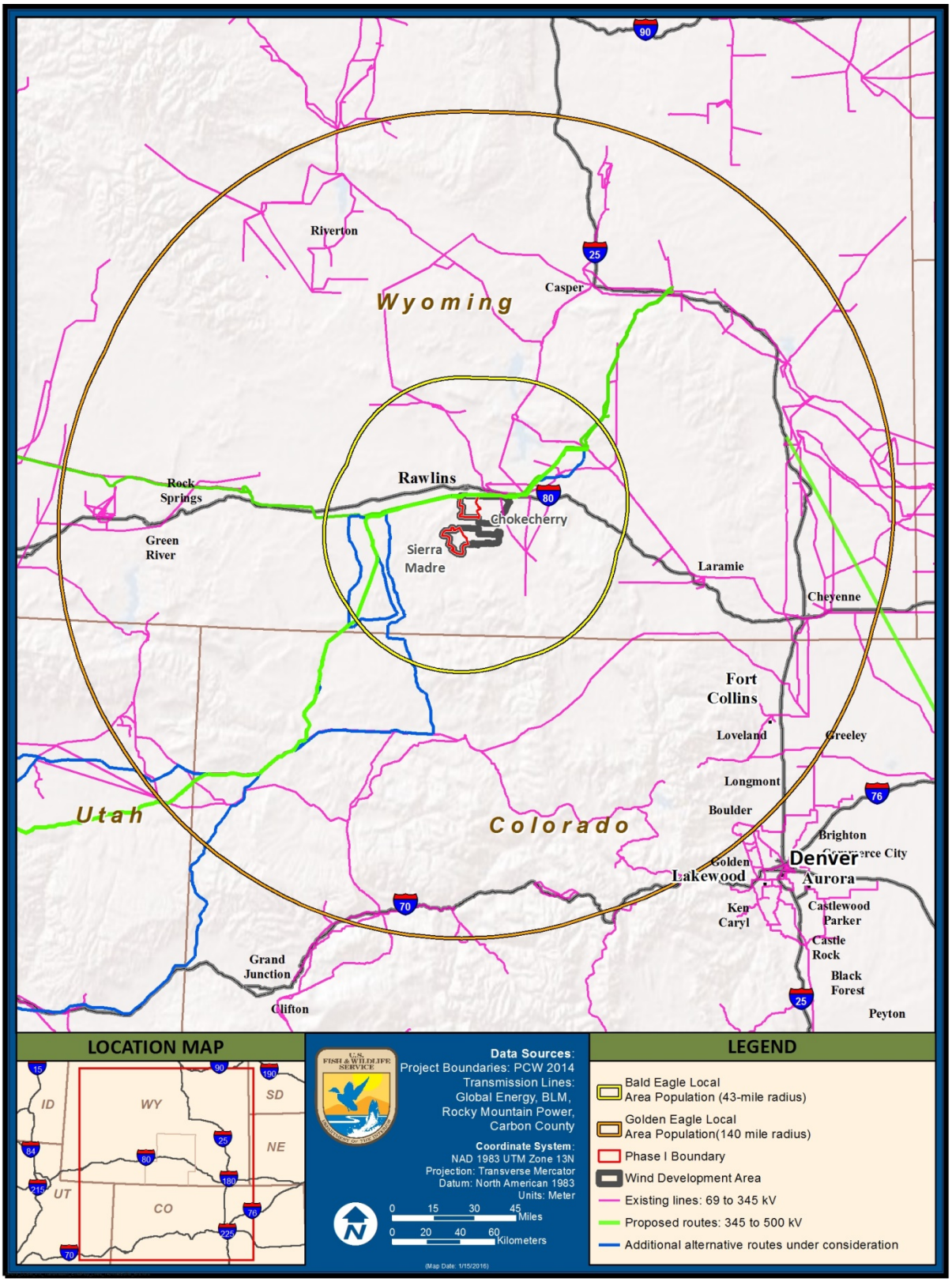

Figure 4-2. Transmission Lines in the Local Area Boundaries for the CCSM Phase I Project in Wyoming

4.3.2.2 Wind Energy

Twelve states, led by Iowa, Oklahoma, Texas, and California, produce more than 80 percent of the wind power in the United States (EIA 2015). Of the three states in the local area (Wyoming, Colorado, and Utah), only Colorado is in the top 12 wind energy producing states. Colorado produced the most wind energy (430 thousand megawatt hours) of the three local area states in the past year, followed by Wyoming (165 thousand megawatt hours) and Utah (59 thousand megawatt hours). However, the number of additional wind energy facilities expected to be constructed and go online is projected to increase in the local area in the future, primarily as a result of the high wind power potential north and east of the CCSM Phase I Project area (see Figure 2-8). Wyoming contains the largest amount of land-based class 6 and 7 wind power potential area of any state in the United States (EIA 2015).

Present and reasonably foreseeable wind energy facilities within the local area, defined as those facilities exporting energy to the transmission grid, are summarized in Table 4-2 and shown in Figure 4-3. Other facilities are in early planning phases and are not listed in Table 4-2 or shown on Figure 4-3.

Table 4-2. Operating and Reasonably Foreseeable Future Wind Energy Projects within the Local Area of the CCSM Phase I Project in Wyoming

Project	Owner/Applicant	County (State)	Status
Belvoir Ranch	Morely Co.	Laramie (WY)	Reasonably foreseeable. Planned operation for 300 MW, 130 turbines.
BLM JCI	BLM	Sweetwater (WY)	Present. Began operations in 2010, 0.1 MW, 1 turbine.
Campbell Hill	Duke Energy	Converse (WY)	Present. Began operations in 2009, 99 MW.
Casper Wind	Chevron Global Power Company	Natrona (WY)	Present. Began operations in 2009, 16.5 MW, 11 turbines.
CCSM Phase II	Power Company of Wyoming	Carbon, (WY)	Reasonably foreseeable. 1,500 MW, 500 turbines.
Dunlap Wind	PacifiCorp	Carbon (WY)	Present. Began operations in 2010, 111 MW, 74 turbines.
F.E. Warren Air Force Base	F.E. Warren Air Force Base	Laramie (WY)	Present. Began operations in 2005, 3.3 MW, 3 turbines.

Project	Owner/Applicant	County (State)	Status
Foote Creek Wind Energy Project, Phases I, II, III, and IV	PacifiCorp; SeaWest; Eugene Water and Electric Board; Foote Creek II LLC; Terra Gen	Carbon (WY)	Present. Began operations in 1999, 84.2 MW, 132 turbines.
Glenrock I and Glenrock III)	PacifiCorp	Converse (WY)	Present. I began operations in 2008, 99 MW, 66 turbines; III began operations in 2009, 39 MW, 26 turbines.
Happy Jack	Duke Energy	Laramie (WY)	Present. Began operations in 2008, 29 MW, 14 turbines.
High Plains Wind/McFadden Ridge Wind Energy	PacifiCorp	Albany (WY)	Present. Began operations in 2009, 127.5 MW, 85 turbines.
Medicine Bow Wind Project	Medicine Bow Wind, LLC	Carbon (WY)	Present. Began operations in 1998, 5.77 MW, 9 turbines.
Pathfinder-Zephyr	Pathfinder Renewable Wind Energy	Platte (WY)	Reasonably foreseeable. Up to 2,100 MW.
Pioneer Wind Park	FTP Power LLC	Converse (WY)	Constructed with operations expected in 2016, 49.6 MW, 46 turbines.
Ponnequin	Public Service Company of Colorado	Weld (CO)	Present, but company is planning to decommission the project. Began operations in 1998, 30 MW, 44 turbines.
Rock River I LLC	Shell Wind Energy, Inc.	Carbon (WY)	Present. Began operations in 2009, 99 MW, 66 turbines.
Rolling Hills	PacifiCorp	Converse (WY)	Present. Began operations in 2009, 99 MW, 66 turbines.
Seven-Mile Hill	PacifiCorp	Carbon (WY)	Present. Began operations in 2008, 99 MW, 66 turbines.

Project	Owner/Applicant	County (State)	Status
Silver Sage	Duke Energy	Laramie (WY)	Present. Began operations in 2009, 42 MW, 20 turbines.
Top of the World	Duke Energy	Converse (WY)	Present. Began operations in 2010, 200 MW, 110 turbines.
White Mountain Wind Energy Project	Teton Wind	Sweetwater (WY)	Proposed/reasonably foreseeable. BLM EA issued in 2010. Up to 240 turbines.

Sources: BLM 2013, 2015a, 2015b, 2016a, 2016b; EIA 2015.

Operation of many present and reasonably foreseeable wind energy facilities may result in take of protected avian species. Limited anecdotal information exists on the amount of take that may be occurring in the local area from wind energy facilities. However, in recent years, the U.S. Department of Justice pursued legal action against wind facilities operated by Duke and PacifiCorp in Wyoming because those facilities were causing the death of migratory birds and, in the process, were violating both the Migratory Bird Treaty Act (MBTA) and BGEPA. Both Duke and PacificCorp pleaded guilty to those charges and entered into legal settlements with the U.S. Department of Justice. The plea agreement by Duke is filed as *United States of America v. Duke Energy Renewables, Inc., Case No. 13-CR-268, Plea Agreement, ECF No 2* (D. Wyoming Nov. 7, 2013), and the plea agreement by PacifiCorp is filed as *United States of America v. PacifiCorp Energy, Case No. 14-CR-301, Plea Agreement, ECF No. 2* (D. Wyoming Dec. 19, 2014).

Of the reasonably foreseeable projects included in Table 4-2, the CCSM Phase II Project is particularly noteworthy in the cumulative analysis because it would be adjacent to the CCSM Phase I Project. The CCSM Phase II Project would consist of up to 500 turbines located on the eastern portions of the CCSM Project area. If for any reason the CCSM Phase I Project would not be built, for the purposes of this analysis, we assumed that the CCSM Phase II Project was still a reasonably foreseeable option. If the Power Company of Wyoming LLC (PCW) proceeds with development of a second project adjacent to the CCSM Phase I Project, it would consult with us to identify avoidance and minimization measures, including recommendations on placement of turbines. These measures would be designed to avoid and minimize take of eagles to the maximum extent practicable and would need to be identified prior to PCW submitting a permit application containing an ECP for a separate programmatic ETP. During the permit evaluation process, we would perform fatality modeling to predict the average number of eagle fatalities per year for the CCSM Phase II Project.

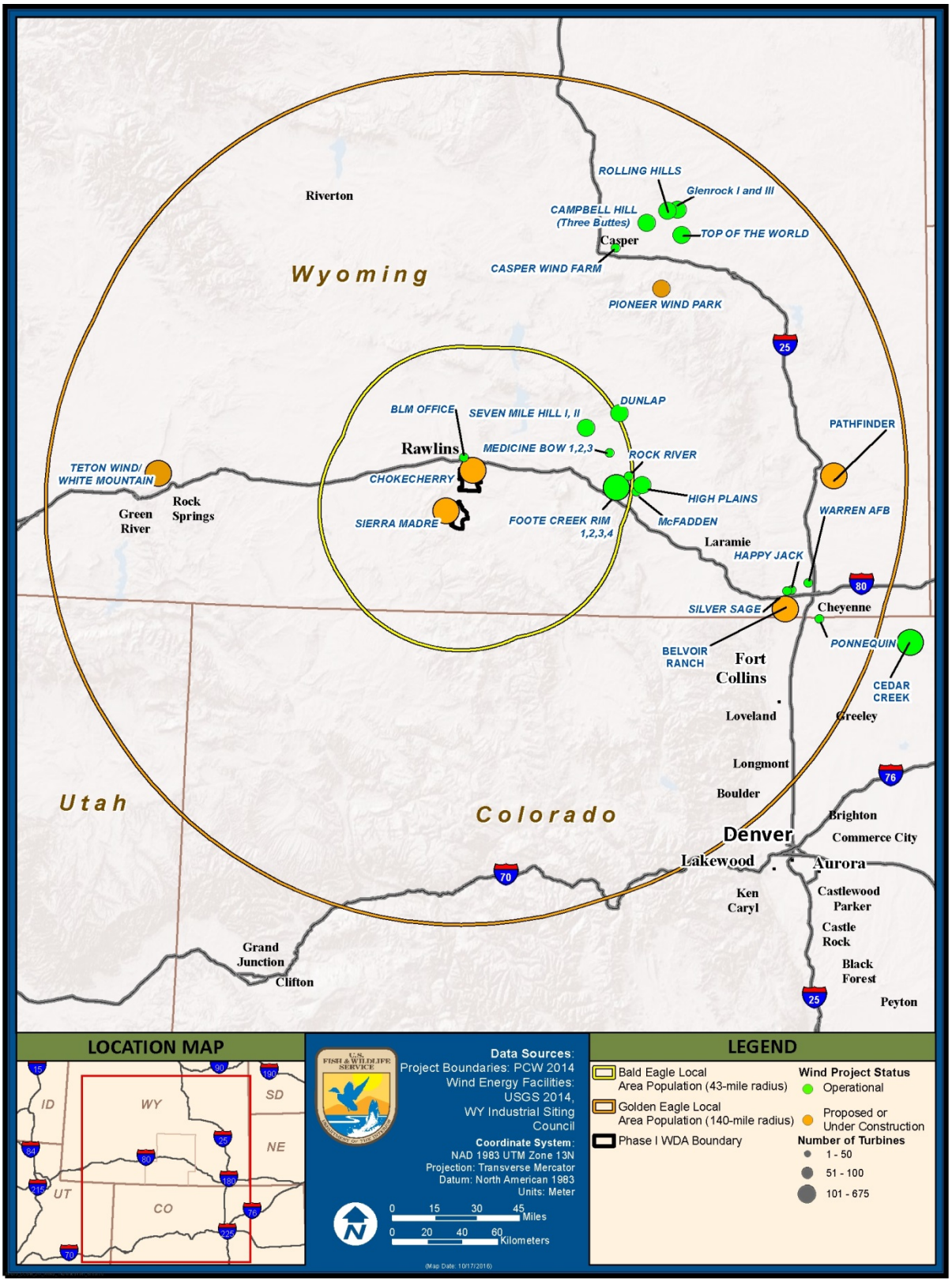

Figure 4-3. Wind Energy Projects in the Local Area Boundaries for the CCSM Phase I Project in Wyoming

With the substantial caveat that no avoidance and minimization measures or avoidance areas have been considered, we developed initial fatality estimates for golden and bald eagles using eagle use data collected from the area east of the Phase I development and infrastructure areas and using the turbine layout assessed in the BLM FEIS. The same version of the model code and assumptions that we used to determine predicted fatalities from the CCSM Phase I Project was used to predict fatalities for the CCSM Phase II Project. The initial prediction of annual take from a second 500-turbine project is presented in Table 4-3 by species and wind turbine blade diameter.

Table 4-3. Initial Prediction of Annual Eagle Take for the CCSM Phase II Project in Wyoming

Species	394-foot-diameter (120-meter-diameter) Wind Turbine Blade	338-foot-diameter (103-meter-diameter) Wind Turbine Blade
Golden Eagle	32	25
Bald Eagle	2	1

If PCW does apply for an ETP for the CCSM Phase II Project, the fatality estimates would likely decrease from the initial prediction for the following reasons:

- The initial fatality modeling does not include avoidance and minimization measures.
- The initial fatality modeling does not include seasonal curtailment.
- The initial fatality modeling includes only a 3 percent non-operational period (the expected value may be closer to 7 to 9 percent).
- For part of the dataset, eagle observations were recorded above or below 150 meters rather than 200 meters, but eagle observations above 150 meters were included in the initial fatality model run even though the model code was adjusted for that part of the dataset to assume observations are truncated at 150 meters, which may overestimate the amount of eagles in the flight path of turbines.
- Flight paths of eagles have not been evaluated in order to refine eagle minutes included in the initial fatality model run (eagle minutes may be reduced upon more detailed evaluation of eagle flight paths).

4.3.2.3 Mineral and Energy Development

Wyoming supplies more energy to other states and has more producing federal oil and natural gas leases than any other state. Although much of Wyoming's coal mining is located northwest of the local area, crude oil and natural gas production are located throughout the local area, as listed in Table 4-4 and shown in Figure 4-4. Oil and natural gas extraction have occurred in the local area since at least 1884. Production increased steadily for over a century, until the past 5 years when increases in oil and gas development and production increased dramatically (EIA 2015). For example, oil production associated with the Niobrara formation increased 960 percent (from 365,000 barrels to 3.5 million barrels) from 2010 to 2013 in Converse, Campbell, and Laramie Counties, Wyoming (EIA 2015). This trend is largely predicted to continue in the local area for the reasonable foreseeable future for both

oil and gas production, particularly from the Greater Green River basin in Colorado and Wyoming, and the Uintah basin in Utah (EIA 2015).

Large oil and gas activity areas located west of the CCSM Phase I Project area, and immediately west of Rawlins, include the Continental Divide-Creston Natural Gas Project, Atlantic Rim Project, Desolation Road Natural Gas Project, and Seminoe Road Development Projects. Natural gas fields in this area are composed of well pads, gathering pipelines, electrical distribution lines, buried pipelines, and access roads. Access roads are subject to daily traffic that includes light and heavy trucks, water trucks, truck and trailer rigs, and motor graders (BLM 2015c, 2016b).

Active surface and underground mining activities are located in Carbon, Sweetwater, and Albany Counties in Wyoming. Mining projects in these counties include coal-to-liquids projects as well as uranium and limestone mining. Major mineral, energy development, and associated infrastructure projects within the local area are summarized in Table 4-4.

Table 4-4. Mineral, Energy Development, and Associated Infrastructure Projects in the Local Area for the CCSM Phase I Project in Wyoming

Project	Owner/ Applicant	County (State)	Status
Atlantic Rim Natural Gas Field Development Project	Anadarko E&P Company and other operators	Carbon (WY)	Present. Project includes 2,000 gas wells and associated facilities; total new surface disturbance limited to 7,600 acres at any given time for an estimated total of 13,600 acres within a 211,000-acre area.
Barrel Springs/Echo Springs/Standard Draw Fields	BP America, Linn Operating, Inc., and 21 others	Carbon, Sweetwater (WY)	Present. Oil/gas operation. Barrel Springs – 469 wells. Echo Springs – 1,041 wells. Standard Draw – 616 wells.
Bird Canyon Field Infill Project	Koch Exploration and Memorial Resource Development	Sublette, Lincoln (WY)	Reasonably foreseeable (NEPA on hold). Project includes 348 oil and gas wells over 10 to 20 years on 17,612 acres.
Black Butte Mine	Ambre Energy, Anadarko Petroleum, and Black Butte Coal Company	Sweetwater (WY)	Present. Operating coal mine on 42,421 acres.

Project	Owner/ Applicant	County (State)	Status
Blacks Fork Hydrocarbon Development Project (formerly Moxa Arch Area Infill)	Anadarko Petroleum Corporation	Sweetwater, Uinta, Lincoln (WY)	Present and reasonably foreseeable Expansion (NEPA on hold). Proposed expansion of 7,500 hydrocarbon wells and 1,000 well pads on 633,532 acres of land.
Carbon Basin Coal Mine	Arch of WY, LLC	Carbon (WY)	Reasonably foreseeable project on 17,154 acres.
Colowyo Mine	Colowyo Coal Company	Moffat (CO)	Present. Operating coal mine on 12,275 acres.
Continental Divide-Creston Natural Gas Development	BP America and 20 other lease holders	Carbon, Sweetwater (WY)	Reasonably foreseeable (FEIS expected spring 2016). Proposal includes 8,950 natural gas wells, including 100 to 500 coal bed natural gas wells, on 1.1 million acres.
Converse County Oil and Gas Project	6 companies	Converse (WY)	Reasonably foreseeable (Draft EIS anticipated mid-2018). Project includes 5,000 new oil or gas wells on roughly 1.5 million acres.
Desarado Mine	Blue Mountain Energy, Inc.	Rio Blanco (CO)	Present. Operating coal mine on 11,819 acres.
Desert Springs Oil and Gas Fields	Urban Oil and Gas Group and 13 others	Sweetwater (WY)	Present. Oil/gas operation with 118 wells.
Desolation Flats Natural Gas Development Project	Samson Resources, Mountain Gas Resources, LLC, and other operators	Carbon, Sweetwater (WY)	Present and reasonably foreseeable (ROD issued 2004; subsequent tiered NEPA in 2013). Development includes up to 385 wells at 361 locations (supporting facilities include up to 450 miles of upgraded and new roads; 361 miles of pipelines; and 4 compressor stations, one gas processing plant, 3 water evaporation ponds, 2 disposal wells, and 10 water wells). Disturbance estimated at 4,900 acres within a 233,542-acre area.

Project	Owner/ Applicant	County (State)	Status
Desolation Road	Mustang Resources	Sweetwater (WY)	Reasonably foreseeable (NEPA on hold). Project includes 17 wells on up to five well pads on 117 acres, within 2 miles of the Adobe Town Wilderness Study Area.
Dragon Trail Oil and Gas Field	Encana Oil and Gas USA and 9 others	Rio Blanco (CO)	Present. Oil/gas operation with 599 wells.
EDC Coal Mine	Energy Development Company	Carbon (WY)	Reasonably foreseeable project on 13,250 acres.
Foidel Creek Mine	Twentymile Coal Company	Routt (CO)	Present. Operating coal mine on 21,821 acres.
Greater Crossbow Oil and Gas Project	EOG Resources	Campbell, Converse (WY)	Reasonably foreseeable (Draft EIS anticipated in summer 2017). Project includes 1,500 new oil and gas wells on roughly 120,000 acres.
Hiawatha Field Project	QEP, along with Wexpro Company	Sweetwater (WY) and northern Moffat (CO)	Reasonably foreseeable (Draft EIS is currently being revised). 157,335-acre project area with 2,200 exploratory and development wells.
Horseshoe Basin Unit Project	Linn Energy	Sweetwater (WY)	Reasonably foreseeable (NEPA on hold). Includes 20 new oil or gas wells on 24,972 acres.
Jim Bridger Mine	Pacific Minerals and Idaho Energy Resources	Sweetwater (WY)	Present. Operating surface, underground, and highwall coal mine on 28,514 acres.
Jonah Infill Drilling Project	Encana and other operators	Sublette (WY)	Past and present. Approved for 3,500 additional natural gas wells in 2006. Disturbance limited to 14,030 acres of the field (30,500 acres) at any given time.
Jonathon Project Limestone Quarry	Pete Lien and Sons	Albany (WY)	Present. Limestone quarry developed on 640 acres.
Lost Creek Uranium In Situ Recovery Project	UR Energy; Lost Creek ISR, LLC	Sweetwater (WY)	Present and reasonably foreseeable. Proposed expansion of 5,750 acres to the existing project area of approximately 4,254 acres.

Project	Owner/ Applicant	County (State)	Status
Medicine Bow Coal Mine	Arch of WY, LLC	Carbon (WY)	Reasonably foreseeable project on 20,352 acres.
Moneta Divide Natural Gas and Oil Development Project	Encana Oil and Gas (USA) Inc. and Burlington Resources Oil and Gas Company LP	Fremont, Natrona (WY)	Present and reasonably foreseeable (Draft EIS is scheduled for mid-2016). Project includes expansion with 4,250 natural gas and oil wells on approximately 265,000 acres of land. The life of the proposed project is estimated to be 40 years.
Nichols Ranch/Hank Unit Uranium In-Situ Recovery Project	Uranerz Energy Corporation	Campbell, Johnson (WY)	Present and reasonably foreseeable (Plan of Operations for expansion approved July 2015). Uranium mining within a 2,250-acre area.
Normally-Pressured Lance (NPL) Natural Gas Development Project	Encana	Sublette (WY)	Reasonably foreseeable (Draft EIS is under development). Project would encompass 141,080 acres with up to 3,500 wells. Most wells would be co-located on a single pad, with no more than four well pads being constructed per 640 acres. On average, each well pad would be 18 acres in size.
Overland Pass Pipeline Project	ONEOK Partners and Williams	Crook County (WY) Wyoming to Colorado	Past. 760-mile natural gas pipeline.
Pinedale Anticline Project	Questar, Shell, and Ultra Resources Inc.	Sublette (WY)	Past and present. Approved for up to 4,399 wells. Surface disturbance estimated at 12,272 acres of the 198,000-acre area.
Rangely Oil and Gas Fields	Chevron USA and 99 others	Rio Blanco (CO)	Present. Oil/gas operation with 2,480 wells.
Riley Ridge to Natrona Project	Denbury Green Pipeline–Riley Ridge, LLC	Fremont, Sublette, Sweetwater, Natrona (WY)	Reasonably foreseeable (NEPA in development). Project includes 243-mile pipeline.

Project	Owner/ Applicant	County (State)	Status
Sage Creek Mine	Sage Creek Coal Company, LLC	Routt (CO)	Present. Operating coal mine on 10,154 acres.
Seminoe Road Gas Development	Dudley & Associates, LLC	Carbon (WY)	Present. 19 natural gas wells.
Seneca II-W Mine	Seneca Coal Company	Routt (CO)	Present. Operating coal mine on 3,880 acres.
Siberia Ridge/Wamsutter/ Tierney	BP America and 22 others	Sweetwater (WY)	Present. Oil/gas operation. Siberia Ridge – 647 wells. Wamsutter – 986 wells. Tierney – 540 wells.
South Baggs Area Natural Gas Development	Merit Energy Company	Carbon (WY)	Past and present. 93 natural gas wells and associated facilities on approximately 500 acres.
Stansbury Coal Mine	Rocky Mountain Coal Company	Sweetwater (WY)	Reasonably foreseeable project on 5,501 acres.
Table Rock/Delaney Rim	Chevron USA, Anadarko, and 6 others	Sweetwater (WY)	Present. Oil/gas operation. Table Rock – 219 wells. Delaney Rim – 31 wells.
Trapper Mine	Trapper Mining, Inc.	Moffat (CO)	Present. Operating coal mine on 10,390 acres.
Wattenberg Gas Field	Noble Energy, Anadarko, and Encana	Weld, Boulder, Broomfield, Larimer (CO)	Past and present. Includes more than 20,000 wells across 2,000 square miles. Eight wells are generally permitted per 160 acres.
Williams Fork Coal Mine	BTU Empire Corporation	Moffat (CO)	Reasonably foreseeable project on 5,829 acres.
Yoast Mine	Seneca Coal Company	Routt (CO)	Present. Operating coal mine on 2,154 acres.

Sources: BLM 2012a, 2013, 2015b, 2016b, 2016c; Colorado Division of Reclamation Mining and Safety 2010; Colorado Oil and Gas Conservation Commission 2016a, 2016b; Utah Division of Oil, Gas, and Mining 2014a, 2014b, 2016; Wyoming Department of Environmental Quality (WDEQ) 2015; Wyoming Oil and Gas Conservation Commission 2016; Wyoming State Geological Survey 2012a, 2012b, 2014.

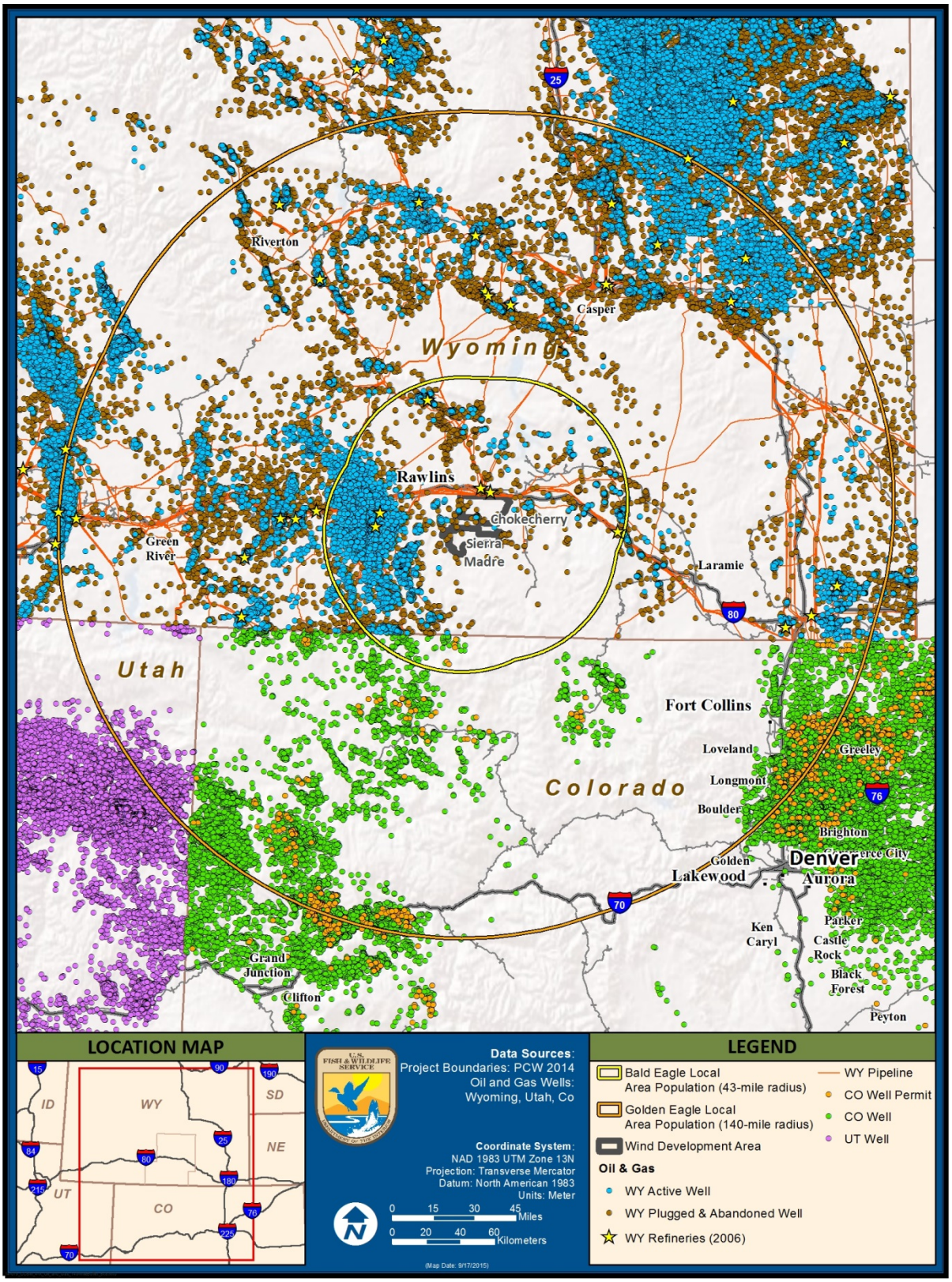

Figure 4-4. Oil and Gas Development in the Local Area for the CCSM Phase I Project in Wyoming

4.3.2.4 Transportation Infrastructure

As discussed in Section 2.2.2.4.3, wildlife can be killed by vehicles while crossing roadways or railroads or while scavenging on roadkill such as deer, coyotes, or other mammals. Scavenging increases during the winter months when other food sources are less available. Data on big game carcasses found along roadways within the local area were collected from State Departments of Transportation to identify high-density carcass areas (Colorado Department of Transportation 2015a; Wyoming Department of Transportation 2015). For purposes of this EIS, high-density carcass areas were identified as those stretches of highway where more than 50 carcasses were found within a 2-square-mile area over the past 7 to 8 years, for Colorado and Wyoming. Data for Utah were not available. High-density carcass areas within the local area are shown in red on Figure 2-8.

High-density carcass areas are generally associated with cities and municipalities in the local area. However, several high-density areas occur on more rural roads, including Wyoming State Highway (WYO) 789 and 70 in Carbon County, Wyoming, just north of the state border with Colorado. Additional high-carcass areas in the local area of Wyoming include WYO 120 near Thermopolis in Hot Springs County, WYO 28 between Lander and South Pass, WYO 131 (Sinks Canyon Road), US 26 west of Riverton, US 26/US 287 between Diversion Dam and Dubois, and US 20/WYO 789 between Wind River Canyon and Kirby (Wyoming Department of Transportation 2013). High-density carcass areas identified in Fremont County, Wyoming, occur largely within the Wind River Reservation, which could be attributed to higher amounts of carcass reporting and documentation.

In Colorado, Larimer and Moffat Counties average more than 3,600 wildlife-vehicle collisions annually (Meyers 2014). According to the Colorado Department of Transportation, wildlife-vehicle collisions have been on a downward trend since 2006 and can be attributed to the wildlife zone designations, which double fines for speeding at night in 100 miles of designated “wildlife crossing zones” (Colorado Department of Transportation 2012). Within the local area, the counties of Moffat, Routt, Jackson, Larimer, Rio Blanco, Garfield, Eagle, Summit, Grand, Boulder, and Weld had a combined total of 871 vehicle-wildlife collisions in 2013 (Colorado Department of Transportation 2014).

The Wyoming, Colorado, and Utah Departments of Transportation have forecast a variety of roadway infrastructure projects over the next 5 years that include rehabilitation, widening, pavement overlays, microsurfacing or resurfacing, slope repair, and bridge replacement. Based on the State Transportation Improvement Plans for the three states within the LAP scale, there are no widening projects or new highways planned in the LAP area during 2016 through 2021 (Wyoming Department of Transportation 2016; Colorado Department of Transportation 2015b; Utah Department of Transportation 2016).

4.3.2.5 Hunting

Hunting is a popular recreational activity in the portions of Wyoming, Colorado, and Utah that comprise the local area. These states prohibit the use of lead shot when hunting waterfowl. Within the local area of analysis, however, wetland areas subject to such restrictions are limited in extent because the LAP area is heavily dominated by arid, upland

habitats. More typically within the local areas, permitted hunters use lead ammunition to hunt for a variety of small game, upland game birds, and big game species. Unpermitted hunting of wildlife also introduces lead into the environment. Although the use of non-lead ammunition has been recommended by USFWS and other organizations, the use of lead ammunition remains legal for non-waterfowl hunting and its use will likely continue. As discussed in Section 2.2.2.4.2, lead concentrations in carcasses can impact eagles when they scavenge animals shot by hunters with lead ammunition.

The 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation determined that more than 500,000 people over the age of 16 hunted in Wyoming, Colorado, and Utah in that year, spending an average of $90 each on ammunition (USFWS and U.S. Census Bureau 2014). The survey did not distinguish between types of ammunition and analyzed data only at the state level.

The WGFD and Utah's Division of Wildlife Resources manage discrete sets of hunting units for most species, whereas Colorado Parks and Wildlife manages a single set of hunting units for most species, with separate unit divisions for bighorn sheep and Rocky Mountain goats. The number of hunting units within the LAP boundary, per big game species, is summarized in Table 4-5. Hunters in these units harvested nearly 61,000 big game animals in 2014 (Colorado Parks and Wildlife 2015; Utah Division of Wildlife Resources 2015; WGFD 2015a). Harvest data were not available for small game and upland game birds for all three states for 2014; however, Wyoming issues nearly 120,000 permits annually for small game and upland game birds that may be hunted with lead ammunition (WGFD 2015b).

Table 4-5. Hunting Units within 140 miles of the CCSM Phase I Project in Wyoming

Big-Game Species	Wyoming	Colorado	Utah
Antelope/Pronghorn	69	59	4
Bear	14	59	3
Big-Horn Sheep	7	18	4
Bison	2	-	1
Mule Deer	63	59	4
White-Tailed Deer	39		
Elk	50	59	3
Moose	12	59	2
Mountain Lion	22	-	-
Rocky Mountain Goat	-	9	2

Sources: Colorado Parks and Wildlife 2015; Utah Division of Wildlife Resources 2015; WGFD 2015a.

4.4 Impacts by Resource

4.4.1 Water Resources

The effects of large landscape trends on water resources occur at a regional scale as well as at the local area scale. Because the local area includes portions of all four BCRs, and many of the impacts are fairly similar, we determined that it is more efficient to combine the discussion of landscape-level effects. Several of the past, present, and reasonably foreseeable future actions described in Section 4.3 affect regional and local water resources significantly. As noted in Section 4.2, we are focusing the analysis of cumulative impacts on the LAP scale for resources other than birds (other than eagles), eagles, and cultural resources.

The criteria we used to evaluate impacts on water resources in Chapter 3.0 are the same criteria that we use to evaluate cumulative impacts on water resources here. Therefore, the impact criteria table from Section 3.3.3 is included below as Table 4-6.

Table 4-6. Impact Criteria for Water Resources for the CCSM Phase I Project in Wyoming

Impact Category	Intensity Type	Definition
Magnitude	Major	The action would substantially affect water resources in the study area. Adverse impacts would include any of the following: • Impacts on surface waters would affect a large portion of a major waterbody or watershed, substantially reducing the ability of these areas to support fish or bird use. • Water quality impacts would alter baseline water quality conditions and cause impairment of waters. • Surface water use from the action would limit existing aquatic life or adversely affect special status fish species. • Floodplains would be substantially altered to limited functionality. • Groundwater conditions would be noticeably affected, and hydrologic connectivity with surface waters or other habitat supported by shallow groundwater would be altered.
	Moderate	The action would measurably affect water resources in the study area. Adverse impacts would include any of the following: • Impacts on surface waters would affect a medium portion of a major waterbody or watershed (or sub-watershed), somewhat reducing the ability of these areas to support fish or bird use.

Impact Category	Intensity Type	Definition
		• Water quality impacts would be detectable, but would be at or below water quality standards and would not cause impairment of any waters. • Surface water use from the action would measurably affect aquatic life or special status fish species, but would not imperil any populations or species. • Floodplains would be measurably altered to somewhat reduced functionality. • Groundwater conditions would be measurably affected, but hydrologic connectivity with surface waters or other habitat supported by shallow groundwater would not be substantially altered.
	Minor	The action could result in some change to water resources in the study area. Adverse impacts would include any of the following: • Impacts on surface waters would affect a small portion of a waterbody or sub-watershed that might slightly affect the ability of these localized areas to support fish or bird use. • Water quality impacts would be detectable but would be well below water quality standards and within desired water quality conditions. • Surface water use from the action would be small but measurable, and would not affect aquatic life or special status fish species. • Floodplain impacts could be measurable, but would be limited to minor and localized effects on floodplain functions. • Groundwater conditions could be measurably affected, but hydrologic connectivity with surface waters or other habitat supported by shallow groundwater would not be measurably affected.
	No effect	Any changes to waterbodies, watersheds, water quality, floodplains, or groundwater would not be measurable or perceptible and would have no consequence on water resources that provide habitat for special status species, migratory birds, or eagle prey species.

Impact Category	Intensity Type	Definition
Duration	Long-term	30 years (proposed project duration)
	Medium-term	5 years (permit term)
	Temporary	Lasting for the duration of construction
Potential to occur	Probable	More likely than not to occur
	Possible	Potential to occur
	Unlikely	Not reasonably likely to occur
Geographic extent	Extensive	Within the two EMUs and four BCRs
	Regional	Within the 140-mile radius of the local area population for golden eagles
	Local	Within 1 mile of Phase I development and infrastructure areas
	Limited	Within 300 feet of Phase I development and infrastructure areas

Surface waters provide direct habitat and sustain adjacent habitat such as wetlands and riparian zones habitat for migratory birds and eagle prey species. Water resources at both landscape scales have been impacted extensively by agricultural conversion and hydrologic modifications such as stream channelization and water diversion. As discussed above, issues of water supply and demand from continued expansion of human development (that is, urbanization, agriculture, mining, and energy extraction) place significant strains on water supplies, resulting in dewatering of streams and other water bodies, degradation of natural stream channels and floodplain functions, groundwater depletions, and impacts on water quality (Pool and Austin 2006; Gupta 2007; IWJV 2013). If climate change results in reduced annual precipitation, the impacts from diversion would be magnified (Zahniser et al. 2009; IWJV 2013; IPCC 2014).

Cropland conversion, livestock grazing, and other development (including transmission lines and transportation projects) also contribute to increased levels of disturbance and reduced vegetative cover, which lead to increased erosion (Marston and Dolan 1988). Watersheds are degraded by increased erosion and human-caused exceedances to other water quality constituents (that is, elevated phosphorous and nitrogen from farming and grazing, metals from mining and energy extraction, and other contaminant emissions, leaks, and spills from various development activities) (Stevens 2001; WDEQ 2012, 2014; IWJV 2013).

Many of the impacts on water resources described above have occurred and are expected to continue to occur within and immediately adjacent to the CCSM Phase I Project. Other nearby projects have their own requirements for use of groundwater or surface water, with potential for surface water impacts through vegetation and topsoil disturbance. Reasonably foreseeable future wind energy development may include the CCSM Phase II Project (proposed east of the CCSM Phase I Project), which is the closest reasonably foreseeable project with the highest potential for cumulative impacts. This would include an additional 500 turbines within both the Chokecherry and Sierra Madre WDAs immediately east of the

Phase I WDAs. The CCSM Phase I Project also includes multiple avoidance and minimization measures to reduce the anticipated impacts on surface waters at and near the site. Additionally, PCW has proposed conservation measures that would provide probable benefits to surface waters, including land management commitments to conserve or enhance aquatic habitat, water development projects associated with greater sage-grouse conservation, and mesic habitat improvements. These conservation measures could improve water resources within the local area as habitat for migratory birds and eagle prey species and could improve floodplain function of select streams.

Development of other renewable energy projects within the local area, discussed in Section 4.3.2.2, could contribute to the abovementioned impacts on water resources, but the farther away the projects are from the CCSM Phase I Project and CCSM Phase II Project, the less impact would be noticed in the project vicinity. For example, projects in different watersheds would primarily affect different water resources. Additional renewable energy generation capacity would reduce the need for additional fossil fuel capacity, and the associated water demands. Local area wind development could contribute less to climate change-related impacts and associated change in water resource habitats, but independent of the implementation of other national and global initiatives for conversion to more renewable energy generation, would not likely contribute a statistically significant amount to climate change.

With implementation of avoidance and minimization measures, the CCSM Phase II Project in combination with Alternative 1 (Proposed Action) would result in probable, limited, moderate to minor temporary to long-term impacts on local and regional water resources, but these impacts could potentially be offset by conservation measures (see Table 4-6 for definitions of impact criteria). Surface water use would have a probable, extensive, minor, long-term impact on the Platte River system as it applies to ESA recovery programs. The impacts under Alternative 2 (Proposed Action with Different Mitigation) and Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would be comparable to the impacts under Alternative 1, but would be slightly less because of different options for mitigation occurring in the local and regional area, and a smaller area of disturbance, respectively. The No Build scenario under Alternative 4 (No Action: Denial of ETPs) would cause fewer impacts than the other alternatives, and the Build Without ETPs scenario under Alternative 4 would likely cause impacts similar to those under Alternative 1. On a cumulative basis with the CCSM Phase II Project, all but the No Build scenario under Alternative 4 would likely have comparable impacts on water resources.

The cumulative effects of past, present, and reasonably foreseeable impacts on water resources within and immediately near the CCSM Phase I Project would have probable, regional, temporary to long-term, moderate, adverse effects on surface water resources and surface water quality (see Table 4-6 for definitions of impact criteria).

4.4.2 Vegetation and Wetlands

The effects of large landscape trends on vegetation and wetlands occur at a regional as well as a local area scale. Several of the past, present, and reasonably foreseeable future actions described above in Section 4.3 would affect vegetation and wetlands. As noted in

Section 4.2, we are focusing the analysis of cumulative impacts on the LAP scale for resources other than birds (other than eagles), eagles, and cultural resources.

The criteria we used to evaluate impacts on vegetation and wetlands in Chapter 3.0 are the same criteria that we use for evaluating cumulative impacts on vegetation and wetlands here. Therefore, the impact criteria table from Section 3.4.3 is included below as Table 4-7.

Table 4-7. Impact Criteria for Vegetation and Wetlands for the CCSM Phase I Project in Wyoming

Impact Category	Intensity Type	Definition
Magnitude	Major	The action would noticeably change the amount or condition of vegetation or wetlands in the study area. Adverse impacts would result in a large reduction in acreage or extensive degradation of vegetation types and wetlands that provide habitat for special status species, migratory birds, or eagle prey species. Major degradation would include a proliferation of noxious weeds or invasive plants across large areas. Major adverse impacts would also include the following: • Loss of any populations or subpopulations of special status plant species or their designated critical habitat • Measurable unmitigated consequences to wetlands Major beneficial impacts would result in a large increase or enhancement of vegetation types and wetlands that provide habitat for special status species, migratory birds, or eagle prey species.
	Moderate	The action would result in some change to the amount or condition of vegetation or wetlands. Adverse impacts would result in a measurable but modest reduction in acreage or degradation of vegetation types and wetlands that provide habitat for special status species, migratory birds, or eagle prey species. Moderate adverse impacts would also include the following: • Measureable but moderate adverse consequence to populations or subpopulations of special status plant species • Readily apparent effects on wetlands over a small area that would have a moderate effect on habitat for special status species, migratory birds, or eagle prey species Beneficial impacts would result in a moderate increase or enhancement of vegetation types and

Impact Category	Intensity Type	Definition
		wetlands that provide habitat for special status species, migratory birds, or eagle prey species.
	Minor	The action could result in some change to the amount or condition of vegetation or wetlands. Adverse impacts would result in a measurable but small reduction in acreage or degradation of vegetation types and wetlands that provide habitat for special status species, migratory birds, or eagle prey species. Minor adverse impacts would also include the following: • Measureable but small adverse consequence to special status plant species • Minor impacts on wetlands that would have a limited effect on habitat for special status species, migratory birds, or eagle prey species Beneficial impacts would result in a slight increase or enhancement of vegetation types and wetlands that provide habitat for special status species, migratory birds, or eagle prey species.
	No effect	Any change to vegetation or wetlands would not be measurable or perceptible and would have no consequence on habitat for special status species, migratory birds, or eagle prey species.
Duration	Long-term	30 years (proposed project duration)
	Medium-term	5 years (permit term)
	Temporary	Lasting for the duration of construction
Potential to occur	Probable	Not avoidable
	Possible	Potential to occur (may be able to mitigate)
	Unlikely	Not reasonably likely to occur
Geographic extent	Extensive	Within the two EMUs and four BCRs
	Regional	Within the 140-mile radius of the local area population for golden eagles
	Local	Within 1 mile of Phase I development and infrastructure areas
	Limited	Within 300 feet of Phase I development and infrastructure areas

Vegetation communities, including wetlands and riparian zones, provide habitat for migratory birds and eagle prey species. Sagebrush shrublands are the most common vegetation community in the 140-mile local area for golden eagles. This vegetation type is slow to recover from impacts, as described in Section 3.4.3 and in the BLM FEIS, which estimates that although grass and forb vegetation communities would recover within 5 years of reclamation, the recovery period for sagebrush shrublands is estimated to be between 15 and 50 years to reach full maturity (BLM 2012a). . Vegetation resources at both landscape scales have been impacted extensively by human development (that is, urbanization, agriculture, infrastructure including transmission lines and transportation, mining, and energy extraction). As a result of cropland conversion, urbanization, and domestic livestock grazing, native vegetation communities have been dramatically degraded in many areas and entirely removed in many other places. The shift from native wildlife grazing patterns to livestock grazing patterns has resulted in less diversity of vegetation and spread of invasive species that alter plant community diversity and abundance (Krausman et al. 2009; Pool and Austin 2006; IWJV 2013). Land management practices from the 1950s to the 1980s commonly included active removal of sagebrush and replacement with non-native livestock forage (Boyle and Reeder 2005; Connelly et al. 2000).

Grazing, urbanization, and infrastructure contribute to the establishment of invasive plants that further affect vegetation communities. Within the cooler and higher elevation areas in the LAP area, invasive species are primarily established in disturbed areas such as roadways rather than in grazing lands (WGFD 2010). Invasive plants can have a negative influence on other undisturbed areas in the landscape. Brandt and Rickard (1994) documented that non-native species were able to colonize relatively undisturbed grasslands and shrublands. Therefore, even relatively undisturbed vegetation communities are affected by disturbed areas within the landscape.

As discussed above, water diversion and other development activities have substantially reduced the amount and condition of wetlands and riparian zones. If climate change results in reduced annual precipitation, wetlands and riparian zones would be further reduced. Fire suppression contributes to the expansion of coniferous woodland into former grassland habitat, and it may also be allowing for the expansion of deciduous vegetation along ephemeral drainages (Pool and Austin 2006). Fire can also act as a disturbance, which promotes the introduction and spread of invasive species that further increase the probability of fire (Milberg and Lamont 1995). Increased incidence of fire can degrade or even eliminate sagebrush communities such as those prevalent in the LAP area due to the amount of time required for sagebrush to mature and produce seed (WGFD 2010). Transmission lines and transportation facilities also contribute to direct loss and degradation of vegetation communities, including wetlands and riparian zones.

Many of the impacts on vegetation and wetlands described above have occurred and are expected to continue to occur within and immediately adjacent to the CCSM Phase I Project. Reasonably foreseeable future wind energy development may include the CCSM Phase II Project, which is the closest reasonably foreseeable project with the highest potential for cumulative impacts. The CCSM Phase I Project also includes multiple avoidance and minimization measures to reduce the anticipated impacts on vegetation and wetlands at and near the site. Additionally, PCW has proposed conservation measures that would provide

probable benefits to vegetation and wetlands. Several conservation measures that would be implemented by PCW as part of its sage-grouse conservation plan would benefit vegetation. The sage-grouse conservation plan includes wind conservation easements, habitat improvement measures, enhancements to relic agricultural fields, and other stabilization and revegetation measures. Improvements to mesic habitats would likely enhance some wetlands and riparian zones and create new wet meadows. Wind conservation easements would protect lands from future wind development but would not necessarily protect vegetation communities from other land uses. Relic agricultural field enhancements would establish desirable types of vegetation communities within portions of the approximately 2,023 acres of identified relic fields that are currently dominated by monocultures of cheatgrass, crested wheatgrass, and other introduced species. Similarly, stabilization and burned area revegetation projects would help protect intact sagebrush communities and re-establish native species.

Development of other renewable energy projects within the local area, discussed in Section 4.3.2.2, could contribute to the abovementioned impacts on vegetation and wetlands, but the farther away the projects are from the CCSM Phase I Project and CCSM Phase II Project, the less impact would be noticed in the project vicinity. For example, projects in different watersheds would affect different wetlands and vegetative habitats. Additional renewable energy generation capacity would reduce the need for additional fossil fuel capacity. Local area wind development could contribute to a lower potential for climate change-related impacts and change in vegetation and wetland habitats, but independent of the implementation of other national and global initiatives for conversion to more renewable energy generation, would not represent a statistically significant contribution to climate change rates.

With implementation of avoidance and minimization measures, the CCSM Phase II Project (proposed east of Phase I) in combination with Alternative 1 (Proposed Action) would result in probable, local, moderate temporary to long-term impacts on vegetation and wetlands, but some of these impacts would be offset by conservation measures (see Table 4-7 for definitions of impact criteria). Probable minor, medium-term impacts to a local area from potential spread of noxious and invasive plants would likely occur. The cumulative effects of past, present, and reasonably foreseeable impacts on vegetation and wetlands within and immediately near the CCSM Phase I Project would have probable, regional, long-term, moderate, adverse effects on vegetation and wetlands (see Table 4-7).

Alternative 2 (Proposed Action with Different Mitigation) and Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would cause impacts comparable to those under Alternative 1 (Proposed Action), but with slightly less impact because of different options for mitigation (especially habitat enhancement and wind conservation easements) occurring in the local and regional area, and a smaller area of disturbance, respectively. The No Build scenario under Alternative 4 (No Action: Denial of ETPs) would not contribute to cumulative impacts, and the Build Without ETPs scenario under Alternative 4 would likely cause impacts similar to the impacts under Alternative 1.

4.4.3 Fish, Amphibians, and Reptiles

The effects of large landscape trends on fish, amphibians, and reptiles can occur at a regional as well as a local scale. Several of the past, present, and reasonably foreseeable future actions described above in Section 4.3 would affect fish, amphibians, and reptiles. As noted in Section 4.2, we are focusing the analysis of cumulative impacts on the LAP for resources other than birds (other than eagles), eagles, and cultural resources.

The criteria we used to evaluate impacts on fish, amphibians, and reptiles in Chapter 3.0 are the same criteria that we use for evaluating cumulative impacts on fish, amphibians, and reptiles here. Therefore, the impact criteria table from Section 3.5.3 is included below as Table 4-8.

Table 4-8. Impact Criteria for Fish, Amphibians, and Reptiles for the CCSM Phase I Project in Wyoming

Impact Category	Intensity Type	Definition
Magnitude	Major	The action would result in substantial indirect habitat impacts from disruption, alteration, or irreplaceable loss of vital and high value habitats, or of a large amount of suitable habitat for fish, amphibians, or reptiles. The action would result in substantial direct fatality or injury of fish, amphibians, or reptiles. The action would adversely affect special status fish, amphibian, or reptile species with substantial consequence to the individual, population, or habitat.
	Moderate	The action would result in some indirect disruption, alteration, or loss of habitat that would be expected to result in measureable but modest impacts on fish, amphibians, or reptiles. The action would result in some direct but localized fatality or injury of fish, amphibians, or reptiles. The action would have a measureable but modest effect on special status fish, amphibian, or reptile species or their critical habitat.
	Minor	The action would result in some indirect change in the amount or condition of habitat for fish, amphibians, or reptiles. The action would result in a limited amount of direct but localized fatality of fish, amphibians, or reptiles that would not be expected to have any long-term effects on any populations of fish, amphibians, or reptiles.

Impact Category	Intensity Type	Definition
		The action would slightly affect special status fish, amphibian, or reptile species or their critical habitat.
	No effect	The action would not result in any measureable or observable indirect or direct impacts on fish, amphibians, or reptiles or their habitat.
Duration	Long-term	30 years (proposed project duration)
	Medium-term	5 years (permit term)
	Temporary	Lasting for the duration of construction
Potential to occur	Probable	More likely than not to occur
	Possible	Potential to occur
	Unlikely	Not reasonably likely to occur
Geographic extent	Extensive	Within the two EMUs and four BCRs
	Regional	Within the 140-mile radius of the local area population for golden eagles
	Local	Within 1 mile of Phase I development and infrastructure areas
	Limited	Within 300 feet of Phase I development and infrastructure areas

Habitat for fish, amphibians, and reptiles has been impacted extensively by human development (that is, urbanization, agriculture, infrastructure including transmission lines and transportation, mining, and energy extraction). Diversion has depleted many water bodies that provide habitat for fish and some reptiles and amphibians. Cropland conversion and domestic livestock grazing has resulted in direct habitat loss, habitat alternation, and fragmentation, across aquatic and terrestrial habitat. Through hydrologic modifications and impacts on water quality (including impacts from mining and energy extraction), some water bodies have become unsuitable for some species of fish and amphibians. The reduction in wetlands and riparian zones represents direct loss of important habitat for many reptile and amphibian species, and removal of these areas also degrades aquatic habitat for fish. If climate change results in reduced annual precipitation, wetlands and riparian zones would be further reduced. Invasive plant species degrade habitat suitability for some reptiles and amphibians. Transmission lines and transportation facilities also contribute to direct loss and degradation of habitat for fish, amphibians, and reptiles. Fire suppression leading to vegetation shifts could result in reduced habitat suitability for some reptiles and amphibians. Climate change may reduce habitat suitability for some fish, amphibians, and reptiles (Zahniser et al. 2009; National Fish, Wildlife and Plants Climate Adaptation Strategy 2012; IPCC 2014). Agriculture, mining and energy extraction, transmission lines, and transportation infrastructure also result in disturbance and direct mortality to reptiles and amphibians, and often create movement barriers that can impede fish, amphibians, and reptiles from completing life-cycle requirements (Forman and Alexander 1998; Jochimsen et al. 2004; PLJV 2015; van der Ree et al. 2011; IWJV 2013).

Many of the impacts on fish, amphibians, and reptiles described above have occurred and are expected to continue to occur within and immediately adjacent to the CCSM Phase I Project. Reasonably foreseeable future wind energy development may include Phase II of the CCSM Project, which is the closest reasonably foreseeable project with the highest potential for cumulative impacts.

Development of other renewable energy projects within the local area, discussed in Section 4.3.2.2, could contribute to the abovementioned impacts on fish, reptiles, and amphibians, but the farther away the projects are from the CCSM Phase I Project and CCSM Phase II Project, the less impact would be noticed in the project vicinity. For example, projects in different watersheds would affect different habitats for amphibians and reptiles. Additional renewable energy generation capacity would reduce the need for additional fossil fuel capacity. Local area wind development could contribute to a lower potential for climate change-related impacts and change in wildlife habitats, but independent of the implementation of other national and global initiatives for conversion to more renewable energy generation, would not represent a statistically significant contribution to climate change rates.

The CCSM Phase I Project includes multiple avoidance and minimization measures to reduce the anticipated impacts on vegetation and wetlands at and near the site. Additionally, PCW has proposed conservation measures that would provide probable benefits to fish, amphibians, and reptiles, including:

- Land management commitments to conserve or enhance aquatic habitat, water development projects associated with greater sage-grouse conservation, and mesic habitat improvements that would likely either directly improve habitat or improve water quality functions and enhance downstream habitat for fish, amphibians, and reptiles.
- Relic agricultural field enhancements that would improve upland habitat for some amphibians and reptiles.

With implementation of avoidance and minimization measures, the CCSM Phase II Project in combination with Alternative 1 (Proposed Action) would result in probable, local, moderate temporary to long-term impacts on fish and fish habitat, amphibians, and reptiles, but some of these impacts would likely be offset by the above conservation measures (see Table 4-8 for definitions of impact criteria). The cumulative effects of past, present, and reasonably foreseeable impacts within and immediately near the CCSM Phase I Project would have probable, local, long-term, minor, adverse effects on fish, amphibians, and reptiles (see Table 4-8).

Alternative 2 (Proposed Action with Different Mitigation) and Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would cause impacts comparable to those under Alternative 1 (Proposed Action), but with slightly less impact because of different options for mitigation (especially habitat enhancement and wind conservation easements) occurring in the local and regional area, and a smaller area of disturbance, respectively. The No Build scenario under Alternative 4 (No Action: Denial of

ETPs) would not contribute to cumulative impacts, and the Build Without ETPs scenario under Alternative 4 would likely cause impacts similar to those under Alternative 1.

4.4.4 Mammals

Cumulative impacts of past, present, and future actions on mammals within the Phase I development and infrastructure areas result primarily from the following:

- Disturbance and displacement from human development (that is, urbanization, agriculture, infrastructure, mining, and energy extraction).
- Habitat loss, degradation, and fragmentation from human development and fire suppression.
- Water diversion leading to changes in hydrology, wetland loss, and habitat suitability
- Global climate change resulting in shifting geographic ranges, seasonal activities, migration patterns, and abundances.

Cumulative impacts on mammals from past and present development (most notably energy-related development, agriculture, fire suppression, and water diversion) include habitat loss, fragmentation, disturbance, and displacement. These impacts are considered cumulatively significant to all mammals, but in particular to big game species that migrate long distances and use habitat over a broad range. Cumulative impacts have the potential to affect multiple seasonal ranges as well as result in barriers to movement. WGFD has determined that crucial winter range is a determining factor for meeting or maintaining big game population objectives. For example, species such as mule deer require high-quality forage during the winter in order to meet their energy needs. Individuals whose needs are not met are unlikely to reproduce and may not survive a particularly harsh season or climate event (WGFD 2013b). As noted in Section 4.2, we are focusing the analysis of cumulative impacts on the LAP scale for resources other than birds (other than eagles), eagles, and cultural resources.

The criteria we used to evaluate impacts on mammals in Chapter 3.0 are the same criteria that we use for evaluating cumulative impacts on mammals here. Therefore, the impact criteria table from Section 3.6.3 is included below as Table 4-9.

Table 4-9. Impact Criteria for Mammals for the CCSM Phase I Project in Wyoming

Impact Category	Intensity Type	Definition
Magnitude	Major	The action would result in substantial indirect impacts on habitat from disruption, alteration, or irreplaceable loss of vital and high-value habitats, or of a large amount of suitable habitat for mammals. The action would result in substantial direct fatality or injury of mammals. The action would adversely affect special status mammal species with substantial consequence to the individual, population, or habitat.

Impact Category	Intensity Type	Definition
	Moderate	The action would result in some indirect impacts on habitat from disruption, alteration, or loss of habitat that would be expected to result in measureable but modest impacts on mammals. The action would result in some direct but localized fatality or injury of mammals. The action would have a measureable but modest effect on special status mammal species or their critical habitat.
	Minor	The action would result in some indirect change in the amount or condition of habitat for mammals. The action would result in a limited amount of direct but localized fatality or injury of mammals that would not be expected to have any long-term effects on any populations of mammals. The action would slightly affect habitat for special status mammals.
	No effect	The action would not result in any measureable or observable direct or indirect impacts on mammals or their habitat.
Duration	Long-term	30 years (proposed project duration)
	Medium-term	5 years (permit term)
	Temporary	Lasting for the duration of construction
Potential to occur	Probable	More likely than not to occur
	Possible	Potential to occur
	Unlikely	Not reasonably likely to occur
Geographic extent	Extensive	Within the two EMUs and four BCRs
	Regional	Within the 140-mile radius of the local area population for golden eagles
	Local	Within 4 miles of Phase I development and infrastructure areas
	Limited	Within 1 mile of Phase I development and infrastructure areas

Sagebrush and wetland habitats in Wyoming have been characterized as having the highest potential exposure to development (Pocewicz et al. 2014) due to the current and projected increase in energy and residential development. Cumulative impacts on sagebrush, riparian habitat, and wetlands affect furbearers, big game, and bats, which use these important habitats for travel corridors, refuge, and foraging. Loss of habitat can also expose mammals

to more urbanized areas, making them more vulnerable to vehicle collisions, hunting, and disturbance. Additionally, human development often results in an increase in noise and lighting, which in turn can increase stress levels of individuals by reducing the time they spend on important biological activities such as feeding, breeding, or resting (Barber et al. 2010). Cumulative impacts from habitat loss and degradation may lead to increased mortality and increased stress levels of individuals, both of which could reduce the overall fitness of a population.

Construction and operation of Phase I and the infrastructure components of the CCSM Project (under all alternatives) would result in long-term, minor to moderate disturbance and displacement impacts for all species and species groups (small game and furbearers, big game, bats, and special status species; see Table 4-9 for definitions of impact criteria). Global climate change could exacerbate these effects, on big game in particular, by resulting in shifting geographic ranges, seasonal activities, and migration patterns. The CCSM Phase I Project would contribute negligible to minor impacts on the cumulatively significant impact of habitat loss and disturbance, when considered in context with the impacts of development, agriculture, and global climate (see Table 4-9). Alternative 2 (Proposed Action with Different Mitigation) could result in beneficial effects on mammals by reducing the number of carcasses in roadsides or by conserving additional habitat.

Development of other renewable energy projects within the local area, discussed in Section 4.3.2.2, could contribute to the abovementioned impacts on mammals, but the farther away the projects are from the CCSM Phase I Project and CCSM Phase II Project, the less impact would be noticed in the project vicinity. For example, projects in different watersheds would potentially affect different habitats for mammals. Additional renewable energy generation capacity would reduce the need for additional fossil fuel capacity. Local area wind development could contribute to a lower potential for climate change-related impacts and change in wildlife habitats, but independent of the implementation of other national and global initiatives for conversion to more renewable energy generation, would not represent a statistically significant contribution to climate change rates.

Construction and operation of the CCSM Phase I Project under Alternative 1 (Proposed Action) would impact mule deer and mule deer crucial winter range, as discussed in Section 3.6.3.2.1 and 3.6.3.2.2., respectively. These impacts would be minor to moderate, temporary to long-term, probable to possible, and limited and would directly affect 426 acres, or 0.2 percent, of the Platte Valley mule deer crucial winter range during construction and 256 acres during operation (see Table 4-9 for definitions of impact criteria). Operation could also affect suspected mule deer migration routes. The Wyoming Game and Fish Department identifies changes in winter and summer habitat, predators, residential development, migration barriers, competition, and disease as factors affecting mule deer in the Platte Valley herd that have contributed to a large population decline over the last several decades (Kauffman et al. 2015). When considered in context with these factors and the effects of climate change, Alternative 1 of the CCSM Phase I Project would contribute a minor amount to cumulatively significant impacts on the Platte Valley herd. Alternative 2 (Proposed Action with Different Mitigation) could result in beneficial impacts on mule deer through the construction of wildlife crossing structures to reduce vehicle collisions or through the protection or enhancement of habitat through conservation easements or enhancement

projects. Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would cause impacts similar to Alternative 1, but impacts on non-crucial range would be less. The No Build scenario under Alternative 4 (No Action: Denial of ETPs) would not contribute to cumulative impacts, and the Build Without ETPs scenario under Alternative 4 would likely cause impacts similar to those under Alternative 1.

Direct impacts on bats from operation of the CCSM Phase I Project under Alternative 1 (Proposed Action) would be major, long-term, and probable as discussed in Section 3.6.3.2.1 (see Table 4-9 for definitions of impact criteria). When considered in context with other development projects that would result in bat fatalities, including the reasonably foreseeable CCSM Phase II Project and the effects of climate change, the CCSM Phase I Project could contribute a minor amount to cumulatively significant impacts on bats (see Table 4-9). Alternative 2 (Proposed Action with Different Mitigation) could result in beneficial effects on bats by decommissioning or upgrading existing wind energy facilities. Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would cause impacts comparable to those under Alternative 1 (Proposed Action), but the impacts would be slightly less because of a smaller area of disturbance. The No Build scenario under Alternative 4 (No Action: Denial of ETPs) would not contribute to cumulative impacts, and the Build Without ETPs scenario under Alternative 4 would likely cause impacts similar to those under Alternative 1.

Within the local area, the cumulative impacts on mammals from transmission lines, mineral and energy development, transportation infrastructure, and hunting include habitat loss and degradation, conversion, and fragmentation; behavioral changes such as avoidance, disturbance, and displacement; and increases in fatalities from construction activities, vehicle collisions, hunting, and turbine operations. Overall, these cumulative impacts on mammals are adverse and significant. The CCSM Phase I Project would contribute minor to moderate impacts on cumulative impacts on mammals in the local area, causing probable temporary to long-term impacts on habitat and species during construction, and probable long-term impacts on habitat and species during operation (see Table 4-9 for definitions of impact criteria).

4.4.5 Birds (Other than Eagles)

The effects of large landscape trends can occur at a regional as well as a local area scale. Below we discuss the impacts on birds (other than eagles) from agricultural conversion, fire suppression, water diversion, mineral and energy development, climate change, transmission lines, transportation, and hunting. As noted in Section 4.2, we are focusing the analysis of cumulative impacts on the LAP scale for birds (other than eagles), eagles, and cultural resources.

The criteria we used to evaluate impacts on birds (other than eagles) in Chapter 3.0 are the same criteria that we use for evaluating cumulative impacts on birds (other than eagles) here. Therefore, the impact criteria table from Section 3.7.3 is included below as Table 4-10.

Table 4-10. Impact Criteria for Birds (Other than Eagles) for the CCSM Phase I Project in Wyoming

Impact Category	Intensity Type	Definition
Magnitude	Major	The action would result in substantial indirect impacts on habitat from a large reduction or alteration of habitat, resulting in a substantial reduction in use by birds for nesting, foraging, wintering, or other life history activities. The action could result in direct injury or fatality of birds, including special status species, resulting in a local population-level effect on a bird species.
	Moderate	The action would result in some indirect impacts on habitat from loss of habitat or alterations that are expected to result in a measureable but moderate change in bird use, including localized reductions in reproductive success or survival. The action could result in some direct injury or fatality of birds, including special status species, but would not result in population-level effects.
	Minor	The action would result in some indirect change in the amount or condition of habitat for birds. The action would result in a limited amount of direct but localized fatality or injury of birds that would not be expected to have any long-term effects on any populations of birds.
	No effect	The action would not result in any measureable or observable direct or indirect impacts on birds or their habitat and would have no consequence.
Duration	Long-term	30 years (proposed project duration)
	Medium-term	5 years (permit term)
	Temporary	Lasting for the duration of construction
Potential to occur	Probable	More likely than not to occur
	Possible	Potential to occur
	Unlikely	Not reasonably likely to occur
Geographic extent	Extensive	Within the two EMUs and four BCRs
	Regional	Within the 140-mile radius of the local area population for golden eagles
	Local	Within 4 miles of the Phase I development and infrastructure areas
	Limited	Within 1 mile of Phase I development and

Impact Category	Intensity Type	Definition
		infrastructure areas

4.4.5.1 Habitat Conversion

In addition to habitat loss due to conversion to agricultural cropland, habitat has been lost due to conversion to domestic livestock grazing. As a consequence of rangeland grazing, the composition of many of the major habitats in the region has been substantially altered or degraded, especially in areas of naturally occurring water that attract livestock, such as riparian zones (Pool and Austin 2006). The shift from native wildlife grazing patterns to livestock grazing patterns has resulted in less diversity of vegetation and habitat, which negatively affects bird species (Fleischner 1994). Birds vary in their responses to grazing, which results in shifts in avian community structure in grazed landscapes (Bock et al. 1993). Cropland and grazing conversion have led to declines in many grassland- and shrubland-dependent species and favored increases in more generalist species. This shift has altered the species composition and relative abundance within bird communities throughout the LAP and on a continental scale (Knopf 1994; Fleischner 1994). Conversion to agricultural production has negatively impacted many bird populations but has also provided important habitat to many others. Additionally, agricultural uses can provide protection from urbanization and thus more realistic opportunities for future habitat restoration (IMJV 2013).

The spread of invasive species has accompanied agricultural conversions. Invasive grasses have influenced the structure and function of grassland and sagebrush habitat throughout the region. Invasive grass species alter plant community diversity, abundance, and ecological function (IWJV 2013). For example, cheatgrass invasion changes the structure of the understory, providing more complete and continuous ground cover in contrast to the sparse cover of native perennials (Pool and Austin 2006; IWJV 2013). While shrubland-associated birds may not be sensitive to cheatgrass understory, grassland-associated birds tend to use native bunchgrass more than cheatgrass (Earnst and Holmes 2012). Invasive vegetation can have a negative influence on other undisturbed areas in the landscape. Brandt and Rickard (1994) documented that non-native species were able to colonize relatively undisturbed grasslands and shrublands. Therefore, even in relatively undisturbed habitats, avian communities are affected by altered or degraded habitats within the landscape. Additionally, an increase in cheatgrass and other invasive plant species increases both the threat and extent of actual wildfires, which ultimately heighten habitat loss and degradation.

4.4.5.2 Fire Suppression and Wildfire

Fire suppression contributes to the expansion of coniferous woodland into former grassland habitat, and it may also be allowing for the expansion of deciduous vegetation along ephemeral drainages (Pool and Austin 2006). Bird communities impacted by woody encroachment are anticipated to favor species tolerant of a higher tree cover in lieu of grassland-obligate species (Coppedge et al. 2004; Chapman, Engle, et al. 2004). Some studies document that wooded edge effects result in higher nest predation (Schneider et al. 2012; Knight et al. 2014). On a landscape level, these impacts have had negative effects on shrub-steppe and grassland avian populations (Knight et al. 2014). Conversely, greater sage-

grouse and other sagebrush obligates are dependent on healthy sagebrush vegetation, and wildfires represent a serious threat. Fire suppression is an effective management tool to protect greater sage-grouse habitat (Connelly et al. 2000). Fire can also act as a disturbance, which promotes the introduction and spread of invasive species that further increase the probability and intensity of fire (Milberg and Lamont 1995).

4.4.5.3 Water Diversion

Issues of water supply and demand from continued expansion of human development (that is, urbanization, agriculture, mining, and energy extraction) place significant strains on water resources. In arid and semi-arid regions, riparian zones and other mesic habitats are important habitat types for many avian species. Mesic habitats exhibit higher species richness and abundance and can act as havens for grassland species (Kim et al. 2008; Sanders and Edge 1998). Demands on the water supply result in direct wetland loss, as well as indirect depletion of water tables and diminished recharge of aquifers. Also, increasingly limited water resources prolong the effects of periodic droughts. As the human population continues to grow locally and regionally, demands on the water supply will continue to have detrimental effects on bird populations through loss of mesic habitats, especially in arid and semi-arid landscapes (Kim et al. 2008).

4.4.5.4 Mineral and Energy Development

Oil and gas exploration and development activities have increased dramatically in recent years and are projected to continue to increase in the reasonably foreseeable future. Coal mining has occurred for many years, and coal-bed methane production is projected to expand in some of the coal-producing areas, especially in northeastern Wyoming (EIA 2015).

Risks to avian communities from oil, gas, and mining activities include habitat loss and fragmentation; increased spread of invasive weeds; disturbance of birds during road construction, drilling, and operation; water depletions; contamination of water and soils; spread of disease; and direct mortality in oil and gas reserve pits, compressors, or collisions with infrastructure. Renewable energy developments can carry many of the same risks and impacts associated with fossil fuel development, including habitat loss and fragmentation from transmission lines and transportation infrastructure (Jones et al. 2015). These effects on avian habitat are described in greater detail in Section 3.7. Other effects from mineral and energy development, such as water depletion, soil and water contamination, and increased spread of invasive species, would result in indirect effects on avian populations through alterations in vegetation communities. This could make some areas unsuitable or less productive and could bring potential changes in invertebrate prey abundance in response to changing water regimes or contamination events (Jones et al. 2015). The presence of ponds associated with oil and gas development, particularly coal-bed natural gas, has been shown to increase mosquito populations and facilitate the spread of West Nile virus among avian populations, including greater sage-grouse (Zou et al. 2006; Doherty 2007; Walker et al. 2007).

Present and reasonably foreseeable wind energy facilities within the local area, defined as those facilities exporting energy to the transmission grid, are summarized in Table 4-2 and

shown in Figure 4-3. The direct and indirect impacts from proposed wind energy on bird populations are described in Section 3.7.3. The bird communities at other wind facilities would experience similar effects from habitat loss habitat loss and degradation, habitat fragmentation, disturbance, displacement, and collision risk.

4.4.5.5 Climate Change

Evidence of present climate-change impacts includes changing precipitation patterns; more frequent hot and fewer cold temperature extremes; and shifting geographic ranges, seasonal activities, migration patterns, and abundance of terrestrial and aquatic species (IPCC 2014). Projected future effects due to climate change include declines in soil moisture; increases in catastrophic events, including landslides and fires; and altered surface water flows, water quality, and water quantity (IPCC 2014).

The declines in soil moisture, changing precipitation patterns, and temperature extremes in a changing climate could affect frequency and duration of heat waves and droughts. Albright et al. (2010) found that the combination of heat waves and droughts results in lower abundance of ground-nesting birds. Coupled with changing temperature regimes, this is expected to cause birds to shift their current geographic ranges. Langham et al. (2015) projected that, based on decades of North American Breeding Bird Survey data, 314 species are vulnerable to losing more than half of their current geographic range across three scenarios of climate change through the end of the century. For 40 percent of these species, the range loss would not be offset by a range shift, but instead their populations are projected to shrink along with their range. The remaining species are likely to colonize new areas where appropriate environmental conditions and habitat exist. However, not all species respond the same to environmental changes, and some species do not have the same dispersal traits as others (Langham et al. 2015).

A shift in the seasonal activities and migration timing of birds could potentially result in timing mismatches between the period when bird species are breeding and the period of highest prey abundance to support successful nesting attempts (Visser and Both 2005). In addition, for some grassland species, initiating nests earlier in the season tends to be a more successful strategy (Hatchett et al. 2013); however, milder winters with earlier warming could potentially cause snakes, a major avian nest predator for grassland and shrubland nesting birds, to become active earlier than usual in the nesting season (DeGregorio et al. 2015).

Development of other renewable energy projects within the local area, discussed in Section 4.3.2.2, could contribute to impacts on birds, but the farther away the projects are from the CCSM Phase I Project and CCSM Phase II Project, the less impact would be noticed in the CCSM Project area. For example, projects in different watersheds would potentially affect different habitats for birds. Additional renewable energy generation capacity would reduce the need for additional fossil fuel capacity. Local area wind development could contribute to a lower potential for climate change-related impacts and change in wildlife habitats, but independent of the implementation of other national and global initiatives for conversion to more renewable energy generation, would not represent a statistically significant contribution to climate change rates.

4.4.5.6 Power Lines

In the reasonably foreseeable future, several major transmission lines may be developed and will supplement current lines, as noted in Table 4-1. Additional distribution lines are also likely to be constructed. Although direct habitat loss associated with transmission line construction may be low, species avoidance of tall structures that provide perching habitat for predators in open landscapes would likely result in indirect habitat loss (Pitman et al. 2005; Pruett et al. 2009). Also, transmission line maintenance roads through woodlands and shrublands create fragmentation, facilitate greater human access, and increase the spread of invasive species and travel corridors for avian nest predators (DeGregorio et al. 2014). These factors typically result in greater edge effects, disturbance from human activities, vegetation community alterations, and potentially higher nest predation by species that use edges created by transmission lines more frequently (DeGregorio et al. 2014). Taken together, the indirect effects on birds from additional power line construction for many avian species likely exceed the direct effects. In addition, the increase of power line corridors in the local landscape increases the collision and electrocution risk for birds.

4.4.5.7 Transportation

In addition to the direct habitat loss from the construction of transportation corridors, indirect habitat loss and habitat degradation through avian species avoidance of roads can be significant. Benítez-López et al. (2010) reported that bird species abundance declined 28 to 36 percent within 2.6 kilometers of roads and 25 to 38 percent within 17 kilometers of infrastructure. However, some bird groups, such as raptors, are more abundant near road corridors (Benítez-López et al. 2010). This study suggested that traffic intensity, or the amount of traffic on a road, is not a consistent predictor of this effect.

Some studies have shown that traffic noise can have an indirect effect on avian populations through shifts in community composition. For some species, nest success was lowest near roads, suggesting that the species is intolerant to high ambient noise (Francis et al. 2009). A potential reason for noise sensitivity in some species may result from the traffic noise disruption of important signaling and communication necessary for establishing breeding territories and maintaining pair bonds (Parris and Schneider 2009). Also, on low-traffic rural roads, avian nest survival can be lower due to higher predation from some predators that use the roads as movement corridors (DeGregorio et al. 2014). Proximity to roads can also increase collision fatalities (Bennett et al. 2011). Conversely, Francis et al. (2009) documented that some species had higher nest success near roads with high noise levels, suggesting that the noise reduced nest predation. Fugitive dust from gravel roads, trucks hauling materials, and windborne soil can also affect wildlife.

Habitat fragmentation is another major impact of road networks. As road density increases, the average habitat patch size decreases (Forman and Alexander 1998). Habitat fragmentation creates variable, isolated populations of species. The long-term viability of species in meta-populations (that is, species with irregular distributions) depends on patch size and the permeability between the populations. Roads, fencing, and other obstructions present barriers to wildlife movement (Holloran 2005; Pruett et al. 2009; Yahner 1988). If too many barriers exist and the patch sizes are not large enough to sustain a population, then

the local extirpation of species increases, with the associated loss of genetic information, further reducing population viability (Bennett et al. 2011). As road density and traffic volumes increase on a landscape scale, fugitive dust and habitat loss and fragmentation also increase; this can have significant consequences on the population viability of some species, while other, tolerant species may increase near roads.

4.4.5.8 Hunting

Hunting is a popular recreational activity in the local and regional areas. Although the use of lead shot is prohibited for hunting waterfowl, hunters often use lead ammunition for vermin, small game, upland game birds, and big game. Fishing with lead sinkers can also introduce lead into the environment. Higher blood lead levels have been documented in vultures during deer and wild pig hunting seasons (Kelly and Johnson 2011). A study on 19 raptor species documented the highest mean blood lead levels in turkey vultures, and 2 percent of the individuals sampled had blood lead levels that exceeded clinical thresholds, indicating sub-lethal and acute toxicity (Martin et al. 2008). Although USFWS and other organizations recommend the use of non-lead ammunition, it is legal except for use in hunting waterfowl and is likely to continue (USFWS 2014c; Frommer 2010). The presence of lead in the environment would impact migratory bird populations, primarily affecting vultures and other avian scavengers.

4.4.5.9 Impact Analysis

Many of the impacts on birds described above in Sections 4.4.5.1 through 4.4.5.8 are expected to occur within and immediately adjacent to the CCSM Phase I Project. Reasonably foreseeable future wind energy development may include the CCSM Phase II Project, which is the closest reasonably foreseeable project with the highest potential for cumulative impacts. Impacts on birds would include injury or fatality from collision with wind turbines, overhead power lines, meteorological or communication towers, buildings, or vehicles, as well as electrocution with power lines. Habitat loss, degradation, fragmentation, and displacement/disturbance could also occur as a result of construction and operation of wind facilities, which could result in various detrimental impacts on the bird community. The addition of this wind facility could compound impacts within the area and contribute to population-level impacts throughout the region and local area. The CCSM Phase I Project includes multiple avoidance and minimization measures to reduce the anticipated impacts at and near the site. In addition to compensatory mitigation, PCW has proposed conservation measures for the permitted take of eagles, by improving habitat for the eagle prey base, including:

- A commitment to work with local private landowners to improve wildlife habitat on private ranch land in the area;
- Restoration of cheatgrass-dominated pastures and restoration of burned areas to shrublands and grasslands;
- Improvement of mesic habitats and creation of wet meadows;
- Implementation of a greater sage-grouse conservation plan to restore and protect sage-grouse habitat;
- Suspension of sage-grouse hunting, reducing potential exposure to lead shot; and

- Procurement of a conservation easement on land along the North Platte River.

While the CCSM Phase II Project would cause detrimental impacts on birds, some of these could potentially be offset by the above conservation measures. The cumulative effects of past, present, and reasonably foreseeable impacts on birds (other than eagles) could result in large-scale, population-level impacts for some bird species. It is probable that the combined impacts on birds (other than eagles) would result in impacts ranging from minor to moderate that are long-term and regional (see Table 4-10 for definitions of impact criteria).

The cumulative effects of past, present, and reasonably foreseeable impacts on birds (other than eagles) within and immediately near the CCSM Phase I Project under Alternative 1 (Proposed Action) would have possible to probable, long-term, moderate, local to regional adverse effects on some bird species (see Table 4-10 for definitions of impact criteria). Some species, could incur probable, major, long-term, and limited to local impacts. Monitoring of impacts on birds from the CCSM Phase I Project, and monitoring of impacts from other projects, could assist in the determination of population-level impacts.

The impacts under Alternative 2 (Proposed Action with Different Mitigation) would be comparable to those under Alternative 1 (Proposed Action), but slightly less because different options for mitigation (especially habitat enhancement and wind conservation easements) would occur in the local and regional areas. Mitigation to remove or avoid carcasses would also benefit other scavenger species. The impacts under Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would be slightly less than impacts under Alternative 1 because a smaller area would be affected. The No Build scenario under Alternative 4 (No Action: Denial of ETPs) would not contribute to cumulative impacts, and the Build Without ETPs scenario under Alternative 4 would likely cause impacts similar to those under Alternative 1.

4.4.6 Eagles

The criteria we used to evaluate impacts on eagles in Chapter 3.0 are the same criteria that we use for evaluating cumulative impacts on eagles here. Therefore, the impact criteria table from Section 3.8.3 is included below as Table 4-11. As noted in Section 4.2, we are focusing the analysis of cumulative impacts on the LAP scale for birds (other than eagles), eagles, and cultural resources.

Table 4-11. Impact Criteria for Eagles for the CCSM Phase I Project

Impact Category	Intensity Type	Definition
Magnitude	Major	The action would result in a large indirect impact on habitat from reduction or alteration of habitat, resulting in a substantial reduction in use by eagles for nesting, foraging, wintering, or other activities, resulting in a population-level effect. The action could result in direct injury or fatality of eagles resulting in a population-level effect.
	Moderate	The action would result in some indirect loss of habitat or alterations that are expected to result in a measureable but moderate change in eagle use, including localized reductions in reproductive success or survival. The action could result in some direct injury or fatality of eagles, but would not result in population-level effects.
	Minor	The action could result in some indirect change to the amount or condition of habitat, but changes would have little risk of injury or fatality of eagles. The action would not be expected to result in any direct injury or fatality of eagles.
	No effect	The action would not result in any measureable or observable direct or indirect impacts on eagles or their habitat and would have no consequence.
Duration	Long-term	30 years (proposed project duration)
	Medium-term	5 years (permit term)
	Temporary	Lasting for the duration of construction
Potential to occur	Probable	More likely than not to occur
	Possible	Potential to occur
	Unlikely	Not reasonably likely to occur
Geographic extent	Extensive	Within the two EMUs (for bald eagles) and four BCRs (for golden eagles)
	Regional	Within the 140-mile radius of the local area population for golden eagles
	Limited	Within 1 mile of Phase I development and infrastructure areas

4.4.6.1 Habitat Conversion

The primary consequence of conversion to cropland is large-scale habitat loss for a majority of eagle prey species, which reduces the suitability of breeding territories. Urbanization also increases habitat loss for prey species. Eagles occupy nest sites in areas with a sufficient prey base to support successful breeding (Steenhof et al. 1997). Kochert et al. (1999) documented that the presence of a vacant neighboring territory, the amount of agricultural land, and the proportion of shrubs within 3 kilometers of a nest territory best predicted the probability of golden eagle territory occupancy. Nest success was not associated with these variables, but was positively associated with previous nesting success (Kochert et al. 1999).

Agriculture is a major source of ground and surface water use, accounting for as much as 90 percent of water consumption in parts of the western United States (U.S. Department of Agriculture 2015). Increased agriculture on the landscape can also result in adverse impacts on water quality through the non-point discharge of agricultural chemicals (that is, pesticides, fertilizers, or herbicides). The loss of surface water and contamination of water bodies could reduce the quality or quantity of aquatic prey available to bald eagles. Alternatively, creation of reservoirs for agricultural or potable water use could provide water sources for aquatic prey and eagle use. Poorly managed livestock grazing can result in changes to vegetation composition and structure, which can alter small mammal communities (Davies et al. 2014). As these changes escalate across the region, increased pressure on the eagles' prey base could result in lower productivity of and distributional shifts in the eagle population, as suitable nesting territories are lost to agriculture.

Sage-grouse and sage brush ecosystem are the specific focus of many conservation efforts throughout the west, where programs such as the Sage Grouse Initiative strive to increase healthier rangelands. These ongoing conservation efforts assist in maintaining and improving a prey base for eagles.

4.4.6.2 Fire Suppression and Wildfire

Fire suppression and the resulting expansion of coniferous woodland into former grassland can remove and degrade habitat for eagle prey and affect aquatic prey through impacts on water quality and quantity. Upland game birds, particularly greater sage-grouse, are important prey species for golden eagles, at least on a local basis, and a major threat to these species is conifer encroachment, causing loss of sagebrush habitat. Wildfires remove sagebrush habitat, which can take 15 to 50 years or longer to return. Wildfires also result in conditions that promote the introduction of invasive weeds and hinder re-establishment of native plant communities, which can degrade or remove sagebrush vegetation and increase the likelihood of additional wildfires. For instance, the spread of cheatgrass could lower small mammal abundance in affected areas (Hall 2012; Gano and Rickard 1982). The expansion of woody vegetation with high water requirements into riparian areas can lower water tables and reduce available foraging habitat for bald eagles (Pool and Austin 2006). Non-native plants, such as saltcedar (*Tamarix* spp.), have higher evapotranspiration rates than grass species, so water is more likely to evaporate before recharging streams and aquifers. The increased demand, increased evaporation due to more trees and woody vegetation, and dwindling water supply are likely to result in prolonged drought effects in the

LAP area and beyond (Pool and Austin 2006; IWJV 2013). Increased risk and severity of wildfires and altered fire regimes are a threat to greater sage-grouse and other eagle prey, and for this reason fire suppression has been suggested as a management tool for golden eagles (Kochert et al. 1999).

4.4.6.3 Water Diversion

Water diversion for agricultural and urban uses results in long-term wetland loss and altered flow regimes, and compounds the effects of ongoing droughts. Eagle prey species, both terrestrial and aquatic, rely heavily on healthy, functioning wetlands, ephemeral and perennial streams, and their associated riparian areas. Prolonged drought affects not only aquatic species, but also terrestrial species that rely on plant productivity. Small-mammal communities can be profoundly affected by droughts, and effects can linger for many years following drought conditions. Effects include poor body condition, changes in community species composition, and reduced abundance (Schramm et al. 1992). The most frequently documented effects of droughts on fish communities include population declines, loss of habitat, changes in the community, movement within catchments, and crowding of fish in reduced microhabitats (Matthews and Marsh-Matthews 2003). A higher frequency of droughts or prolonged droughts could have a significant effect on the prey base of eagles in the region, resulting in lower productivity of the eagle population on a regional level.

4.4.6.4 Mineral and Energy Development

Oil and gas development in the region has expanded greatly in the last 50 years and is projected to continue. The patterns of development and road infrastructure associated with oil and gas development result in habitat loss and extensive habitat fragmentation (Jones and Pejchar 2013). Oil and gas development can also result in direct eagle fatalities due to electrocution or collision with overhead power lines, buildings, or vehicles. In addition, oil and gas development can result in high amounts of water consumption, noise and light pollution, introduction of invasive species, and soil and water contamination, as well as impacts on ecosystem services (Jones et al. 2015). These impacts represent degradation of and disruption to eagle nesting and foraging habitat. There is a documented association between ponds affiliated with oil and gas development, particularly coal-bed natural gas, and the spread of West Nile Virus to birds (Zou et al. 2006). Both bald and golden eagles are susceptible to infection with West Nile Virus (Jimenez-Clavero et al. 2008; Ip et al. 2014), or could become potential sources of the virus in its sub-lethal form (Nemeth et al. 2006).

Non-hydrologic renewable energy development, such as solar and wind, is anticipated to increase due to the high commercial potential of these resources in the BCRs. In addition to the direct habitat loss and fragmentation associated with renewable energy development, eagles also experience direct collision mortality with wind turbines. Transmission lines and towers that accompany solar and wind energy development also result in habitat fragmentation and direct fatality due to electrocution and collision (Erickson et al. 2005).

The proliferation of mineral and energy development and associated infrastructure in the LAP boundary and surrounding area is likely to result in additive effects of direct collision mortality as well as reduced productivity, due to alterations in the eagles' prey base from

water depletion, water contamination, habitat loss, and habitat fragmentation. In general, the negative impacts on small mammal and upland game bird populations, as well as development impacts on fish habitat, are likely to result in lower eagle productivity in areas where energy infrastructure intensifies or where previously undisturbed areas experience new disturbance from multiple impacts. In addition, occupancy of nesting territories may decrease in areas where road infrastructure density increases, which would result in higher densities of top predators (eagles) in areas that are less impacted, putting increased pressure on the prey base.

4.4.6.5 Climate Change

Present evidence of climate change includes changing precipitation patterns, more severe weather events, and more frequent hot and fewer cold temperature extremes. These anomalies result in shifts in geographic range, seasonal activities, migration, and abundance of terrestrial and aquatic species (IPCC 2014). The reduction or increase in abundance of terrestrial and aquatic prey base would likely have corresponding effects on eagle productivity and territory occupancy. The geographic ranges and the seasonal activities of the bald and golden eagle could shift with their respective prey bases. An increase in the number of extremely hot days could have a regional negative effect on golden eagle nesting success and brood size (Steenhof et al. 1997).

Projected future effects of climate change include declines in soil moisture, increases in catastrophic events such as fires, altered surface water flow, and changes in water quality and quantity (BLM 2009). Due to the increased demand for water in this region described above, the reduction in supply and impairment of water quality could potentially have detrimental effects on eagles.

Development of other renewable energy projects within the local area, discussed in Section 4.3.2.2, would reduce the need for additional fossil fuel capacity. Local area wind development could contribute to a lower potential for climate change-related impacts and change in wildlife habitats, but independent of the implementation of other national and global initiatives for conversion to more renewable energy generation, would not represent a statistically significant contribution to climate change rates.

4.4.6.6 Impact Analysis

The cumulative effects of past, present, and reasonably foreseeable impacts on bald and golden eagles in combination with the CCSM Phase I Project were evaluated in detail within the LAP boundary; eagle populations and migration within the EMU, which includes the four-BCR area for golden eagles, were also considered. Figure 2-1 illustrates the EMUs for bald eagles, and Figures 2-2 and 4-1 show the EMUs (the four BCRs) for golden eagles.

4.4.6.6.1 Bald Eagle

The LAP boundary for bald eagles is delimited by a circle with a radius of 43 miles around the project footprint, with 43 miles representing the mean natal dispersal distance for bald eagles. The management units currently used by USFWS to manage bald eagle populations are the Northern Rocky Mountains and the Rocky Mountains and Plains EMUs.

The LAP of bald eagles for the CCSM Phase I Project is approximately 117 eagles, as shown in Table 4-12, and the 1 percent and 5 percent benchmarks for this LAP are 1 and 6 bald eagles, respectively. We have identified that a take rate of 1 percent of the estimated total eagle population at the LAP scale (referred to as the 1 percent benchmark) is a level of take that would be of concern to us (USFWS 2013b). We have determined that the 5 percent benchmark (a take rate of 5 percent of the estimated eagle population at the LAP scale) is the upper end of what would be appropriate under the BGEPA preservation standard, whether offset by compensatory mitigation or not (USFWS 2013b).

Table 4-12. Estimated Bald Eagle Local Area Population for the CCSM Phase I Project in Wyoming

Eagle Management Unit (EMU)	Estimated Number of Bald Eagles
Northern Rocky Mountains	114
Rocky Mountains and Plains	3
Total Local Area Population	117
1% LAP Benchmark	1
5% LAP Benchmark	6

We established take thresholds for bald eagle populations by EMU in the Final Environmental Assessment for the 2009 BGEPA take regulations. For the Northern Rocky Mountains EMU, the annual take threshold for the portion within the USFWS Region 6 boundary is 31 bald eagles per year, and for the Rocky Mountains and Plains EMU, the annual take threshold is 13 eagles per year; the combined annual take threshold is 44 bald eagles per year (USFWS 2009).

Based on the USFWS eagle mortality database and an additional set of eagle mortality records available from the WGFD, there were 11 reported bald eagle mortalities within the bald eagle LAP between 2005 and 2014, as shown in Table 4-13. These mortalities were identified as due mostly to human causes, including three records of collisions with wind turbines, three records of highway accidents (assumed to be cases where vehicles collided with eagles), two records of electrocution on power lines, and one record of a collision with a power line (see Table 4-13). The lack of mortalities due to natural causes such as disease or starvation should not be interpreted as meaning that these mortality types did not occur within the local-area population between 2005 and 2014; undoubtedly these types of mortalities did occur, but we simply lack information on them for this time period.

Table 4-13. Known Bald Eagle Mortalities within 43 Miles of the CCSM Phase I Project in Wyoming, 2005 through 2014

Type of Mortality	Number of Mortalities	Percent of Total Mortalities
Human Causes		
Electrocution	2	18.1
Collision with Power Line	1	9.2

Type of Mortality	Number of Mortalities	Percent of Total Mortalities
Collision with Wind Turbine	3	27.3
Collision with Vehicle	3	27.3
Unknown	2	18.1
Total Mortalities	11	100

The mortality database included two other bald eagle mortalities for which the cause was unknown. Again, a major caveat is that these records are biased due to the manner in which they were obtained and reported. Although most of the available bald eagle mortality records in our database and the WGFD database are related to power lines, wind turbines, and collisions with vehicles, we cannot say that these sources of eagle mortality are more important as factors in eagle mortality within the LAP than other potential mortality sources such as shooting, poisoning, or other human sources. Facility maintenance practices for electric utility and wind energy companies ensure that these facilities are on a regular inspection schedule which may explain the higher rates of reporting of eagle mortalities for these industries. It is certainly possible that other anthropogenic eagle mortality factors, such as shooting or poisoning, or natural mortality causes such as disease and starvation, could be more important in terms of total eagle take within this area; however, we simply lack the data to meaningfully assess the relative importance of different mortality factors.

To assess bald eagle mortalities due to collisions with wind turbines at existing wind energy facilities, we used a USFWS cumulative effects tool to calculate that 0.8 are taken by existing online wind facilities at the LAP level. The USFWS LAP analysis (USFWS 2016e) is included in Attachment E. Again, a caveat on this estimate is that it is based only on bald eagle mortality records self-reported to us by online operating wind facilities. There are other online wind energy facilities within the LAP boundary that are not reporting bald eagle mortalities to us, but for which eagle mortalities are likely occurring at some level. However, in this analysis we elected not to assign a value for bald eagle mortalities to these wind facilities because estimates of unreported wind energy fatalities would be too speculative. The above estimate of 0.8 bald eagles taken per year within this LAP by online wind facilities should be viewed as a minimum estimate for this type of take. If we subtract the estimate of 0.8 eagles taken by wind facilities per year from the above 1 percent and 5 percent benchmarks, we are left with approximately 0.2 eagles at the 1 percent level and 5.2 eagles at the 5 percent level.

For bald eagle fatalities due to power line impacts, the total number reported from 2005 through 2014 was 3 (see Table 4-13), or 0.3 eagles per year. Again, because not all eagles taken by electrocutions or collisions with power lines are discovered and reported to us, the average of 0.3 bald eagle killed by power line impacts should be considered a minimum estimate for this type of take. If we subtract the estimate of 0.3 bald eagles per year taken by power lines from the above numbers for wind turbine impacts, we are left with -0.1 bald eagles at the 1 percent level and 4.9 eagles at the 5 percent level.

For bald eagle fatalities due to collisions with vehicles on highways, the total number from 2005 through 2014 was 3 (see Table 4-13), or 0.3 eagles per year. Again, because not all

eagles killed in vehicle collisions are discovered or reported, an average of 0.3 eagles taken per year could be considered a minimum estimate for this type of take. If we subtract the estimate of 0.3 eagles per year taken by vehicle collisions from the above combined numbers for take due to wind turbine and power line impacts, we are left with -0.4 eagles at the 1 percent level and 4.6 eagles at the 5 percent level.

We used eagle data from pre-construction eagle surveys for the CCSM Phase I Project in our eagle fatality prediction model (USFWS 2013c) to predict the number of bald eagles the CCSM Phase I Project would take per year. At the upper 80th credible interval level, we estimate this wind project would take 1 or 2 bald eagles per year, depending on the size of the wind turbines used for the Project. The take of 2 bald eagles per year by the CCSM Phase I Project would be of greater concern so we included here only the overall assessment for take at this level which is the more conservative approach for the species. Using this prediction of 2 eagles taken per year, and the above combined reductions against the 1 percent and 5 percent benchmarks due to wind energy, power lines, and vehicle collisions, the combined take would be -2.4 eagles at the 1 percent level and 2.6 eagles at the 5 percent level. So, the combined take of bald eagles from the CCSM Phase I Project, with permitted take of 2 eagles per year added to other bald eagle take from collisions with wind turbines, power lines, and vehicle collisions (0.8 eagles per year for wind turbines, 0.3 eagles per year for powerlines, and 0.3 eagles per year for vehicle collisions) is about 3.4 eagles per year, or about 3 percent of the LAP. For a predicted level of eagle take due to the CCSM Phase I Project of 2 eagles per year, the combined annual take of bald eagles (3.4 or about 3 percent of the LAP) exceeds the 1 percent benchmark level, but is below the 5 percent benchmark level for this LAP. Our full LAP analysis for bald and golden eagles (USFWS 2016e) is provided as Attachment E. The local areas are shown in Figures 2-1 and 2-4.

The CCSM Phase II Project is also estimated by USFWS to result in up to 1 or 2 additional takes of bald eagles per year (see Table 4-3), depending on the wind turbine blade diameter. Considering again only the predicted take level of 2 bald eagles per year (again from a bald eagle conservation perspective this would be of greater concern than take of 1 bald eagle per year) for the CCSM Phase II Project combined with the estimates for the CCSM Phase I Project reported above, an estimated combined take of about 7 bald eagles would occur, which is about 6 percent of the LAP. Therefore, the combined estimated take for the CCSM Phase I Project and the CCSM Phase II Project would exceed both the 1 percent and 5 percent benchmark levels, which would be a concern. Development of other renewable energy projects within the local area would contribute to impacts on eagles, but the farther away the projects are from the CCSM Phase I Project and CCSM Phase II Project, the less impact would be noticed in the project vicinity.

We also considered the cumulative take of bald eagles associated with the CCSM Phase I Project in terms of the bald eagle thresholds for the bald eagle EMUs provided in the 2009 Final Environmental Assessment, Table C.3 (USFWS 2009). The estimated take of 3.4 bald eagles per year (2 bald eagles per year estimated from the CCSM Phase I Project plus other ongoing eagle take), subtracted from the combined threshold level for the Northern Rocky Mountains and Rocky Mountains and Plains EMUs (44 eagles), leaves 40.6 bald eagles per year that could still be taken from the combined EMUs in Region 6. Most of the bald eagles in the LAP associated with the CCSM Phase I Project are from the Northern Rocky

Mountains EMU. If only the Northern Rocky Mountain EMU threshold of 31 eagles per year is considered, and the estimated take above of 3.4 eagles per year is subtracted, this leaves 27.6 eagles per year that could be taken—a reduction for the Northern Rocky Mountain EMU of about 11 percent. It is probable that the CCSM Phase I Project combined with past, present, and reasonably foreseeable future actions within the LAP would result in minor to moderate, long-term, extensive impacts on bald eagles (see Table 4-11 for definitions of impact criteria). Monitoring of impacts on bald eagles from the CCSM Phase I Project, and monitoring of impacts from other projects, could assist in the determination of population level impacts.

Alternative 2 (Proposed Action with Different Mitigation) and Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would cause impacts comparable to those under Alternative 1 (Proposed Action), but with slightly less impact because of different options for mitigation occurring in the local and regional areas, and a smaller area of disturbance, respectively. The No Build scenario under Alternative 4 (No Action: Denial of ETPs) would not contribute to cumulative impacts. However, the Build Without ETPs scenario under Alternative 4 would cause greater impacts than the Proposed Action because many of the provisions of the ECP would not be implemented.

4.4.6.6.2 Golden Eagle

For the CCSM Phase I Project, the LAP of golden eagles is comprised of eagles within the 140-mile radius. The LAP of golden eagles for the CCSM Phase I Project is approximately 1,932 eagles, as shown in Table 4-14, and the 1 percent and 5 percent benchmarks for this LAP are about 19 and 97 golden eagles, respectively. We have identified that take rates of between 1 percent and 5 percent of the total estimated local-area eagle population size are a concern to us, with 5 percent being at the upper end of what would be appropriate under the BGEPA preservation standard, whether offset by compensatory mitigation or not (USFWS 2013b).

Table 4-14. Estimated Golden Eagle Local Area Population for the CCSM Phase I Project in Wyoming

Bird Conservation Region (BCR)	Estimated Number of Golden Eagles
BCR 17: Badlands and Prairies	357
BCR 10: Northern Rockies	1,126
BCR 16: Southern Rockies/Colorado Plateau	422
BCR 18: Shortgrass Prairie	27
Total Local Area Population	1,932
1% LAP Benchmark	19
5% LAP Benchmark	97

Based on combined records from our USFWS eagle mortality database and the WGFD eagle mortality database, 430 golden eagle mortalities were documented within the LAP between 2005 and 2014, as shown in Table 4-15. About 92 percent of these reported mortalities were due to human causes, with only 4 reported cases of mortality due to natural causes. Given that there were undoubtedly other eagle mortalities due to natural causes within this 10-year span, this further illustrates a bias with these mortality records because there was no systematic mortality survey effort, and no standardized method of data collection, on found deceased eagles. Of the anthropogenic causes of mortality, 50 percent were related to power lines, with 217 cases of electrocutions and 4 cases of collisions with power lines (see Table 4-15). The remaining eagle mortalities due to human causes were mostly due to either collisions with wind turbines (97 records; 23 percent of all records) or collisions with vehicles along highways/roads (60 records; 14 percent). Our recent review of golden eagle mortality throughout North America (USFWS 2016c) found different proportions of fatalities than illustrated in Table 4-15 for the LAP. The North American dataset identified poisoning and shooting as the top two non-natural causes of mortality, and also included data on lead toxicosis mortality, but the statistics were not used as a basis for our analysis because the LAP data are relevant to the CCSM Phase I Project area.

Additionally, there were seven records of golden eagles being shot, three records of collisions with trains along railroad lines, two records of mortality due to collision with a fence, two records of non-target snaring, one record of mortality due to collision, but where the type of structure collided with was unknown, and one record where an eagle was killed due to management/research trapping (see Table 4-14). While there are numerous sources of golden eagle fatality due to human causes in the LAP analysis area, the three sources of fatality that are most common are for power lines (mostly electrocutions but some collisions too), collisions with wind turbines, and collisions with vehicles. As such, our calculations of combined eagle take consider only mortalities due to power lines, collisions with wind turbines, and collisions with vehicles.

Table 4-15. Known Golden Eagle Mortalities within 140 Miles of the CCSM Phase I Project in Wyoming, based on available data from 2005 through 2014

Type of Mortality	Number of Mortalities	Percent of Total Mortalities
Natural causes		
Killed by another animal	1	<1
Emaciation/Starvation	2	<1
Physiological Stress	1	<1
Human Causes		
Electrocution	217	50
Collision with Power Line	4	1
Collision with Wind Turbine	97	23
Collision with Vehicle	60	14
Collision with Fence	2	<1
Collision on Railroad	3	<1
Collision (Unknown structure)	1	<1
Shot	7	2
Non-target snaring	2	<1
Management/Research Trapping	1	<1
Unknown	19	4
Other	13	3
Total Mortalities	430	100

Although most of the available golden eagle mortality records combined from our database and the WGFD database are related to power lines (mostly electrocutions) or collisions with wind turbines or motor vehicles, we cannot say that these sources of eagle mortality are more important as factors in eagle mortality within the LAP than shooting, poisoning, or any other human-related source of eagle mortality. Facility maintenance practices for electric utility and wind energy companies ensure that these facilities are on a regular inspection schedule, which may explain the higher rates of reporting of eagle mortalities for these industries. Similarly, eagle remains are more visible along highways than in areas away from roadways. It is certainly possible that other eagle mortality factors that our sample suggests occur infrequently, such as shooting, could be much more important in terms of total eagle take within this area; however, we simply lack the data to meaningfully assess the relative importance of these mortality factors.

For golden eagle mortalities due to collisions with wind turbines at wind energy facilities, we used the USFWS cumulative effects tool to calculate that approximately 17 eagles per year are taken by existing online wind facilities at the LAP level. The USFWS LAP analysis (USFWS 2016e) is included in Attachment E. The estimate is based on available data from 2005 through 2014, with the likelihood that more recent data include more mortalities. A further caveat on this estimate is that it is based only on golden eagle mortality records self-reported to us by online operating wind facilities. There are other online wind energy facilities within the LAP boundary that have not reported golden eagle mortalities to us but for which eagle mortalities are likely occurring at some level. However, in this analysis we

elected not to assign a value for golden eagle mortalities to these wind facilities because estimates of unreported wind energy fatalities would be speculative. Therefore, the above estimate of 17 golden eagles taken per year within this LAP by online wind facilities should be viewed as a minimum estimate of mortalities due to this mortality type. Subtracting the estimate of 17 eagles taken by wind facilities per year from the above 1 percent and 5 percent benchmarks leaves approximately 2 eagles at the 1 percent level and 80 eagles at the 5 percent level for the LAP.

For golden eagle mortalities due to power line impacts (combination of electrocutions and collisions with power lines), the total number from 2005 through 2014 was 221 (see Table 4-15), for an average of about 22 per year. Again, because not all eagles that are killed by electrocutions or collisions with power lines are discovered and reported to us, the average of 22 golden eagles per year killed by power line impacts should be viewed as a minimum estimate of this type of take. If we subtract the estimated 22 eagles per year taken by power lines from the above numbers for wind turbine impacts, we are left with -20 eagles at the 1 percent level and 58 eagles at the 5 percent level for the LAP. Subsequently, the combined golden eagle take due to wind turbines (approximately 17 eagles) and power lines (approximately 22 eagles) is approximately 39 eagles per year.

For golden eagle mortalities due to collisions with vehicles on highways, the total number from 2005 through 2014 was 60 (see Table 4-15), for an average of about 6 eagles per year. Again, because not all eagles killed along highways in collisions with motor vehicles are discovered and reported, this average of 6 eagles taken per year should be viewed as a minimum estimate for this type of take. If we subtract the estimated 6 eagles per year taken by vehicle collisions along highways from the above combined numbers for take due to wind turbine and power line impacts, we are left with -26 eagles at the 1 percent level and 52 eagles at the 5 percent level for the LAP. Consequently, the current combined take of eagles due to wind turbine, power line, and vehicle collision impacts is approximately 45 eagles per year.

We used eagle data from pre-construction eagle surveys provided by PCW for the CCSM Phase I Project in our eagle fatality prediction model (USFWS 2013b) to predict the number of golden eagles the CCSM Phase I Project would take per year. At the upper 80th credible interval level, we estimate that the proposed project would take either 10 or 14 golden eagles per year (depending on the size of wind turbines used for the Project; see Chapter 2, Section 2.2.1.3.3). The take of 14 golden eagles per year by the CCSM Phase I Project would be of greater concern, so we included here only the overall assessment for take at this level, which is the more conservative approach for the species. Using this prediction of 14 golden eagles taken per year, and the above reductions against the 1 percent and 5 percent benchmarks due to existing wind energy, power lines, and vehicle collisions, then the combined take would be -40 eagles at the 1 percent level and 38 eagles at the 5 percent level. So the combined take of golden eagles from the CCSM Phase I Project, with permitted take of 14 eagles per year added to other golden eagle take from existing power lines and collisions with turbines and vehicles, is about 59 eagles per year or about 3 percent of the LAP. For a predicted level of golden eagle take due to the CCSM Phase I Project of 14 eagles per year, the 3 percent combined take level for golden eagles at the LAP scale exceeds the 1 percent benchmark, but is still below the 5 percent benchmark level. Our full

LAP analysis for bald and golden eagles (USFWS 2016e) is provided as Attachment E. The local areas are shown in Figures 2-1 and 2-4.

The CCSM Phase II Project is estimated by USFWS to take up to 25 or 32 additional golden eagles per year (see Table 4-3), depending on the wind turbine blade diameter is used. The estimated numbers of take are based on conservative assumptions, providing anticipated high values. Considering again only the predicted take level of 32 golden eagles per year (again from a golden eagle conservation perspective, this would be of greater concern than the take of 25 eagles per year) for the CCSM Phase II Project combined with the estimates for the CCSM Phase I Project reported above, an estimated combined take of 91 golden eagles could occur, which is still below the current 5 percent benchmark level. Development of other renewable energy projects within the local area would contribute to impacts on eagles, but the farther away the projects are from the CCSM Phase I Project and CCSM Phase II Project, the less impact would be noticed in the CCSM Project area.

The CCSM Phase I Project under Alternative 1 (Proposed Action) would contribute minor to moderate adverse impacts on other past, present, and reasonably foreseeable future actions in the local area, which would result in probable long-term, extensive impacts on golden eagles (see Table 4-11 for definitions of impact criteria). Monitoring of impacts on golden eagles from the CCSM Phase I Project, and monitoring of impacts from other projects, would assist in the determination of population level impacts.

Alternative 2 (Proposed Action with Different Mitigation) and Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would cause impacts comparable to those under Alternative 1 (Proposed Action), but with slightly less impact because of different options for mitigation occurring in the local and regional area, and a smaller area of disturbance, respectively. The No Build scenario under Alternative 4 (No Action: Denial of ETPs) would not contribute to cumulative impacts. However, the Build Without ETPs scenario under Alternative 4 would cause greater impacts than the Proposed Action because many of the provisions of the ECP would not be implemented and compensatory mitigation would not occur.

4.4.7 Cultural Resources

This section focuses on the cumulative impacts on the cultural value of eagles in the context of national symbolism and the importance of eagles to Native American cultures. Cumulative impacts on the cultural value of eagles result primarily from the cumulative number of eagle takes, the resulting impact on the stability of eagle populations, and the cultural impacts of administration of religious-use permits under BGEPA. Cumulative eagle take and population stability are discussed in Section 4.4.6; therefore, this section discusses primarily the latter source of impacts, which has particular relevance to the cultural value of eagles to Native Americans. The section concludes with an analysis of how the CCSM Phase I Project contributes to cumulative impacts from all sources on the cultural value of bald and golden eagles.

As discussed in Section 3.9.3, culture is not geographically bound, and most cumulative impacts would be consistent whether the affected individual or community is in the EMU or

the LAP. Therefore, cumulative impacts at the EMU and LAP levels are discussed jointly, and, in a broader sense, national implications as they relate to Native American tribes are also discussed. As noted in Section 4.2, we are focusing the analysis of cumulative impacts on the LAP scale for resources other than birds (other than eagles), eagles, and cultural resources.

The criteria we used to evaluate impacts on cultural resources in Chapter 3.0 are the same criteria that we use for evaluating cumulative impacts on cultural resources here. Therefore, the impact criteria table from Section 3.9.3 is included below as Table 4-16.

Table 4-16. Impact Criteria for Eagles as a Cultural Resource for the CCSM Phase I Project in Wyoming

Impact Category	Intensity Type	Definition
Magnitude	Major	The action would clearly change resource conditions. Adverse impacts would result in blocked or greatly reduced access to eagles, feathers, or parts, or would alter the relationship between eagles and a cultural group's practices and beliefs to the extent that the survival of those practices and beliefs would be jeopardized. The impacts would substantially deteriorate or destabilize eagles' condition or culturally valued elements. These conditions and elements may be tangible, such as the stability of local eagle populations, or intangible, such as the perception of eagles' ability to give power to tribal members. Beneficial impacts would facilitate access, empower groups in their traditional practices or beliefs, or substantially improve the quality of the resource.
	Moderate	The action would result in some change to resource conditions. Adverse impacts would result in reduced access to eagles, feathers, or parts, or would alter the relationship between eagles and the cultural group's practices and beliefs, although those practices and beliefs would survive. Beneficial impacts would encourage access or contribute to the relationship between eagles and cultural groups' traditional practices or beliefs.
	Minor	The action could result in some change to the resource. Adverse impacts would not appreciably alter access to eagles, feathers, or parts, or the relationship between eagles and the affiliated group's practices and beliefs. Beneficial impacts would temporarily or slightly improve access to eagles or the relationship between eagles and cultural groups' practices and beliefs.

Impact Category	Intensity Type	Definition
	No effect	Any change to the resource would be barely perceptible and would not appreciably alter access to eagles, feathers, or parts, or the relationship between eagles and cultural groups' practices and beliefs.
Duration	Long-term	30 years (proposed project duration)
	Medium-term	5 years (permit term)
	Temporary	Lasting for the duration of construction
Potential to occur	Probable	More likely than not to occur
	Possible	Potential to occur
	Unlikely	Not reasonably likely to occur
Geographic extent	Extensive	Within the two EMUs and four BCRs
	Regional	Within the 140-mile radius of the local area population for golden eagles
	Limited	Within 1 mile of Phase I development and infrastructure areas

4.4.7.1 Administration of Religious-Use Permits

We administer several types of religious permits under BGEPA. The most common is a permit to obtain eagles or eagle parts through the USFWS National Eagle Repository (NER), which is called a permit for eagle parts for Native American religious purposes. BGEPA also allows for religious take permits, which cover all manners of take, including capture, harassment, and killing an eagle from the wild; however, only a few of these latter permit types have actually been issued, as discussed further below. We also administer Native American Eagle Aviary Permits. All of these types of BGEPA permits are available only to members of federally recognized tribes.

The National Congress of American Indians has identified access to and usage of eagle feathers for traditional cultural purposes as an important issue in the protection of Native cultures (2010a). Native American requests for eagles, feathers, and parts through the repository currently outstrip supply, a situation that contributes to Native American dissatisfaction with the repository system. Further, demand can be expected to rise as tribal enrollment and Native American interest in traditional practices increase (Kovacs 2014).

To understand how BGEPA impacts Native American cultures, it is necessary to summarize important aspects of the law, its implementing regulations, and related policies. The initial law, Act for the Protection of Bald Eagles, was enacted in 1940 and amended in 1962 to include golden eagles. The 1962 amendment also introduced the law's religious exception for Native American tribes. The U.S. Department of the Interior (DOI) released implementing regulations in 1963 that outlined the permitting process and requirements, including proof of enrollment in a federally recognized tribe; 50 CFR 22 governs eagle take permit requirements, with 50 CFR 22.22 applying to Indian religious purposes, 22.26(e)(4)(ii)

addressing Native American religious use for rites and ceremonies that require eagles be taken from the wild.

In 1975, the DOI introduced the Morton Policy, which established certain activities in which Native Americans can engage "without fear of Federal prosecution, harassment, or other interference" (DOI 1975). These activities include the possession, use, and wearing of federally protected birds, their feathers, and their parts. The policy also allows gifting, loaning, or exchange of the same, provided this occurs between Native Americans and does not involve compensation. Native Americans may also collect naturally molted feathers.

BGEPA's primary impact on Native American culture is the addition of a permitting process that may interfere with traditional relationships between tribes, members, and eagles (Kovacs 2014). Traditionally, access to eagles often followed strict cultural rules that established who may obtain or handle eagles or their parts. The eagle-cultural relationship was maintained through prayer, ceremony, or direct interaction. The permitting process imposed on top of traditional practices is in some cases simply an inconvenience, but in other cases may interfere with those practices and beliefs. BGEPA also restricts traditional practices pertaining to the transfer and transportation of eagles and their feathers or parts, including prohibitions on bartering and gifting or bestowing of feathers to non-Native Americans and a limitation on international transportation and gifting. Furthermore, the DOI's regulations implementing BGEPA (50 CFR 22) and the U.S. Department of Justice policy on possession (2012) are limited to federally recognized tribes. Although this is consistent with the fiduciary trust responsibility the United States has with such tribes, the result is that non-federally recognized tribes and unenrolled Native Americans have argued that this denies them a legal means for performing traditional practices as they relate to eagles.

Few tribes have acquired religious take permits under BGEPA (Kovacs 2014) that allow for all manner of eagle take from the wild. Nationally, nine religious take permits were filed and granted between 2001 and 2014 (USFWS 2014d). There is a widespread perception that these permits are rarely granted and that submitting an application is futile. Furthermore, some individuals object to the permitting process on religious or political grounds. Many Native Americans feel they are unfairly required to have a permit to exercise their religion (Kovacs 2014; USFWS 2014d). This perception extends to the permit to obtain feathers or parts from the NER.

Native Americans who do not obtain religious take permits are faced with the challenge of maintaining their traditional practices. Some find they can meet their needs through the NER. Others change their practices to accommodate the requirements of the law or choose not to engage in certain traditional practices. Some pursue illicit means of obtaining eagles through illegal collection or illegal take, or from an expanding black market trade of eagles, feathers, and parts (Kovacs 2014).

Although the Morton Policy allows Native Americans to possess legally obtained eagles, feathers, and parts, investigations into illicit activities involving bald and golden eagles have led to fear among Native Americans that their use of eagle feathers may subject them to detention, seizure of their feathers, and possibly prosecution (National Congress of American Indians 2010b). The National Congress of American Indians has identified undercover

investigations as a primary source of fear by tribal practitioners that threatens to force traditional religious beliefs and practices 'underground' (National Congress of American Indians 2009, 2010b, 2011). Tribal working groups, the USFWS, U.S. Department of Justice, Bureau of Indian Affairs, and White House and Congressional personnel have jointly and independently worked on solutions to some of these problems. Such efforts contributed to the 2012 U.S. Department of Justice policy announcement regarding Native American possession of feathers.

As noted above, the NER is the primary means by which federally recognized tribal members obtain eagles, feathers, and parts for their traditional ceremonies and practices. The NER distributes eagle remains, feathers, and parts from birds sent in by agencies, land owners, industries, and others across the nation. Applicants must be Native Americans enrolled in a federally recognized tribe who have obtained a permit from USFWS, and distribution occurs on a first-come, first-served basis. Wait times for certain requests can exceed 5 years due to the number of requests received at the NER. The NER received more than 4,000 requests in fiscal year 2014 and filled 3,868 orders from 2,309 birds (USFWS 2014e).

Although the NER system fulfills some needs, many Native Americans are dissatisfied with the system, in part due to the waitlist, but also because of the regulatory burden, poor condition of some feathers and parts upon receipt, and conflict with traditional practices (Kovacs 2014). Much like religious take permits, the repository and permitting system may interfere with traditional knowledge and beliefs related to the acquisition of eagles, feathers, and parts. For some tribes, the manner of death has implications on the usefulness of the eagle or its parts; however, the practitioner may not know the manner of death when he or she receives eagles or parts from the repository. Likewise, some ceremonies require 'pure' or 'clean' eagles, which means they cannot have died from causes such as electrocution, collision, and poisoning (Kovacs 2014). Many eagles at the repository died from such causes and are considered unsuitable. Reliance on the NER system to fulfill Native American religious needs does not address the cultural importance of the interaction between the individual and eagle as part of traditional practices.

We recognize the shortcomings of the NER system and the impact on Native American tribes. We have held annual summits with Native American tribes to discuss eagles and eagle management since 2011 and continue to implement improvements to the administration of the NER and permitting process. Additional improvements have also been suggested by tribes and legal scholars, including the permitting of tribes that could subsequently distribute eagles, feathers, and parts according their own laws and needs (Kovacs 2014).

Some Native Americans have pursued tribal eagle aviaries as a solution to some of their religious needs. Seven tribes have established aviaries in Arizona, New Mexico, and Oklahoma (USFWS 2015f). These tribes are able to provide feathers to their own members and other Native Americans with naturally molted feathers, as well as interaction with eagles. Establishment of tribal aviaries, religious take permits, and use of the repository system are examples of the ways tribes negotiate the requirements of BGEPA and fulfill eagle-related practices and beliefs in ways that are culturally meaningful.

4.4.7.2 Impact Analysis: Native American Cultures

As discussed in Section 4.4.6, the cumulative effects of past, present, and reasonably foreseeable impacts on bald and golden eagles across the EMUs, including the four BCRs for golden eagles, combined with the CCSM Phase I Project were analyzed.

If bald and golden eagle populations were to decline, this could have a major impact on tribes, not only regarding their access to eagles but also their underlying cultural relationship with the species (see Table 4-16 for definitions of impact criteria). As noted in Section 3.9, eagles are considered sacred and in some cases connect tribes with their spiritual environment. Some tribes describe the health and well-being of their communities as inextricable from the health and well-being of eagles. Scholarship on cultural risk assessment supports this view, describing the health and well-being of Native American individuals and communities as derived in part from access to traditional resources and the ability to participate in traditional community activities (Harris and Harper 2000). Decline of these species' populations could impact Native American cultural identity and religious beliefs.

The effects of past and present impacts on eagle populations, combined with the effects of federal laws, regulations, and policies related to bald and golden eagles, have a considerable ongoing impact on Native American cultural relationships with eagles. Although BGEPA and associated regulations and policies accommodate certain religious needs, the law has historically reduced access to eagles and their parts, and has precipitated changes in traditional cultural practices as a result of that reduced access and fear of prosecution. These regulatory impacts may make Native American cultural practices and beliefs regarding eagles more vulnerable to the effects of eagle take and population-level decline.

Future operation of the NER system in its current form will continue to restrict access to bald and golden eagles, feathers, and parts. Increases in demand, as public knowledge, tribal enrollment, and interest in traditional practices increase, would exacerbate the problem, as would decreased supply, whether from successful mitigation of anthropogenic eagle fatalities or decreased eagle populations (Kovacs 2014). Increased knowledge and issuance of religious take permits could alleviate the burden on eagle-related cultural practices; however, eagle populations may not be able to sustain the level of demand for religious take permits. Future changes to regulations and policies that implement BGEPA could also moderate the cumulative impact on tribes.

The CCSM Phase I Project under Alternative 1 (Proposed Action) would contribute to probable minor to moderate, long-term, regional to extensive impacts on the cultural value of eagles by contributing to the moderate impacts on bald and golden eagle populations in the LAP and a reduction in population at the four-BCR area (see Table 4-16 for definitions of impact criteria). Bald and golden eagle impacts would also be recognized by tribal interests outside the LAP and EMU areas. Whereas eagles are considered sacred in many Native American cultures, those tribes are likely to be concerned about the welfare of eagles and eagle populations regardless of geography. Therefore, the CCSM Phase I Project under Alternative 1 (Proposed Action) could possibly contribute to minor, long-term, extensive impacts on the cultural value of eagles to tribes outside the four-BCR area (see Table 4-16). The magnitude of cumulative impacts on tribes outside the four BCRs is considered less than

on tribes within the four BCRs because there would be no direct impacts on access to eagles, parts, or feathers or on individual eagles or eagle populations with which tribes have specific cultural relationships. Alternative 2 (Proposed Action with Different Mitigation) could possibly contribute a minor, long-term, extensive beneficial impact under the rehabilitation option if funding were made available to tribes to develop or expand rehabilitation facilities that would provide tribes with an alternate means of interacting with eagles and acquiring naturally molted feathers (see Table 4-16).

Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would cause impacts comparable to those under Alternative 1 (Proposed Action), but the impacts would be slightly because of a smaller area of disturbance. The No Build scenario under Alternative 4 (No Action: Denial of ETPs) would not contribute to cumulative impacts. However, the Build Without ETPs scenario under Alternative 4 could possibly contribute to major cumulative impacts on tribes' access to eagles, feathers, and parts if local or regional eagle populations were to decline and fewer eagles were available through the NER; this would represent a disproportionately high and adverse impact on Native American tribes and a possible environmental justice issue.

4.4.7.3 Impact Analysis: National Symbolism

Cumulative impacts that threaten the stability of bald eagles within the LAP and EMU areas could also impact the bird's symbolic value. Americans view eagles as symbolically representative of the United States and of values such as freedom, strength, perseverance, and environmental protection. On one hand, American symbolic investment in bald eagles is abstract; as discussed in Section 3.9.3.2, individuals may devalue certain aspects of eagles as a species at the same time they value its symbolic attributes. On the other hand, the symbolism of freedom, strength, and perseverance could be undermined if bald eagle populations were to become threatened. Such a situation could also change the meaning of the bird's symbolism for the environment, from a symbol of success to one of regression. The cumulative effects of past, present, and reasonably foreseeable impacts under Alternative 1 (Proposed Action) combined with the CCSM Phase I Project would result in possible minor, long-term, extensive impacts on the value of bald eagles as the national symbol (see Table 4-16 for definitions of impact criteria). The magnitude of impacts could increase if the vitality of bald eagle populations decline.

Alternative 2 (Proposed Action with Different Mitigation) and Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would cause impacts comparable to those under Alternative 1 (Proposed Action), but with slightly less impact because of different options for mitigation occurring in the local and regional area, and a smaller area of disturbance, respectively. The No Build scenario under Alternative 4 (No Action: Denial of ETPs) would not contribute to cumulative impacts, and the Build Without ETPs scenario under Alternative 4 would likely cause impacts similar to those under Alternative 1.

4.5 Unavoidable Adverse Impacts

Unavoidable adverse impacts would result from implementation of Alternative 1 (Proposed Action) or any of the other alternatives carried forward for detailed review in this EIS. Unavoidable impacts could occur from construction and operation of the Phase I facilities and infrastructure.

Construction activities would directly and unavoidably impact natural and physical resources, including those that relate to eagles or are under our jurisdiction (as discussed in Section 3.1), such as water resources, vegetation and wetlands, and mammals. For example, vegetation clearing for construction of facilities and infrastructure (which were optimally sited based on a variety of factors) would be unavoidable. Impacts on wetlands and floodplains from water crossings would also be unavoidable. Due to habitat impacts and noise from construction, impacts on fish, amphibians, reptiles, mammals, and birds (including potential eagle take associated with nest abandonment) would be unavoidable. Vehicle collisions could unavoidably result in adverse effects on mammals and birds (including eagles).

Operation of the wind turbines would result in unavoidable eagle take, and would also adversely affect birds and flying mammals through collisions and by producing behavioral responses such as avoidance. Noise from the turbines and vehicles used by personnel operating and maintaining the proposed project would be unavoidable. Visual impacts on the Continental Divide National Scenic Trail (CDNST), Overland Trail, and Cherokee Trail would also be unavoidable.

Monitoring, adaptive management, compensatory mitigation, and additional conservation measures as proposed by PCW and enforced by either us or BLM, would help reduce the extent of impacts and offset some of the unavoidable impacts under Alternative 1 (Proposed Action). Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would result in less unavoidable impact as a result of less disturbance compared to Alternative 1 (Proposed Action), Alternative 2 (Proposed Action with Different Mitigation), and the Build without ETPs scenario under Alternative 4 (No Action: Denial of ETPs). The Build without ETPs scenario would likely result in more unavoidable adverse impacts on various resources than the other alternatives, because under this scenario, the ETP stipulations described in Section 2.2.1.4 would not be implemented.

4.6 Short-Term Uses and Long-Term Productivity

NEPA requires consideration of the relationship between short-term uses of the environment and long-term productivity associated with a proposed action. This involves the consideration of whether a proposed action is sacrificing a resource value that might benefit the environment in the long term, for some short-term value to the sponsor or the public. Long-term productivity accounts for impacts on land foreclosed by use or affect as part of implementation of a project, plan, or policy. For example, conversion of crop or grazing land to a facility or roadway would decrease the natural resource productivity of the land. However, the use of land for wind power would result in less productivity impact than elimination of habitat for solar power or for establishment of coal mines. Although Federal

and State laws require restoration of surface (open pit) coal mines, the large areas of disturbance for those operations and the extensive time for habitat restoration results in a long-term disturbance.

NEPA and its implementing regulations, and subsequent guidance provided by DOI and USFWS, do not define what is considered a short-term versus long-term impact. However, the BLM FEIS defines short-term impacts as those being associated with construction and the first 5 years of operation, and long-term applies to beyond 5 years of operation to the project life of 30 years or longer. Our analysis applies these subjective timelines for the consideration of long-term productivity impacts.

Balancing the relationship between short-term impacts and long-term productivity is an important consideration in project planning. The following text addresses short-term impacts on and use of resources, and long-term effects and benefits or losses that could be expected. We evaluated short-term impacts on and use of resources in relation to long-term productivity in accordance with NEPA regulations and guidelines published by the Council on Environmental Quality (CEQ) and DOI on implementing NEPA.

Data were gathered from the review of construction and operation impacts and all applicable resources analyzed in this EIS. This analysis qualitatively discusses the relationship between short-term impacts on and use of resources, and the long-term benefits and productivity of the environment.

Construction for the CCSM Phase I Project could contribute to potential short-term construction impacts related to (but not limited to) the following:

- Water quality (erosion and sedimentation, and potential fuel and lubricant spills)
- Vegetation and wetlands (removal, fugitive dust, and sedimentation)
- Eagle disturbance take at nests

In addition, short-term employment, use of materials, and purchases of goods and services generated by project construction would occur, and would decrease substantially on an annual basis for operation and maintenance of the facilities once the construction phase is completed.

Long-term adverse impacts would occur as described in the main body of this EIS. Long-term productivity could be minimally affected as noted in the BLM FEIS, with some reduction in grazing land, slight increases in noise and vibration impacts on sensitive receptors, and increased collision impacts with wildlife. Alternative 1 (Proposed Action) and other alternatives with construction would result in some permanent impacts on waterways, water bodies, vegetation and wetlands, and wildlife, which could affect long-term productivity of eagles. Although eagle take would increase in the Phase I development area, the long-term productivity of eagles would be maintained or improved through implementation of monitoring, adaptive management, compensatory mitigation, and additional conservation measures.

The addition of wind power generation to the CCSM Phase I development and infrastructure areas would contribute to a long-term increase in power generation capability and provide a competitive energy resource to meet current and future demands. A reduction in air pollution emissions could occur as a result of use of wind power versus coal- and oil-generated power. In the near-term, the U.S. consumption of electricity is still increasing and the energy generated by wind power has yet to offset the emissions from burning of fossil fuel. Given the Nation's focus on shifting to renewable energy sources, this project and other proposed projects (see Section 4.3) would progress towards that goal of offsetting emissions over the long-term.

Improved employment opportunities would exist in the CCSM Phase I development and infrastructure areas, with increased economic activity. Another long-term benefit would be an increased tax basis for Carbon County. Some of the infrastructure added via this project could support future energy resource development and distribution within Carbon County and surrounding counties. Alternative 1 (Proposed Action) could improve eagle and other bird productivity within the BCRs, based on the retrofitting of high-risk power poles. Alternative 2 (Proposed Action with Different Mitigation) could potentially result in habitat enhancement and benefits associated with other mitigation measures, and could improve the area's long-term productivity compared to the Proposed Action and the other alternatives considered. Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would result in less short-term use and less impact on long-term productivity than Alternative 1, Alternative 2, and the Build without ETPs scenario under Alternative 4 (No Action: Denial of ETPs). The Build without ETPs scenario would likely result in more impacts on long-term productivity than the other alternatives because of the lack of implementation of experimental advanced conservation practices (EACPs).

4.7 Irreversible and Irretrievable Commitment of Resources

NEPA requires that environmental analysis include identification of "…any irreversible and irretrievable commitments of resources which would be involved in the Proposed Action should it be implemented" (42 United States Code [U.S.C.] 4332). Irreversible and irretrievable commitments of resources relate directly to the trade-offs of implementing a project versus not implementing a project. We evaluated irreversible and irretrievable impacts in accordance with NEPA regulations and subsequent guidance published by CEQ and DOI. We assessed potential commitments for the alternatives identified in Chapter 2.0.

Irreversible resource commitments are related to the use of nonrenewable resources, such as soils, wetlands, and visual resources, and the effects that the uses of these resources would have on future generations. Such actions are considered irreversible because their implementation would affect a resource that has deteriorated to the point that renewal can occur only over a long period of time or at great expense, or because they would cause the resource to be destroyed or removed.

Irretrievable resource commitment of natural resources means loss of production or use of resources as a result of a decision. It represents opportunities forgone for the period of time that a resource cannot be used. Irretrievable refers to the permanent loss of a resource, including extinction of a threatened or endangered species, disturbance of a cultural site, loss

of land production, or use of natural resources (including minerals and coal). For example, production or loss of agricultural lands can be irretrievable, while the action itself may not be irreversible.

We assessed data from the applicable resources analyzed in Chapter 3.0, especially the consumption of energy (for example, fuel use for equipment and vehicles, production of system components) and natural resources (as derived from the assessment of water resources, natural habitats and wildlife, and wetlands). Additionally, we evaluated the land use change of the land proposed for conversion to support Phase I and infrastructure development of the CCSM Phase I Project.

We qualitatively assessed the potential use of existing resources and land, and identified the potential for irreversible and irretrievable use of these resources. Resources considered in this analysis were those resources on which the CCSM Phase I Project would have a direct or indirect effect.

Various resources within the Phase I development and infrastructure areas would be impacted to implement the CCSM Phase I Project, such as grazing land, streams, wetlands, wildlife habitat, and cultural resources. Resources that would not originate directly within the Phase I development and infrastructure areas would most likely need to be acquired from outside the areas and could include steel and other components for the wind turbines, petroleum, natural gas, and concrete materials. Rock would be available from the Road Rock Quarry.

Construction under the Proposed Action and other alternatives would result in the irreversible and irretrievable commitment of land in specific locations. The land would be converted from its current condition to support installation of wind turbines and infrastructure. However, these areas would be reclaimed upon decommissioning and the commitment of the land would not be irretrievable because the resource condition would be reversible. Operation of the project is compatible with other productive land uses such as grazing. Construction materials would consist largely of steel and other components for the wind turbines, concrete, and rock. Whereas the use of these materials would be largely irretrievable, these resources are not in short supply, and many of the materials could be recycled for other uses after decommissioning.

Several energy resources would be committed to the CCSM Phase I Project, including petroleum, natural gas, electrical, and human capital (or labor) expenditures for construction, operation, and maintenance activities. These resources would generally be irretrievable.

Compared to Alternative 1 (Proposed Action), Alternative 2 (Proposed Action with Different Mitigation) would have nearly the same irreversible and irretrievable impacts, with potentially slightly less impact from mitigation of older wind facilities, wind conservation easement, habitat enhancement, and rehabilitation of injured eagles. Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) would result in less irreversible and irretrievable impacts through less disturbance compared to Alternatives 1 and 2, as well as the Build without ETPs scenario under Alternative 4 (No Action: Denial of ETPs). The Build without ETPs scenario would likely result in more irreversible and

irretrievable impacts than the other alternatives because of the likely lack of implementation of EACPs.

Irreversible and irretrievable impacts from the Proposed Action and its alternatives do not require mitigation; consequently, no mitigation measures are proposed.

Chapter 5.0
Consultation and Coordination

5.1 Introduction

During development of our Environmental Impact Statement (EIS) for Eagle Take Permits (ETPs) for the Chokecherry and Sierra Madre (CCSM) Phase I Project, we, the U.S. Fish and Wildlife Service (USFWS), engaged the public, agencies, and tribes in the National Environmental Policy Act (NEPA) process. The first formal step in the NEPA process is the scoping phase, a process used by federal agencies in the early stages of preparing an EIS. Scoping gives individuals and organizations the opportunity to comment and offer input on alternatives, issues, concerns, and opportunities that should be considered in a NEPA document. We documented the verbal and written input received during the scoping phase (see Section 1.8). Then we applied the input to our consideration of alternatives for evaluation, and to the scope of our effort for describing the affected environment and predicting environmental consequences of the Proposed Action and other alternatives carried forward for detailed evaluation.

Following scoping, we prepared the Draft EIS and conducted the second formal step in engaging and soliciting public, agency, and tribal participation in the NEPA process by releasing the Draft EIS for review. The Draft EIS review period is used to gather input from interested parties on the alternatives and resources analyzed in the document. We notified the public, agencies, and tribes of the availability of the Draft EIS for review and comment, and held public and agency meetings during the comment period. Draft EIS review comments were considered during development of our Final EIS.

This chapter includes relevant coordination and consultation information (in addition to that provided in Section 1.8), and responds to public, agency, and tribal input received on the Draft EIS document.

5.2 Public Involvement

During the scoping phase, we used a variety of outreach methods to raise the public's awareness of the EIS and solicit comments for our consideration. We issued a Final Scoping Report in April 2014 that documents the outreach, summarizes public input, and includes as appendices the Notice of Intent published on December 4, 2013, in the *Federal Register* (78 *Federal Register* [FR] 7296–7298), our press release, and newspaper notices. The Final Scoping Report is available on our website (https://www.fws.gov/mountain-prairie/wind/chokecherrySierraMadre/). Additional outreach methods and the public scoping meetings are discussed below.

During the Draft EIS review phase, we notified the public (as well as agencies and tribes) of the availability of the Draft EIS for review and comment via publication of the Notice of Availability in the *Federal Register* on April 29, 2016 (81 FR 25688-25690). An amended notice was published in the *Federal Register* on July 15, 2016 (81 FR 46077) to announce the reopening of the EIS review comment period. The public review periods and public

meetings for the Draft EIS were also announced in press releases and newspaper notices, as described below.

5.2.1 Scoping Phase

5.2.1.1 Press Release

A press release announcing the scoping phase of our EIS for ETPs for the CCSM Phase I Project was developed and published on our website on December 3, 2013. The press release announced two public meetings to discuss the proposed ETPs for the CCSM Phase I Project. The press release also provided relevant background about the CCSM Phase I Project; our responsibilities under NEPA; the dates, times, and locations of both public meetings; and information regarding the public comment period and how to comment.

5.2.1.2 Newspaper Notices

Newspaper notices were published in two local and two regional newspapers of record to provide awareness of our intent to prepare an EIS for ETPs for the CCSM Phase I Project and the associated scoping phase. The newspapers were chosen based on their proximity to the CCSM Phase I Project in order to raise a strong local awareness of the open comment period. Table 5-1 identifies each newspaper in which notices were published and their corresponding publication dates.

Table 5-1. Newspaper Notice Publication Details for the CCSM Phase I Project in Wyoming

Newspaper of Record	Notice Publication Date(s)
Rawlins Daily Times	January 21–23, 2014
Casper Star-Tribune	January 21–23, 2014
Saratoga Sun	January 21, 2014
Wyoming Tribune-Eagle	January 19–21, 2014

5.2.1.3 Project Website

We established a website for our EIS as a way to provide the public with background information and documents regarding our consideration of whether or not to issue ETPs for the CCSM Phase I Project and the associated NEPA analysis. The EIS website offers contact information for public comment, information on the two public scoping meetings held, and links to all published information at the scoping meetings, specifically the Notice of Intent, press release, fact sheet, and a copy of the poster boards from the public scoping meetings. A link to the Bureau of Land Management (BLM) NEPA Review documents is also available on the website. The Record of Decision (ROD) and other publically released EIS-related documents will be provided on the website as they are completed. The website can be found at https://www.fws.gov/mountain-prairie/wind/chokecherrySierraMadre/.

5.2.1.4 Social Media

We used social media to raise awareness of the public comment period during the scoping phase for this EIS. Approximately 15 Tweets were published on Twitter advertising the public comment period with an accompanying link to our EIS website. These Tweets were retweeted by several followers.

5.2.1.5 Public Scoping Meetings

We held two public scoping meetings for our EIS in conjunction with the BLM's scoping meetings for an Environmental Assessment (EA) for the CCSM Phase I Project. Table 5-2 identifies the date, time, location, and number of attendees at each public scoping meeting. The number of attendees listed for each meeting does not include our staff and contractors, staff from the BLM and the Power Company of Wyoming LLC (PCW), and their contractors who were present at the meetings.

Table 5-2. Public Scoping Meeting Details for the CCSM Phase I Project in Wyoming

Date and Time	Location	Attendees
Monday, Dec. 16, 2013 4:00–6:30 p.m. *Presentations at 4:30 p.m. and 5:30 p.m.*	Jeffrey Center 315 West Pine Street Rawlins, Wyoming 82301	Public – 21 Agency – 7
Tuesday, Dec. 17, 2013 4:00–6:30 p.m. *Presentation at 4:30 p.m.*	Platte Valley Community Center 210 West Elm Street Saratoga, Wyoming 82331	Public – 29 Agency – 8

The meetings were organized in an open house format during the scoping period. We, along with representatives of the BLM and PCW, gave brief formal presentations at each meeting to provide general information on the CCSM Phase I Project, as well as our role and that of the BLM in considering issuing permits for the CCSM Phase I Project. The purpose of these meetings was to provide information to the public, to answer questions regarding the NEPA process and the agencies' roles, and to receive input regarding any issues and alternatives recommended for evaluation in our EIS.

A fact sheet was provided at the public scoping meetings, and poster boards were on display in the meeting locations, explaining the CCSM Project background and the need for our EIS for ETPs for the CCSM Phase I Project. Our EIS team members were available for personal, one-on-one interaction during the meetings to answer questions or clarify project details.

5.2.2 Draft EIS Review Phase

5.2.2.1 Draft EIS Notifications

A press release announcing the availability of the Draft EIS and the corresponding review period of the EIS was distributed to 94 media contacts representing 35 different media

organizations. The press release was also published on the USFWS' Mountain-Prairie Region website on April 20, 2016. The press release provided information on how to access the Draft EIS documents. The press release also provided relevant background about the CCSM Phase I Project; Draft EIS alternatives, our responsibilities under NEPA; the dates, times, and locations of Draft EIS public review meetings; and information regarding the public comment period and how to comment.

A press release announcing the reopening of the CCSM comment period was distributed to the same 94 media contacts representing 35 different media organizations as the original Draft EIS press release. The press release announcing the reopening of the comment period was also published on the USFWS' Mountain-Prairie Region website July 15, 2016. The press release explained that the comment period was reopened after it was discovered that a hyphen replaced an underscore in the public comment email address in several outreach materials. Once we discovered the error, we promptly changed our electronic inbox so that it could receive comments sent to either the hyphen or underscore address (either ccsm-eis@fws.gov or ccsm_eis@fws.gov). However the comment period was reopened to allow members of the public a chance to resubmit comments if there was a possibility that they sent their comments to the incorrect email address.

On April 20, 2016, we sent an email notification to interested stakeholders, as well as congressional staff, cooperating agencies, and the Wyoming Governor's office to notify them of the release of the Draft EIS, public meetings, and how members of the public may provide comments. On July 14, 2016, we sent an email notification to the same 79 individuals potentially affected by the project explaining that the CCSM Draft EIS comment period was reopened.

On April 21, 2016, a postcard notice was sent to all contacts on our project mailing list announcing the availability of the Draft EIS, the Draft EIS review period, and the public meetings. The mailing list includes 471 individuals identified as being potentially interested in the EIS. Individuals on the mailing list include elected state, federal, and local officials; agency contacts; special interest groups; community businesses and gathering places; and interested members of the public that have contacted us throughout the NEPA process. On July 19, 2016, another postcard notice was sent to the 471 individuals potentially interested by the project. The postcard included information on the CCSM Phase I Project, why the comment period was reopened, and how to provide comments.

We sent letters to 73 Native American tribes and tribal organizations inviting input and notifying them of the availability of the Draft EIS. Notification letters were sent on April 28, 2016, to 46 Native American tribes in USFWS Regions 1 and 6 identified as project stakeholders. An additional letter was sent to these tribes on July 22, 2016, notifying the tribes of the reopening of the Draft EIS comment period.

Following the close of the Draft EIS comment period, we became aware that notification of the Draft EIS did not go out to all potentially interested tribes as soon as intended. On July 22, 2016, letters were sent to 27 Native American tribes in USFWS Region 2 notifying them of the release of the Draft EIS and the reopening of the comment period until July 29, 2016. The letter informed tribes that due to the government-to-government relationship between the

tribes and the federal government, they could continue to provide comments beyond the public comment period. Although outreach provided tribes with several months for coordination outside of the public comment period, we heard from some tribes that they may not have had sufficient time to review and respond to the Draft EIS.

5.2.2.2 Newspaper Notices

Newspaper notices were published in two local and two regional newspapers of record to provide awareness of the availability of the Draft EIS and the associated comment period. The newspapers were chosen based on their proximity to the CCSM Phase I Project in order to raise a strong local awareness of the comment period. Table 5-3 identifies each newspaper in which notices were published and their corresponding publication dates during the original 60-day comment period.

Table 5-3. Publication Details of Newspaper Notices for Draft EIS Comment Period

Newspaper of Record	Notice Publication Date(s)
Rawlins Daily Times	April 28–30, 2016
Casper Star-Tribune	April 28–30, 2016
Saratoga Sun	May 4th, 2016
Wyoming Tribune-Eagle	April 28–30, 2016

A second round of newspaper notices was published in the same newspapers of record to provide awareness of the reopening of the CCSM Draft EIS comment period. Table 5-4 identifies each newspaper in which notices were published and their corresponding publication dates during the reopening of the comment period.

Table 5-4. Publication Details of Newspaper Notices for Draft EIS Comment Period Reopening

Newspaper of Record	Notice Publication Date
Rawlins Daily Times	July 16, 2016
Casper Star-Tribune	July 19, 2016
Saratoga Sun	July 20, 2016
Wyoming Tribune-Eagle	July 20, 2016

5.2.2.3 Availability of the Draft EIS

The Draft EIS was made available for review and comment during the public comment period. Copies of the Draft EIS, as well as the permit application and the supporting Eagle Conservation Plan (ECP), were made available during the public review period at the Carbon County Library System at 215 West Buffalo Street, Rawlins, Wyoming; the Saratoga Public Library at 503 West Elm Street, Saratoga, Wyoming; USFWS Wyoming Ecological Services Office at 5353 Yellowstone Rd, Suite 308A, Cheyenne, Wyoming; and USFWS Region 6 Office at 134 South Union Boulevard, Lakewood, Colorado.

An electronic version of the Draft EIS was made available for online review or download from our website at https://www.fws.gov/mountain-prairie/wind/chokecherrySierraMadre/. The Draft EIS was filed electronically with the U.S. Environmental Protection Agency (USEPA) and can also be accessed at USEPA's NEPA website at https://www2.epa.gov/nepa.

5.2.2.4 Draft EIS Review Meetings

We held two public Draft EIS review meetings and one cooperating agency Draft EIS review meeting. Each public meeting shared the same format: one hour of informal open-house style conversation followed by a formal presentation and question-and-answer session. The purpose of the meetings was to share information about the Draft EIS and solicit feedback. Information was provided to the public at the meetings related to: project background, purpose and need, Draft EIS alternatives, Draft EIS findings, the ETP process, project schedule and additional opportunities for public involvement.

Members of our project team provided information about the Draft EIS and answered questions. Suggestions and concerns about the project voiced by the meeting participants were collected for incorporation into the development of the Final EIS. The Draft EIS review meetings were held at the locations identified in Table 5-5. The number of attendees listed for each meeting does not include the staff from the BLM, the USFWS, PCW, or their contractors who were present at the meetings.

Table 5-5. Public Meeting Details

Date and Time	Location	Attendees
Monday, June 6, 2016 4:30–6:30 p.m. *Presentation at 5:30 p.m.*	Platte Valley Community Center 210 West Elm Street Saratoga, Wyoming 82331	40
Tuesday, June 7, 2013 4:30–6:30 p.m. *Presentation at 5:30 p.m.*	Jeffrey Center 315 West Pine Street Rawlins, Wyoming 82301	24

As noted in Section 3.1, the emphasis in this EIS is on biological resources, with other resources described and evaluated in detail with regard to their potential for being affected by the take of bald and golden eagles and other special status species. Consequently, we focused on comments and questions that may affect our responsibility to review the application for CCSM Phase I ETPs.

All comments received during the comment period were reviewed prior to preparing the Final EIS.

5.3 Agency Coordination

We have coordinated with federal, state, and local agencies throughout the NEPA process. In addition, we have coordinated with cooperating agencies (that is, a group of agencies that were more closely involved in our NEPA process through their legal responsibilities and their special expertise), as discussed in Section 1.8.4.

5.3.1 Agency Notification

Agency notification letters included information on the CCSM Phase I Project, the EIS scoping and Draft EIS review periods, and how to provide comments. A copy of a generic scoping notification letter is included in the Final Scoping Report. Agencies and other interested parties were also encouraged to stay informed on the status of our EIS by visiting our website (https://www.fws.gov/mountain-prairie/wind/chokecherrySierraMadre/).

5.3.2 Cooperating Agency Coordination

Based on feedback from agency notification and internal discussions, we extended an invitation to 19 agencies to become a cooperating agency on our EIS for ETPs for the CCSM Phase I Project. A copy of the letter sent to cooperating agencies is included in the Final Scoping Report.

Five agencies are recognized as cooperating agencies to this EIS: the BLM, Carbon County, the Saratoga-Encampment-Rawlins Conservation District, Wyoming Game and Fish Department (WGFD), and Wyoming Industrial Siting Council. The input from the cooperating agencies was documented in a Final Cooperating Agencies Meeting Report (USFWS 2014f) and was considered when we developed our range of alternatives in the Draft EIS. The cooperating agencies were also offered a chance to review and provide input on the Draft and Final EIS prior to the respective public review periods.

5.4 Tribal Coordination

We recognize that tribal governments are sovereign nations located within and dependent upon the United States. Because of this, we have a responsibility to tribes when considering our actions that may affect tribal rights, resources, assets, and traditions. Specifically, we recognize that bald and golden eagles are of great spiritual and cultural importance to many tribes. These species have migratory ranges extending well outside of the vicinity of the CCSM Phase I Project in Carbon County, Wyoming. As a result, we have identified Bird Conservation Regions (BCRs) as an appropriate scale for addressing many migratory bird populations. We provided notification to tribes with land located in the boundaries of BCRs 10, 16, 17, or 18, which are the regions through which potentially affected golden eagles may migrate.

Consistent with the National Historic Preservation Act of 1966 and Executive Order (EO) 13175, Consultation and Coordination with Indian Tribal Governments, we invited 72 tribes to participate in government-to-government consultation (see Section 1.8.4). The Final Scoping Report provides additional information on early coordination with tribes. In this EIS, Section 3.9.2.4 describes the consultation process and includes a list of tribal

concerns and comments on the effects on eagles, effects on cultural and religious resources and traditions, and opportunities for mitigation.

Nine tribes have been engaged in ongoing consultation: the Cheyenne River Sioux Tribe of the Cheyenne River Reservation, Chippewa Cree Indians of the Rocky Boy's Reservation, Comanche Nation, Eastern Shoshone Tribe/Eastern Shoshone Business Council, Northern Arapaho Tribe/Northern Arapaho Business Council, Northern Cheyenne Nation, Pueblo of San Felipe, Santa Clara Pueblo, and Shoshone-Bannock Tribes of the Fort Hall Reservation. We have held consultation meetings or teleconferences with each of these tribes, and many participated in a roundtable discussion held in partnership with the BLM in Rawlins on October 16, 2015.

The USFWS has also engaged Native American tribes in programmatic consultation on eagle policy through webinars and a series of Eagle Summits. This outreach extended to tribes beyond the regions with potential impacts from the CCSM Phase I Project. A webinar concerning proposed changes to eagle regulations was held on November 19, 2013, and attended by nine representatives from eight tribes, as shown in Table 5-6. Eagle Summit III was held in Denver, Colorado, on March 20 and 21, 2014, with an opportunity for government-to-government consultation on both days. Representatives from 29 tribes attended the summit, with representatives from 19 tribes present at the consultation sessions, as shown in Table 5-6. Several tribal representatives indicated that their involvement did not constitute formal government-to-government consultation, but they did participate in the ensuing discussion (USFWS 2014d). A description of the CCSM Project and consideration to issue ETPs for the CCSM Phase I Project was presented at the summit, and comments were solicited. The CCSM Project was also discussed at 2015 Eagle Summit IV in March 2015.

Table 5-6. Tribal Representation at Eagle-Related Meetings and CCSM Consultations for the CCSM Phase I Project in Wyoming

Tribe	Eagle Policy Webinar (Nov 19, 2013)	Eagle Summit III (March 20-21, 2014)	Eagle Summit III Consultation Session (March 20-21, 2014)	Individual Consultation Meetings (various dates)	Tribal Roundtable (October 16, 2015)
Cheyenne River Sioux Tribe of the Cheyenne River Reservation		X		X	X
Chippewa Cree Indians of the Rocky Boy's Reservation		X	X	X	X
Comanche Nation		X	X		X
Confederated Salish and Kootenai Tribes	X	X	X		
Crow Tribe		X	X		

Tribe	Eagle Policy Webinar (Nov 19, 2013)	Eagle Summit III (March 20-21, 2014)	Eagle Summit III Consultation Session (March 20-21, 2014)	Individual Consultation Meetings (various dates)	Tribal Roundtable (October 16, 2015)
Eastern Shoshone Tribe/Eastern Shoshone Business Council		X	X	X	X
Gros Ventre and Assiniboine Tribes of Ft. Belknap	X				
Kiowa		X			
Lower Brule Sioux Tribe	X	X	X		
Navajo Nation		X			
Northern Arapaho Tribe/Northern Arapaho Business Council		X	X	X	X
Northern Cheyenne Tribe of the Northern Cheyenne Indian Reservation		X	X		X
Northern Ute Tribe		X			
Oglala Sioux	X				
Osage Nation		X	X		
Paiute Indian Tribe of Utah	X				
Ponca Tribe of Nebraska		X	X		
Prairie Band Potawatomi Nation		X	X		
Pueblo of Pojoaque		X			
Pueblo of San Felipe		X	X	X	
Pueblo of Santa Ana		X	X		
Pueblo of Santa Clara		X	X	X	X
Rosebud Sioux Tribe		X			
Santee Sioux Nation		X	X		

Tribe	Eagle Policy Webinar (Nov 19, 2013)	Eagle Summit III (March 20-21, 2014)	Eagle Summit III Consultation Session (March 20-21, 2014)	Individual Consultation Meetings (various dates)	Tribal Roundtable (October 16, 2015)
Shoshone-Bannock Tribes of the Fort Hall Reservation	X	X	X	X	X
Sisseton-Wahpeton Oyate of the Lake Traverse Reservation	X	X	X		
Southern Ute Indian Tribe	X	X			
Spirit Lake Tribe		X			
Taos Pueblo		X			
Te-Moak Tribe of Western Shoshone Indians of Nevada		X			
Ute Indian Tribe of the Uintah and Ouray Reservation		X	X		
Ute Mountain Ute Tribe		X	X		

As discussed in Section 5.2.2.1, we notified 73 tribes of the release of the Draft EIS and the opening or reopening of the comment period. Although our tribal outreach provided several months for coordination outside of the public comment period, we heard from some tribes that they may not have had sufficient time to review and respond to the Draft EIS.

5.5 Scoping Comments

An overview of comments received during the scoping phase for this EIS is provided in Section 1.8.2. A detailed compilation of individual scoping comments received, organized by comment topic, is provided in an appendix to the Final Scoping Report. This section of the EIS focuses on the consideration of the comments and their application to development of the EIS.

5.5.1 NEPA and EIS Processes

We coordinated with BLM regarding the scope of the BLM NEPA documents and the ETPs, and we decided that our EIS should be a separate document from the BLM FEIS. We and the BLM have separate responsibilities and separate actions regarding the CCSM Project. We have used data and analysis performed by the BLM as much as possible to reduce duplication

and redundancy, and much of the information from BLM FEIS was determined to be adequate for our analysis and incorporated by reference in accordance with 40 Code of Federal Regulations (CFR) 1502.21.

5.5.2 Statements of Opposition and Statements of Support

Commenters provided statements against and for permitting of the CCSM Phase I Project. We did not have a preferred alternative at the time of scoping or in the Draft EIS, and instead awaited input from the public, agencies, and tribes on the Draft EIS to determine our course of action.

5.5.3 Purpose and Need

In consideration of comments, our purpose and need statement addresses statutory authorities and goals, and also allows the consideration of alternatives that differ from the current plan of development. As noted in Section 5.5.4 below, we considered several alternatives, ultimately screening out alternatives that would not meet the purpose and need (other than the No Action alternative, as required by Council on Environmental Quality [CEQ] regulations) using screening criteria described in Section 2.1.1.

5.5.4 Alternatives

We considered comments when we developed the range of alternatives as well as when we selected alternatives to carry forward for detailed analysis. Chapter 2.0 explains how potential alternatives were identified, how several alternatives were screened out prior to detailed analysis, and the rationale for carrying forward particular alternatives. Regarding the permit time frame, at the time of scoping, the duration for a programmatic permit was considered to potentially be up to 30 years (the proposed duration of the CCSM Phase I Project). Subsequently, a recent court decision set aside the rule authorizing 30-year permits (see Section 2.3.2), so this EIS reviewed impacts associated with a 5-year duration for the standard and programmatic ETPs.

5.5.5 Eagle Conservation Plan and Eagle Take Permits

Although the ECP has been developed with input and recommendations from us, the ECP was prepared by PCW. The ECP is included in this EIS as Attachment A.

The ETPs, if granted, will state how eagle fatalities will be documented and disclosed, and will include adaptive management over the life of the permit. We will take an oversight and enforcement role under any ETPs granted.

5.5.6 Eagles and Eagle Data

Eagle data used for our analysis were based on information gathered over several years (see Section 3.8.2.1), and were considered to be the best available data for considering impacts on eagles and estimating allowable take numbers during construction and operation of the CCSM Phase I Project. The data included nest locations, migratory pathways, and habitat for

eagles and eagle prey species. We considered both direct and indirect impacts on eagles during construction and operation of the CCSM Phase I Project.

5.5.7 Wildlife

Based on our role regarding permitting for the CCSM Phase I Project, our EIS focuses on potential impacts on bald and golden eagles. As noted in Section 3.1, emphasis in our EIS is on biological resources, with other resources described and evaluated in detail based on their potential for being affected by the take of bald and golden eagles and other special status species. Consequently, we also address impacts on other birds, fish, bats, and many other species, as well as their habitats. Greater sage-grouse were considered in their role as prey for eagles, and Alternative 2 (Proposed Action with Different Mitigation) would involve habitat enhancement, with prey enhancement as an essential component. Separately, the BLM has established requirements for PCW regarding protection of greater sage-grouse habitat.

5.5.8 Additional Resource Areas

Many of the specific comments pertaining to resources not evaluated in detail in our EIS apply to the purview of the BLM and were addressed in the BLM FEIS and in BLM's site-specific EA1 and EA2, as appropriate. Tribal input was considered in identifying and evaluating mitigation options. Ongoing consultation with tribes may provide further input on permit conditions if we grant ETPs. The cumulative impact analysis in Chapter 4.0 of our EIS considers other major projects currently located, or reasonably foreseeable, near the Phase I development and infrastructure areas. Our cumulative impact analysis specifically addresses potential impacts from the CCSM Phase II Project.

5.5.9 Construction and Decommissioning

The site-specific plans of development (SPODs) developed by PCW include our input on the locations, footprints, and timing of construction activities in an effort to reduce construction-related impacts on eagles. As noted in our EIS in Section 2.2.1.2.2, decommissioning activities are not covered under the scope of the ETPs currently being applied for and are therefore not evaluated in this EIS.

5.6 Draft EIS Review Comments

Following the Draft EIS public review period, the Draft EIS was modified based on the public, agency, and tribal comments received. We received a total of 36 comment letters from project stakeholders and agencies. These letters contained information and input that was sorted into 366 discrete comments within 28 topic categories that we considered in the Final EIS. Comments received that directly informed the content of the Final EIS included, but are not necessarily limited to, comments on eagles and eagle data, monitoring, advanced conservation practices, compensatory mitigation, avoidance and minimization measures, and adaptive management.

5.6.1 NEPA and EIS Process

We received 15 comments related to the NEPA and EIS process, including the following:

- Request to extend the comment period
- Recommendations that the USFWS and the BLM conduct a coordinated review for CCSM Phase II and concern that more coordination on CCSM Phase I is needed
- Recommendation to put the project permitting question to a public vote
- Question on how future ETP applications will be handled
- Request for us to address the needs of the Applicant, provide a full implementable framework for the permit, and accurately reflect wind energy's impacts on and benefits to wildlife and their habitats generally, and eagles specifically

The original comment period on the Draft EIS was 60 days. We subsequently reopened the comment period for 14 days to provide an opportunity for anyone who submitted comments during the early window, in which they may have been using an incorrect email address, to resubmit their comments. We believe this was adequate time to submit comments on the document.

The BLM has jurisdiction for reviewing permits for development on BLM-managed public lands per the Federal Land Policy and Management Act (Public Law 94–579). Public voting is not a component of the law. We are coordinating with the BLM in our review of the potential impacts of our respective federal actions, and we believe we are identifying and analyzing relevant impacts. We plan to conduct a coordinated review with the BLM should PCW submit an ETP application for the CCSM Phase II Project to us. We will respond to any potential future ETP applications in accordance with the Bald and Golden Eagle Protection Act (BGEPA), the Migratory Bird Treaty Act (MBTA), relevant implementing permit regulations, and the 2009 EA supporting establishment of eagle permitting regulations or forthcoming EIS addressing revisions to those regulations. Priority for all current and future ETP decisions will be focused on promoting sustainable bald and golden eagle populations.

The Applicant's purpose and need are addressed in the description of the Proposed Action in Section 2.2.1, and we have added information to the description of Alternative 3 (Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project) concerning how that scenario would affect the Applicant. The framework for permit implementation is addressed throughout the document. The discussion of climate change in Chapters 3.0 and 4.0 has been revised to better acknowledge potential impacts and benefits from wind energy development. However, we have little specific information about quantifying those effects directly or indirectly in Chapter 3.0 or cumulatively in Chapter 4.0, especially concerning how eagles would be affected. The extent to which eagles would be affected by the CCSM Phase I Project, including potential benefits from conservation measures or mitigation, is analyzed in both Chapters 3.0 and 4.0.

5.6.2 Scope of EIS

We received 14 comments regarding the scope of the EIS. Several commenters identified sections where the Draft EIS could be altered or updated. These comments included the following:

- Recommendation to limit review of the potential impacts analyses to big game, sage-grouse, vegetation, and other peripheral related topics
- Recommendation that this analysis provide only new information, incorporate existing information by reference, and stick more closely to the stated purpose and need
- Recommendation to reduce or eliminate Section 2.2.1.1, Overview, and Section 2.2.1. 2, Covered Activity, as they discuss actions previously analyzed under the BLM review
- Request to remove analysis of Wildfire Emergency Stabilization and Burned Area Rehabilitation
- Request to remove analysis of species that have been determined to not be present in or near the project vicinity
- Recommendation to include acronym definitions in all section titles
- Recommendation to identify areas where wind energy should not be developed due to unacceptable risk to eagles, raptors, and other federally and state-protected wildlife
- Recommendation that the purpose and need be amended to include language related to preservation of eagles as part of the purpose of the federal action

Regarding comments that our scope of analysis is too broad, we respectfully disagree. First, with respect to summaries of information from the BLM NEPA Review documents that we have provided in this EIS, we have summarized relevant information that we are incorporating by reference to provide additional context for those who would not prefer to obtain and review the original documents (which are available through a link on our website at https://www.fws.gov/mountain-prairie/wind/chokecherrySierraMadre/, as well as on the BLM's website at https://www.blm.gov/wy/st/en/info/NEPA/documents/rfo/Chokecherry.html). Although this approach inherently creates redundancy, we believe the added context is beneficial for most readers because it avoids the need to cross-reference the BLM documents while reviewing our EIS. Second, with respect to resources included in our EIS beyond bald and golden eagles, these resources (that is, water resources, vegetation and wetlands, mammals, and birds [other than eagles]) comprise the local habitat for eagles, influence eagle productivity and success, and are therefore relevant to the analysis of impacts on eagles from the CCSM Phase I Project. While some individual species of mammals and birds discussed in the EIS may not represent prey species or food sources, we would be remiss in our responsibilities not to disclose potential impacts on these trust resources, or to include new data relevant to the resource discussed.

In response to comments received on the Draft EIS, we have reduced descriptions of certain elements of the proposed covered activities in Sections 2.2.1.1 and 2.2.1.2, removing some redundant text and unnecessary detail while keeping the information needed for context and a

complete analysis. The section on Wildfire Emergency Stabilization and Burned Area Rehabilitation was deleted from Chapter 2.0, as were references to it in Chapters 3.0 and 4.0. A portion of the language was inserted in Section 4.3.1.5.2 in the Cumulative Impacts chapter. Mention of species that have been determined to not be present in or near the project vicinity (including medusahead) has also been deleted from the Final EIS. We reviewed all analysis provided in Chapter 3.0 and streamlined discussions where appropriate.

Acronym use has been revisited in the Final EIS; all acronyms are now spelled out at first use within each chapter.

We are developing tools that may lead to better landscape planning by the wind industry by identifying areas inappropriate for wind development early in the planning process. While this may assist in future project development, our role in these current permit applications is to review whether the applications meet existing permit criteria and, if so, issue the permits with appropriate conditions.

In regard to our purpose and need statement, we agree that conservation of eagles is fundamental to our role in implementing and enforcing BGEPA and believe the statement accurately reflects our purpose and need as we understand it. Our definition of purpose and need for this EIS in Chapter 1.0 states that the CCSM Phase I Project must be consistent with BGEPA regulatory standards.

5.6.3 Eagle Conservation Plan and Eagle Take Permit

We received 15 comments that offered suggestions or asked questions related to the ECP and the standard and programmatic ETPs. These comments included the following:

- Requests for clarification on what take would be allowable under the standard and programmatic ETPs, if issued, and suggestions to review the time period of the programmatic ETP, saying that “the current timeframe does not seem reasonable and consistent with DOI Secretarial Order 3285.” It was suggested by some commenters that future programmatic ETPs be issued for a longer time frame; however, other commenters suggested that the possibility of 30-year ETPs is far too long and would make consistent monitoring infeasible.
- Requests for additional details describing the permit renewal process and how future ETPs will be issued, and the consequences of exceeding permitted take limits.
- Recommendations that as the project proceeds, adaptive management and compensatory mitigation should be mandated by the programmatic ETP in conjunction with new scientific evidence to reduce eagle fatalities.
- Suggestions that consequences of exceeding established ETP limits be further explained.
- Expression of doubt concerning the likelihood of take of raptor species in the CCSM Project region because of the lack of major nearby flyway or water resource.

Although new revisions to eagle take permit regulations may allow for permits of longer durations, the CCSM Phase I Project permit application is subject to, and is being reviewed under, the regulations existing previously, which limit the permit duration to 5 years.

Therefore, concerns regarding a longer time frame are not relevant to this potential permit issuance; at the same time, we are not authorized to issue this permit for a time frame exceeding 5 years without re-initiating review of the permit application on that basis, as well as with any other regulatory revisions that might be applicable if assessed under a revised Eagle Take Rule.

Throughout the EIS, including sections cited below, we have added language to clarify our permit processes, including the steps if eagle take were to be exceeded and the processes for renewing the permit. The programmatic ETP, if issued, would include specified thresholds and clear action if the thresholds are exceeded. Predicted eagle take, which is described in Section 2.2.1.3.3, is a limit that PCW is required to not exceed. As stated in Section 2.2.1.3.4, if actual take from the project exceeds the allowable take under the permit, PCW would be liable for the additional take. However, if fatalities identified during post-construction monitoring are on a trend to exceed this limit or the limit has been exceeded, advanced conservation practices may be required to prevent future eagle take. This is discussed in Section 2.2.1.4.2. We would remain engaged with eagle take and, if issued, the programmatic permit for the CCSM Phase I Project through the adaptive management process. We retain the right to amend, suspend, or revoke an eagle take permit if new information indicates such action is necessary to protect local or regional eagle populations. This has been clarified in Section 2.2.1.4.1.

If we were to issue a standard ETP for disturbance take of eagles, it would in this case cover 4 golden eagle nests and 1 bald eagle nest. This standard ETP would also cover the potential take of young eagles in each of these 5 nests (on average a range of 1 to 3 eaglets in each nest). The take of young eagles in the nest is an implicit part of a standard ETP if it were issued, but the take listed on the permit itself is in terms of the number of adults or nests that could be taken. Although we anticipate that take of eagles due to various types of disturbance activities associated with project construction could occur for these 5 nests, it is important to keep in mind that it is not certain that this take will actually occur. Individual eagle pairs vary considerably in their tolerance of human activities, such as constructing a wind energy facility, with some pairs being extremely tolerant of such development to the point it does not compromise nesting activities or success in any way. The research on eagle take due to various types of projects that could result in disturbance take is rather limited, so there is no way to predict with certainty whether a given project type will result in take or not. This is why we include a condition in standard ETPs that requires monitoring over several nesting seasons to determine nest occupancy, productivity, and nest success for all eagle nests covered under the permit. Over time, we want to acquire data from actual development projects, or other human actions, that have the potential to cause disturbance take of eagles to better inform future decisions about how likely such take is to occur, to determine if certain types of human actions consistently cause or do not cause eagle take, and to assist in designing conservation measures that could be applied to projects to avoid and minimize take. The standard permit is a type of ETP that could be viewed as an assurance for a proposed project in that if such disturbance take did occur, then the proponent is covered legally for that take.

We have used information available to us to assess potential impacts on raptor species. Explanation of uncertainties inherent in estimates generated from available information has

been added to discussions of impacts on other bird species, including other raptors, in Chapter 3.0.

5.6.4 Eagles

We received 33 comments regarding eagles during the comment period. These comments covered many issues, but primarily focused on concerns with the modeling used to predict eagle fatality. The following are among the concerns that were identified:

- Concern that the model underestimated eagle fatality for reasons such as year-to-year variance, unaccounted-for migratory or wintering eagle populations, total exposure time between dawn and dusk when eagles are known to fly, and the potential increased numbers of fatalities associated with including up to four chicks per nest when counting numbers of nests that might be lost
- Concerns over the baseline used in the Local Area Population (LAP) to determine eagle fatality, with several commenters noting that eagle populations have been steadily growing in and around the vicinity of the project for decades, and that the LAP analysis used summer survey data
- Observation that the computer modeling for eagle fatality is complicated and request for clarification whether the 5 percent benchmark is the loss the local area populations can sustain and still remain viable
- Suggestion that the fatality model be re-evaluated over time
- Question whether the model reflects the loss of production and future recruitment of eagles from nests within the boundaries of the CCSM Phase I Project
- Request for clarification about why the Executive Summary states that PCW agreed to curtail operations of wind turbines within 1 mile of unoccupied golden eagle nests
- Multiple observations of the discrepancy between the BLM FEIS estimate of 64 golden eagle takes annually, and our assessment of either 10 or14 (depending on turbine size) golden eagle fatalities annually for the project

We acknowledge that there are uncertainties inherent in this and any fatality estimate. The model used to generate our fatality estimate underwent an independent third-party peer review, and was found to be appropriate for the purpose for which it is being used. We are unaware of any alternative method to predict fatalities from wind energy facilities that has undergone a similar review. As part of the application of our model, we intentionally apply a conservative approach of using the 80 percent upper credible limit (80th quantile) of the model output to calculate potential annual take, to increase confidence that the resulting take will not exceed predicted take. Consequently, while we recognize that factors not addressed in the model may lead to errors in its estimate, we believe it is the most reliable and objective model available, and are applying it in a manner intended to limit the likelihood of underestimated eagle fatalities.

Depending on the size of the turbine blades ultimately selected by PCW, our model predicts either 10 or 14 golden eagles will be killed each year (see Section 2.2.1.3.3). We will update our eagle fatality prediction model based on the actual blade diameters used. This information would be specified in the ETP, if issued. Many of the predicted fatalities are likely to be eagles nesting in close proximity to the CCSM Phase I Project because these

eagles are likely to spend more time near the turbines. Fatalities may also include other local non-breeding birds (adult floaters and immature eagles) as well as juveniles that fledge from nests in the vicinity of the CCSM Phase I Project. We also recognize that some fatalities may include eagles from outside of the LAP, such as birds migrating through the area or eagles from elsewhere that winter in the vicinity; however, the best available data suggest that the vicinity of the CCSM Phase I Project is not a substantial migration corridor or wintering area for golden eagles. We have added clarification to the Final EIS on our expected demographics of eagle fatalities.

The fatality estimate was based on eagle use data collected over 2 full years, including the post-fledging period in both years. It can be difficult to make accurate distance measurements, but the biological monitors were trained in taking distance measurements, and we have no reason to believe the data were flawed. The cutoff for eagle height did change during the surveys, but we were able to adjust the model to account for the different methods.

Because of our concerns with spatial coverage provided by the point counts in the first year of eagle survey data, we asked for and received substantially more spatial coverage in the second year of monitoring to better ensure the data would be representative of the entire area covered by the project. The amount of eagle use was lower in the second year, but we expect eagle activity will vary among years; therefore, we recommend project proponents collect at least 2 years of pre-construction data. It is possible that eagle use could be higher in some future years due to better prey availability and higher density of eagles; however, some future years might have even lower eagle use. Because there is uncertainty, we have taken a conservative approach in calculating the fatality estimate, such as using the 80th percent upper credible limit rather the 50th percent (average) to estimate the amount of eagle take. In addition, PCW would be required to conduct rigorous post-construction fatality monitoring to evaluate the accuracy of the fatality estimate.

Day length is influenced by latitude, so we used Teton Reservoir as a north-south mid-point to represent the CCSM Phase I Project. Day length was derived from the time of sunrise to sunset for Teton Reservoir as determined by the National Oceanic and Atmospheric Administration solar calculator. While eagles may fly in low light conditions prior to sunrise or after sunset, the best available information shows eagle activity before sunrise and after sunset is negligible and that eagle activity in the first few early morning hours is considerably less than mid-day. Therefore, using daylight hours between sunrise and sunset is a reasonable representation of the time eagles are at risk.

The 5 percent benchmark is not the loss the local area populations can sustain and still remain viable. Rather, we use the 1 percent and 5 percent benchmarks as a guide to ensure that at the LAP level, eagle populations are preserved. The ECP guidance defines these benchmarks as the eagle harvest rates at the LAP scale that should trigger heightened scrutiny. We developed the LAP analysis approach, and the related 1 percent and 5 percent benchmarks, in response to concerns expressed to us from state fish and wildlife agencies regarding possible loss of eagle populations at a local scale. The primary purpose of the approach is to help us ensure that this does not happen. We do evaluate and consider the effects of programmatic ETPs on eagles at the EMU, LAP, and project-area population scales. However, the thresholds for eagle populations in terms of viability are those for the

eagle EMUs established in the Eagle Take Permit Final EA (USFWS 2009) completed for the 2009 BGEPA regulations that allow for non-purposeful take of eagles. Many of these fatalities may be for eagles nesting in close proximity to the project because these eagles are likely to spend more time near the turbines. We anticipate, however, that eagle fatalities for the CCSM Phase I Project will also likely include other local non-breeding birds (adult floaters and immature eagles), juveniles that fledge from nests near the CCSM Phase I Project, and eagles from outside of the local area population, such as birds migrating through the area or eagles from elsewhere that winter in the vicinity of the CCSM Phase I Project. We have clarified this in the Final EIS. Our eagle fatality prediction model does not account for lost productivity that occurs from an eagle fatality nor does it account for the future recruitment from nests if breeding eagles are killed. However, the resource equivalency analysis (REA) model (used to calculate required numbers of power pole retrofits to offset the take of eagles when compensatory mitigation is required) does take into account this loss of productivity and impacts on future recruitment.

In regard to development of the population estimates of golden eagles, between 2006 and 2012, we funded annual, late-summer aerial golden eagle surveys over four BCRs in western North America. This includes three of the four BCRs contiguous with the CCSM Phase I Project and almost all of Wyoming. Other population estimates throughout the nation are available from various sources. The surveys in the four western BCRs between 2006 and 2009 were the basis for population estimates and take thresholds established in the Eagle Take Permit Final EA (USFWS 2009). We are fairly confident in the population estimates of golden eagles within the LAP and EMUs, and we will continue to incorporate survey results to improve our population estimates. However, we acknowledge that eagle density estimates are not uniform across the BCRs. Given better information on resource selection, seasonal variation in density, and an improved understanding of seasonal changes in eagle density and population-specific movement patterns, we will refine the LAP analysis in the future to better assess potential impacts of projects.

There are numerous reasons why our eagle fatality estimate is different from the estimate presented in the BLM FEIS, which was a range of 46 to 64 golden eagle fatalities per year. First, the proposed action analyzed in the BLM FEIS was twice the size proposed for the CCSM Phase I Project (1,000 turbines rather than 500). Second, the area analyzed in the BLM EIS is much greater than the project area analyzed for the proposed CCSM Phase I Project. Third, between preparation of the BLM FEIS in 2012 and our EIS in 2016, at least 2 years of eagle use surveys were completed within the area of the CCSM Phase I Project. These surveys were designed in close cooperation with us, and adhered to draft and final ECP guidance. The results of these surveys that were specific only to the area of the CCSM Phase I Project were incorporated into our fatality estimate.

During the development of avoidance and minimization measures, we confirmed that PCW agreed to curtail operation of turbines within 1 mile of unoccupied golden eagle nests between February 1 and April 30. This time period is when golden eagles generally establish nest sites and territories. The intention of this measure is to allow a certain level of protection for nests that, while not occupied, may become occupied later. We have added additional text to the Executive Summary in order to clarify this statement.

5.6.5 Avoidance and Minimization

We received 10 comments related to avoidance and minimization measures. These included suggestions that inconsistencies in the buffer distances and time frames offered in the ECP and Draft EIS be reconciled. Additionally, several comments supported our plans to continue to develop additional avoidance and minimization measures in conjunction with PCW, and a means to comply with the ETP avoidance standard.

Other commenters suggested that specific avoidance and minimization measures be considered, including the following:

- Turbine curtailment should be extended through the post-fledging period instead of when only applying when young fledge.
- Bubblers should include escape ramps for eagles because bubblers and tanks have been known to cause mortality for eagles.
- The USFWS should require PCW to perform targeted curtailment of turbine operations during July and August.
- Monitors should include trained experts who have authority to shut down turbines when eagles are present and displaying behaviors that put them at risk of collision.
- The Final EIS should discuss why increased cut-in speed and other minimization measures are not practicable or how uncertainty as to their effectiveness makes them more appropriate as part of adaptive management.
- The USFWS should explain why restricting construction within the 0.5-mile buffer zone of occupied bald eagle nests during fledging of young eagles (June and July) would not be required to avoid eagle take.

The closest occupied bald eagle nest to the North Platte River Water Extraction Facility is within 530 feet of the facility. The other occupied bald eagle nest is greater than 0.5 mile away from the North Platte River Water Extraction Facility. Hence this nest was not included as a consideration for coverage under a standard ETP in relation to disturbance take. Regarding golden eagle nests in relation to possible disturbance effects for nests within 1 mile of construction activities, only one golden eagle nest (nest #162) is of concern. This golden eagle nest is over 0.5 mile from construction activities, but it is within 1.0 mile of these same activities. This is the only golden eagle nest that would be subject to the BLM's no-disturbance buffer for golden eagles per the Best Management Practices (BMPs) specified in the BLM ROD. The BLM would implement its 1.0-mile no-disturbance buffer for this golden eagle nest.

We have corrected text in Section 3.8.3.2.1 to agree with the BLM FEIS, which in Appendix Table D-1 states that a 1-mile buffer would be required around any Occupied golden eagle nests between February 1 and July 15 on BLM land. Our standard ETP would retain this stipulation for all golden eagle nests regardless of land ownership.

PCW has committed to numerous avoidance and minimization measures, as well as conservation measures and BMPs, as described in Sections 2.2.1.3.2 and 2.2.1.3.4, respectively. These measures must be clearly defined, as they are in the ECP submitted by

PCW, before an ETP can be issued and must demonstrate that the Applicant has eliminated all possible eagle mortality except that which is unavoidable.

Sections 3.8.3.2.1 and 3.8.3.2.2 specify the timing windows for construction and operation relative to eagle nests. We have determined that the current timing windows are appropriate for the documented nesting periods of eagles in southern Wyoming. We intend "fledge" to mean when a young eagle leaves the nest, as the purpose behind this avoidance measure is to lessen risk of eagles when they are known to be tied to the nest location. We recognize that fledging may occur during a broad window, and that eagle young remain dependent on the adults for some time after leaving the nest, and will work with PCW on a case-by-case basis to determine when fledge has occurred. Risk of eagle take will continue after fledging, and effective post-construction monitoring will be used to identify whether those risks are notably higher immediately after fledge for either young or adults, and this information could be used to identify additional measures through adaptive management.

We are aware of ongoing efforts to develop technological avoidance measures such as mechanically triggered, temporary turbine curtailment in response to detected eagle presence. At this time, however, we are aware of no such systems that have been demonstrated to be effective. We are aware of existing efforts to use observer-based triggers to avoid take of eagles, with mixed success to this point. Turbine curtailment could be included as an experimental Advanced Conservation Practice (EACP), but this would be guided by adaptive management and the results of post-construction monitoring. Additionally, any required EACPs would need to be proven effective. Seasonal curtailment is indicated as an example of an EACP that could be implemented. This has been clarified in Section 2.2.1.4.2.

We are uncertain if bubblers will be a component of PCW's proposed habitat improvements. However, PCW has indicated in their ECP that they have already constructed and installed escape ramps for wildlife in water tanks on the privately owned ranch land, and they will continue to install escape ramps across the ranch wherever there is an identified risk to wildlife.

Cut-in speeds are avoidance measures that have been shown to be relevant to protection of bats, but have not been shown to have documented benefits to eagles or other migratory birds. We have added information about cut-in speeds to Section 2.3.5. Bats are not within our jurisdiction unless they are listed under the Endangered Species Act. If cut-in speeds are shown to be useful in limiting impacts on migratory birds, and especially eagles, we would assess their use in the CCSM Phase I Project through adaptive management.

5.6.6 Monitoring

We received 24 comments regarding the monitoring program discussed in the Draft EIS. These comments covered a range of topics, including the following:

- Encouraging the concept of using a third-party group of monitors to observe and document eagle kills.
- Concerns over how to conduct monitoring while minimizing disturbance of habitat and wildlife behavior caused by human observers.

- Desire for all monitoring data to be made publicly available.
- Desire for metrics such as eagle displacement, nest success, habitat loss, and potential habitat competition to be used to determine CCSM impacts. Trending these factors over time and through project phases is also suggested and should be made publicly available.
- Suggestion that there be a mechanism to report if and when eagle kills regularly exceed ETP limits.
- Request for us to keep accurate, real-time data on eagle mortality at large commercial wind projects and their associated infrastructure, locally, regionally, and nationally.
- Suggestion that the once-per-month monitoring discussed in the Draft EIS may not be realistic through winter conditions and that it be mindful of potential wildlife, soil, water, and vegetation impacts.
- Request that we reject the notion of third-party monitors and rely on the professional ethics of consultants hired by PCW.
- Suggestion that we, in collaboration with WGFD, impose a bounty on reports of eagle kills, payable to any person that submits photographic or physical evidence of the discovered kill. The bounty would incentivize such reports and may be preferable to monitoring by consultants or third-party monitors.

The ECP (see Attachment A) and Bird and Bat Conservation Strategy (BBCS; see Attachment B) outline the post-construction monitoring protocol developed by PCW, partially in response to our technical input. If we issue ETPs, we will specify the approved post-construction monitoring protocol that we believe includes standardized methods based on sound scientific principles, and sufficient to quantify direct impacts on eagles as a result of operation of the CCSM Phase I Project. We also provided comments to PCW concerning post-construction monitoring for other birds and bats based on the same criteria, and substantial changes have been made in response to our comments since we issued the Draft EIS. The final BBCS is available for further public review as Attachment B to this Final EIS.

All monitoring and the results of monitoring required as a condition of the ETP, if issued, would be available to the public. We have not yet determined how results will be made available. However, real-time sharing of in-progress analysis and coordination is unlikely to occur. Annual reports would contain information concerning the timing, age of the eagle, and nature of the take, as well as specific geographic location or season. These data would be important in the consideration of potential management actions that may be implemented through adaptive management. Information concerning other potential impacts that would not constitute “take” of eagles (such as eagle displacement, nest success, habitat loss, and potential habitat competition) is not required to be reported, but as information is developed, we agree it should be incorporated into the larger assessment of the CCSM Phase I Project’s impacts through an adaptive management process. Because annual reports will include eagle fatalities, permit mechanisms will require reporting well before eagle take would exceed ETP limits, and take that does exceed ETPs would be a violation.

The 2009 eagle permitting regulations under which we are considering issuing ETPs for the CCSM Phase I Project do not provide legal authority to require independent or third-party monitoring. Under the ETP regulations at 50 CFR 22.26, the project applicant is responsible

for completing monitoring. However, the applicant must grant the USFWS or parties that we designate access to the facility for the purpose of monitoring eagles. This has been clarified in Section 2.2.1.4.3.

Post-construction eagle fatality monitoring and eagle nest monitoring would be used to quantify actual eagle take as well as to monitor the accuracy of the eagle fatality prediction model, and the effectiveness of any EACPs applied to the project and BMPs implemented to reduce eagle mortality. This has been clarified in Section 2.2.1.4.2. The permit renewal process is discussed in Section 2.2.1.4.1.

We acknowledge concerns about possible unintentional impacts on wildlife species and potentially other resources during winter months in relation to post-construction eagle fatality monitoring that will be required of the project proponent and that such impacts could occur. However, given the size and scope of the CCSM Phase I Project, the predicted level of eagle take, and the need to reliably measure and document eagle take as part of the conditions for issuance of a programmatic ETP, fatality monitoring is necessary as described in the ECP and the BBCS. Post-construction eagle fatality monitoring must be based on a rigorous protocol, which means that all the turbines will need to be searched at least once every 30 days. Fatality monitoring needs to be conducted in this manner so that we have statistically reliable data to document that the take limits on the permit are not exceeded and to properly credit the proponent in the future should project take be documented as less than what is predicted in terms of the compensatory mitigation work they are required to do. After collecting 2 years of post-construction fatality monitoring data, we will evaluate the protocol and the results; based on that review, we may be able to reduce the number of turbines searched, the frequency with which turbines are searched, or both. In various locations in the Final EIS, we have added a discussion and disclosure of anticipated impacts from post-construction avian and bat fatality monitoring where such analysis was previously omitted in the Draft EIS.

We do not have authority to impose “bounties” as incentives to report eagle kills. Moreover, because such reporting would not be systematic, we would not be able to calibrate received reports to determine a reliable estimate of any unreported eagle take. Systemized monitoring protocols include measures to assess effectiveness of the monitoring efforts themselves (including searching efficiency tests), and do not risk variation in monitoring efforts based on weather, season, or other factors. Consequently, it is preferred as a method to accurately determine impacts of a project.

5.6.7 Compensatory Mitigation

We received 23 comments regarding compensatory mitigation during the Draft EIS comment period. These comments included the following:

- Suggestions that we better describe the time frame for, geographic range, and expected benefits of compensatory mitigation, including ensuring that the mitigation be additive and that it be a benefit to the impacted eagle population
- Suggestions that compensatory mitigation be undertaken for the duration of the project impacts, not only the duration of the ETP

Several other comments related to risks to eagle populations posed by electrocution and concerns over the methodology used to determine the number and the nature of power pole retrofits as a compensatory mitigation tool. In particular, these comments included the following:

- Concern that retrofits would not necessarily provide additive benefit to eagle populations
- Suggestions that power pole retrofitting should increase additionality (that is, provide a new contribution to conservation values and functions beyond what would have occurred without the mitigation) in the eagle population
- Suggestions to install power lines underground where it is practicable to do so, and support for separating wires on power poles
- Request that we should clarify a standard and criteria for both power pole retrofits and future compensatory mitigation mechanisms
- Recommendation that we provide a substantive rationale describing how proposed compensatory mitigation (1) would not have occurred in the absence of this permit requirement and (2) does more than require permittees to complete actions that a third party is otherwise legally required to complete under federal, state, or local law
- Request for more clarity regarding the time frames associated with power pole retrofits
- Request to require compensatory mitigation for bald eagles as well as golden eagles

Under BGEPA, issuance of an ETP does not require that a permitted action result in a net benefit to golden eagles. Authorized, incidental take of bald and golden eagles is permitted under BGEPA as long as it is found to be consistent with the goal of stable or increasing breeding populations. Permitted take that is in excess of established take thresholds that are determined to ensure this standard is met must be offset through compensatory mitigation. For golden eagles, compensatory mitigation must achieve no-net-loss because the current take threshold for the species is zero. Further information regarding the ETP can be found in Section 2.2.1.4. As discussed further below, retrofitting power poles, in the appropriate circumstances, may meet this standard, but neither this form of mitigation nor other forms would be required to demonstrate a net benefit to eagles.

Similarly, required mitigation must address the impacts of the duration of the ETP, rather than the life of the project. If impacts exist beyond the duration of the ETP, those impacts – if they constitute take – would be in violation of the BGEPA unless a renewed or additional ETP has been issued, and any additional mitigation necessary to address those impacts would be a condition of that additional ETP.

Locating power lines underground would certainly remove risk of electrocution, but is not considered a necessary measure because other recommended measures exist as industry standards that are considered effective at reducing risk of electrocution to a level of risk that approaches zero. Some of these measures include separation of wires on power poles.

Sufficient mitigation to fully offset any eagle take needs to occur before that take occurs. If we issue an ETP, we will require that any compensatory mitigation be in addition to any other planned actions or measures that may have reasonably occurred otherwise. We have

clarified this in Sections 2.2.1.4.5 and 3.8.3.2.2 in the Final EIS. An ETP will not be issued without a mitigation plan that includes compensatory mitigation that meets the requirements of no-net-loss of golden eagles through implementation of measures that would not have occurred in the absence of the ETP and is in addition to any other legally required actions. PCW will be required to submit a sufficient mitigation plan that meets these criteria prior to issuance of the ETP. We have clarified this in several locations throughout the Final EIS.

The EIS described the number of power pole retrofits needed to fully offset the anticipated take during only the first 5 years of operation and not all eagle take over 30 years. PCW would need to apply for another eagle take permit and will need to fully offset through compensatory mitigation any future take of eagles beyond the first 5-year permit. We described avoided loss for two time periods, 5 years and 10 years, to demonstrate how the number of needed retrofits would change depending on the durability (longevity) of the retrofits. If we were confident that the proposed retrofits would continue to function and save eagles for 20 or 30 years, for example, we could use 20 or 30 years of avoided loss in the REA model in place of 5 or 10 years to account for the take that occurs during the 5-year term of the permit.

The eagle fatality model does not account for lost productivity that occurs from an eagle fatality; however, the REA does. The REA assumes a certain amount of lost productivity for every eagle killed, and it also assumes an equivalent amount of productivity gained for each eagle saved by compensatory mitigation (e.g., power pole retrofits). We have stated that the compensatory mitigation could occur anywhere in the four BCRs that overlap the local area population. We also recognize a preference by cooperating agencies and commenters to locate the compensatory mitigation close to the CCSM Phase I Project and in Carbon County. We do not yet know where the compensatory mitigation will occur, and while it can occur anywhere in the four BCRs, we will help PCW identify potential locations in southern Wyoming and northern Colorado where power pole retrofits would benefit eagles.

The number of power pole retrofits that would be required, as noted in Section ES.2.3 and Table 2-10, is between 1,015 and 2,556, depending on the turbine blade diameter. PCW would need to demonstrate adequate compensatory mitigation in its mitigation plan prior to issuance of a programmatic ETP. It would be PCW's responsibility to demonstrate that there are sufficient priority power poles needing retrofits within the four BCRs. Again, in any ETP we issue, we will require that compensatory mitigation be in addition to any other planned actions or measures that may have reasonably occurred otherwise. For example, a company with responsibility to retrofit its own power poles may develop an avian protection plan with our technical input that reasonably establishes a schedule for completing those retrofits, but that still leaves substantial numbers of power poles creating risk of eagle electrocution pending completion of that schedule. A compensatory mitigation plan that quantifiably accelerates that power pole company's schedule would accomplish measurable reduction of risk to eagles that would not otherwise have occurred, despite the power pole company's reasonable intent and legal obligation to do so.

As described in Section 2.2.1.4.5, compensatory mitigation is required for only golden eagles. Predicted fatality rates of bald eagles would not exceed calculated EMU take thresholds. As such, the current eagle rule does not require compensatory mitigation in this

situation. Section 2.2.1.3.1 describes the eagle fatality prediction model used to estimate expected take. This model uses the best available and most relevant golden eagle collision probability data. We have a high level of confidence in this model and the data on which it is based.

5.6.8 Adaptive Management

We received 19 comments on the Draft EIS regarding adaptive management, including the following:

- Concerns over the need for establishing and monitoring of the efficacy of mitigation options to best implement a data-driven adaptive management approach supported by science
- Requests for additional explanation of what methodology would be used to determine how new technologies would be implemented as they are developed and how changes in circumstances might be addressed
- Suggestion that the adaptive management framework identify triggers or thresholds based on science that, when crossed or exceeded, would require further mitigation
- Suggestions that ongoing research and analysis be undertaken to test methods to reduce lethal take, including a requirement that the project show progress by reducing its legal take over time or face increased mitigation requirements

If issued, the programmatic ETP would require a post-construction monitoring program that we have approved, and that would be determined appropriate to assess actual impacts from the CCSM Phase I Project in a manner allowing for meaningful adjustments to management action through an adaptive management process.

Adaptive management would be ongoing throughout the life of the ETPs, if issued. We would require PCW to submit annual reports to us and to contact us immediately regarding any fatality. This communication will allow for adaptive management to occur, although management changes would necessarily occur after data are reviewed and therefore would be unlikely during the same year. The conditions for the permit, if it is granted, have yet to be finalized.

As a component of adaptive management, we cannot require PCW to test future new turbine designs. As described in Section 2.2.1.4.4, an adaptive management process is necessary to adjust EACPs, BMPs, additional avoidance and minimization measures, and conservation efforts to reduce risk to eagles and other species to the extent practicable. It is also expected that over the life of the CCSM Phase I Project, additional BMPs and EACPs would become available. As such, adaptive management would be an essential component of the permit stipulations and would be employed to ensure that risk is minimized to the extent practicable.

In general, research and testing of new designs or methods cannot be a requirement of an ETP, as the required measures must be for the purpose of avoiding or mitigating take, and by definition the potential benefits of research or testing cannot be quantified to know how much to require or whether the measures will successfully achieve the required level of mitigation. We agree that additional research and analysis is important, and as effective new

measures are identified can address implementation of such measures through adaptive management.

We would not require mitigation based on triggers focused solely on adaptive management because mitigation would be required only to offset permitted eagle take exceeding thresholds. We may establish triggers as part of an adaptive management framework to assess when other forms of avoidance or minimization would become relevant.

5.6.9 Alternative 1 – Proposed Action: Issue ETPs for Phase I Wind Turbine Development and Infrastructure Components

We received 18 comments related to Alternative 1 (Proposed Action). These included the following:

- Three statements of support for this option
- Two requests that the proposed 27,500-acre conservation easement for prohibition of wind development activities also include restrictions on mineral development of the subsurface
- Question whether our eagle fatality prediction model accounted for the losses associated with proposed power lines needed to carry power to Nevada, Arizona, and California
- Request for more details on how PCW will undertake locating power lines underground to the maximum extent practicable
- Noting the idea of no net loss as setting forth a bare minimum requirement for permit issuance, a request that the USFWS add a requirement for reduction in unauthorized take as well as net benefit to eagles
- Question whether the option to use shorter turbine blades is viable and suggestion that the USFWS is obligated to choose this option if it kills fewer eagles
- Several edits to specific components of the text to rectify inconsistencies
- Requests that predicted take information be made publicly available

The proposed conservation easement in question would not be a feature of the ETP, if one is issued, because it was developed in response to other authorities separate and apart from this application for ETPs. It is addressed in this EIS due to its relevance to analyzing the environmental impacts of the CCSM Phase I Project. Whether additional protection, such as restrictions on development of the mineral estate, should be incorporated would depend on the extent to which the proposed measures meet requirements of other agencies that are requesting such measures.

Power lines constructed or operated as part of this permitted project would be required to meet standards that avoid likelihood of eagle electrocution, regardless of whether they are buried. Any separate power lines that carry power from the CCSM Phase I Project to other parts of the country (such as Nevada, Arizona, or California) would be required independently to meet requirements under BGEPA, which would likely mean complying with similar standards. Additionally, although our eagle fatality prediction model does not account for losses of eagles associated with proposed power lines beyond the scope of the CCSM Phase I Project, our LAP analysis (see Attachment E) described in Chapter 4.0 does

consider the loss of eagles associated with past, present, and reasonably foreseeable future power lines within the local area for golden eagles. Locating power lines underground would certainly remove risk of electrocution, but is not considered a necessary measure because other recommended measures exist as industry standards that are considered effective at reducing risk of electrocution to a level of risk that approaches zero.

Our authorities allow us to require that any take be consistent with long-term stable or increasing breeding populations, and for golden eagles that means that any authorized take must achieve "no net loss" through offsetting mitigation. We are not, however, authorized to require a net benefit to eagles in order to qualify for a programmatic ETP.

While we agree that using smaller turbine blades would likely result in fewer predicted eagle fatalities, we consider imposing that requirement in the decision whether to issue an ETP to be equivalent to requiring that less energy be generated. Fewer turbines, smaller turbines, or fewer wind energy facilities would inherently lead to less impact on eagles, but there is no clear point at which we could determine that the impacts have been reduced sufficiently, without being arbitrary. We use the status of eagle populations to determine whether any take can be authorized without requiring compensatory mitigation, and use LAP calculations to determine whether those impacts would be sustainable at a local level even if mitigated. We use surveys and other site-specific information to determine whether turbine locations, operational systems, and similar measures sufficiently avoid likelihood of take. We lack authority outside of these bounds to determine that projects must be downsized to reduce take, as any project could always be downsized to reduce take further, which would call into question the purpose of ETPs. In addition, NEPA requires that we analyze impacts from a proposed action, but does not require an agency to choose a particular alternative, even if it may result in less environmental impact.

Through this EIS, and associated documents, we are making information concerning predicted take publically available.

5.6.10 Alternative 2 – Proposed Action with Different Mitigation

We received 24 comments on the Draft EIS regarding Alternative 2, including the following:

- Support for Alternative 2 based on its broad array of mitigation options that would address multiple environmental concerns.
- Requests that the USFWS facilitate a process to develop, quantify, and validate a wide variety of compensatory and alternative mitigation strategies.
- Recommendations that until alternative mitigation measures have been validated, we should not authorize them for use on the project.
- Suggestion that bonds be required to ensure that funds are available for alternative mitigation and power pole retrofits.
- Suggestion that due to changes in hunting practices, lead abatement measures may be less necessary than in previous years as many hunters have switched to non-lead alternatives.
- Support for the lead abatement measures and suggestions that hunters be required to use non-lead ammunition in both shotguns and rifles within the LAP area.

- Suggestion that we consider including more flexibility in our requirements for compensatory mitigation to account for both the effectiveness and economy of alternative mitigation strategies, and to undertake a strategy that "would allow PCW and USFWS to work together to determine the best science-based approach to compensatory mitigation based on the most current data available." This would take the place of a more prescriptive requirement for how to achieve compensatory mitigation.
- Interest in developing an eagle rehabilitation center or possible habitat enhancement project for eagles on the Wind River Indian Reservation in partnership with us.
- Suggestion that carcass removal be expanded to rabbits and other small animals and include the entire area of the project rather than just roadways.

We are interested in expanding the range of options for compensatory mitigation, and the request for comments on that alternative was intended as an opportunity to gain new information to help develop other defendable options for mitigation. We would note, however, that any take above permit levels would first trigger examination of the permit itself, and the first option to address it would more likely be adoption of new avoidance measures if available rather than allowance for new mitigation.

We agree that additional information is important to effectively pursue additional mitigation measure options, and we are pursuing various forms of analysis in conjunction with other partners. We also agree that we will be responsible for determining any relevant guidelines that may be necessary when authorizing other forms of mitigation. If we issue a programmatic ETP, we will consider certain mitigation measures when determining what, if any, additional permit conditions should be imposed beyond the compensatory mitigation measures identified in the existing ECP. We will not require any mitigation option unless we believe that it is likely to quantifiably offset the predicted levels of eagle take, and that it may be feasibly implemented. If no opportunity exists to accomplish a particular form of mitigation within the approved geographic area, it would not be considered feasible. Before issuing a permit, we would require that PCW demonstrate a binding commitment (such as a contract) to complete identified and approved mitigation measures rather than require a bond, which we would consider more relevant if the mitigation commitment was yet to be determined.

Hunting in Wyoming is regulated by WGFD. Laws prohibiting lead shot would need to be passed by the Wyoming state legislature. The alternative compensatory mitigation option of lead abatement could include hunter education programs to voluntarily reduce the use of lead shot. More information about lead abatement as a compensatory mitigation measure is provided in Section 2.2.2.4.2. We have added information from WGFD regarding the lead abatement option in the Final EIS.

While we agree that additional research would be beneficial in identifying and quantifying alternative methods to mitigate for take of eagles, funding that research would not constitute a replacement of the lost resource, and therefore would not itself mitigate for the eagle take.

We have entered into discussions with certain tribes and PCW concerning interest in developing future mitigation measures based on eagle rehabilitation or on habitat

enhancement, but it is not currently feasible for PCW to depend on those measures to achieve required mitigation levels. As with other mitigation methods that may be developed, we would anticipate including provisions in the ETP to allow the Applicant to commit to and adopt different mitigation if proven effective during the life of the permit.

In general, we note and appreciate the interest in developing other forms and methods to offset through mitigation any permitted eagle take. Comments received concerning several mitigation options may assist in developing sufficient information and models that may allow them to be implemented in the future. However, limited information was received through public comment that directly assists in developing quantifiable means to implement new mitigation measures.

Carcass removal along roadways is intended to reduce the risk of vehicle collisions with eagles. This risk is highest for sizable carcasses that are not immediately scavenged and removed by eagles or other predators. Efficiently removing or even finding carcasses of rabbits and smaller animals throughout the project area would be impossible given the size of the project.

5.6.11 Alternative 3 – Issue ETPs for Only the Sierra Madre Portion of the CCSM Phase I Project

Six comments were received on the Draft EIS related to Alternative 3, including the following:

- Several statements that Alternative 3 is not preferable because it does not meet the purpose and need of PCW
- Suggestions that because Alternative 1 is consistent with BGEPA, Alternative 3 should not be a viable alternative
- One preference for the smaller footprint proposed in Alternative 3

We believe that Alternative 3 demonstrates an alternative that would have a significantly different level of impact from Alternative 1. As noted in discussion of Alternative 3, for us to choose to permit a different size project, we would require a specific project to analyze and for which to determine the predicted level of eagle take. The specific Alternative 3 was chosen because available data made it feasible to represent a different project size and design that might be eligible for permitting, and for which we could assess differing environmental impacts from Alternative 1. If Alternative 1 is determined not to be eligible for permitting and a smaller project might be eligible, PCW would need to submit a specific new proposed project for review, for which the specific smaller project may or may not be the exact design as Alternative 3. For purposes of this Final EIS, Alternative 3 demonstrates the level of information and the analysis we would use.

5.6.12 Alternative 4 – No Action: Denial of ETPs

Five comments were received on the No Action alternative in the Draft EIS, including the following:

- Statements of support for the non-issuance of an ETP, splitting up or moving the CCSM Phase I Project to a new location, or the option not to build the project
- Support for the non-issuance of an ETP and instead fining PCW for any illegal take
- Several explicit statements of opposition to the No Action alternative because commenters felt it would result in greater impacts than other alternatives

We cannot prohibit PCW from developing a project that was approved through the BLM FEIS and ROD in 2012. If we deny the ETP, the decision to build or not build is up to PCW, and PCW would assume the legal risk if unpermitted take occurs. However, if we determine that the permit application meets regulatory criteria, it would be inappropriate and potentially arbitrary and capricious to deny the application solely on the expectation that the Applicant can afford to pay resultant criminal fines. If no recordable impacts on regulated species occur, of course, no violation would occur.

5.6.13 Siting and Other Alternatives

Five comments were received related to siting. The majority of these comments asserted that the siting of the CCSM Phase I Project is extremely poor, noting that large wind projects should adhere to the American Bird Conservancy's definition of Bird-Smart wind energy, including independent pre-construction risk assessments leading to proper siting, tested effective mitigation, collection of mortality data post-construction by independent, third party experts reporting directly to regulatory agencies, and compensation for unavoidable take of public trust resources. Additional concerns over access to transmission resources were offered as evidence that the project siting is inadequate.

Six comments were received that discussed other alternatives beyond those analyzed in full in the Draft EIS. These included the following:

- The use of polluted, contaminated mine sites for solar or wind energy development
- Vertical-axis wind turbines
- Forest and habitat conservation, energy efficiency, and distributed solar
- Use of larger turbines that would require fewer total turbines and less total take
- Use of nuclear technology
- Bird-friendly generators
- Concerns over recreation in areas subject to the proposed conservation easements

Four comments were received related to concern regarding an ETP time frame of 30 years.

We are aware of ABC's work to define "Bird Smart" wind energy, and agree that proactive landscape level planning would be likely to help reduce long-term effects on migratory birds. However, our authority does not extend to site selection for wind energy projects, but rather to whether a proposed project meets criteria for an ETP if we receive a permit application. As

a major part of our consideration of the permit application, we review the impacts that may result on eagles based on the project's location, and what the company will do to appropriately avoid those risks.

Over the past several years, PCW has reconfigured the turbine layout to avoid or minimize impacts on eagles and other birds based on pre-construction avian use studies and our advisement. This process is detailed in Section 2.2.1.3.2. As described in Section 2.3.4, our permit review is considering whether the current project layout avoids impacts on eagles sufficient to meet regulatory criteria. Adaptive management would include monitoring to determine the effectiveness of these avoidance and minimization measures. If hazardous turbines are identified during operation, we would work with PCW to address the problem and find a solution. This process is described in Section 2.2.1.4.4. The USFWS is developing tools that may lead to better landscape planning by the wind industry, by identifying areas inappropriate for wind development early in the planning process. While this may assist in future project development, our current role is to review whether this permit application meets existing permit criteria and, if so, issue the permit with appropriate conditions. Concerning requirements that third parties independently conduct monitoring and report directly to the agency, it is not within our current authority to require that for this permit, although revisions to permitting regulations may provide that authority if the permit is renewed.

For these same reasons, use of mine sites for this project would not be within permitting authority and therefore not viable as an alternative. Alternative wind turbines that may result in fewer fatalities to birds or bats are not considered a proven technology that is feasible at a commercial scale at this time, and therefore are not a practicable alternative to the Proposed Action. Further analysis of other alternative forms of energy generation was considered but ultimately dismissed in this EIS. Justification is provided in Section 2.3.9. In this EIS, we analyze the potential for different levels of impacts based on different turbine sizes, but do not determine what level of energy must be generated; rather, we assess what level of impacts may occur due to those turbine sizes, whether the proposal meets criteria for an ETP, and what mitigation may therefore be necessary to obtain an ETP. Societal efforts to reduce energy use, conserve habitat from other negative impacts, or develop new energy distribution systems are likewise not within our authority and therefore not considered as alternatives to the Proposed Action. If conservation easements were required as part of issuing an ETP, we would, to the extent our authority would allow, consider how those impacts would affect other land uses (such as recreation) beyond those directly relevant to eagle conservation.

If a programmatic ETP is issued for the CCSM Phase I Project, it would be for a maximum of 5 years. Any subsequent ETP applications would be evaluated given the regulatory framework, biological information, and technological advances available at the time of the application.

5.6.14 Bats

Six comments on the Draft EIS related to bats were received, including the following:

- Statements that PCW should commit to follow the American Wind Energy Association's voluntary operating protocol for bats, and that we should work with PCW, the Department of Energy, and other researchers currently conducting bat avoidance minimization research to see if the CCSM Phase I Project represents an opportunity to perform applied research to better understand bat mortality, risk, and minimization
- Identification of inconsistencies in the impact threshold criteria applied to bats
- One statement of concern about the bat fatality estimates provided in the Draft EIS

PCW has not committed to follow the American Wind Energy Association's voluntary operating protocol for bats. PCW has committed to numerous avoidance and minimization measures, as well as conservation measures and BMPs, to reduce impacts on bats. Many of these measures are described in Section 2.2.1.3.4 and are also included in the BBCS for the CCSM Phase I Project, provided as Attachment B.

We have no authority to require PCW to adhere to specific operating protocols for the protection of bats. In regards to the impact threshold criteria, we have added intensity and magnitude criteria to the discussion regarding operational impacts on bats from habitat degradation, fragmentation, and disruption/displacement to Section 3.6.3.2.2. We have also revised text in Section 3.6.3 to indicate that conservation easements and habitat enhancements do have beneficial impacts on bats.

Within Section 3.6.3.2.2, we provided additional discussion of the approach we have used to estimate bat fatalities for the CCSM Phase I Project, as well as the uncertainties within that estimate. In doing so, we have reviewed language to clarify and resolve potential inconsistencies in impact criteria. In order to provide a range of predicted fatality rather than a specific number, which is consistent with fatality estimates for birds (other than eagles), we have added the bat fatality estimate considered by the BLM in its FEIS for the CCSM Project to our Final EIS. The recommended caveats and cautions about the use of the fatality rate estimates have been retained in the text immediately following the estimate.

5.6.15 Migratory Birds

We received 11 comments on the Draft EIS that provided input on migratory birds. These comments included the following:

- Several suggestions that impacts on migratory birds could be more significant than predicted in the Draft EIS
- Concerns that survey methods were inconsistent and did not adhere to USFWS standards
- Recommendations that when incidental take permits become available under the MBTA, PCW should be obligated to apply for one

- Identification of a discrepancy in the major impacts on passerines listed by Wyoming as Species of Greatest Conservation Need as characterized as being both regional and limited in extent
- Question as to why other migratory birds were being reviewed in this analysis unless they were being considered as prey or carrion

In Section 3.7.2.2, we provided additional discussion concerning avian surveys used, available baseline avian use data, and the approach taken to generate an estimate of the avian impacts from the CCSM Phase I Project, as well as the uncertainties of these data and our estimates. While we recognize that actual impacts could be greater than current estimates, due to the wide uncertainties, we have intentionally considered those uncertainties in the estimates provided in this Final EIS, to reduce the risk of understating the risk to migratory birds. We are confident that we have reasonably considered available information and potential methods to generate take estimates to inform the material provided in this Final EIS.

At this time, it is not possible for us to require PCW to obtain a permit for incidental take of migratory birds under the MBTA because no such permit is currently available. In 2015, the USFWS issued a Notice of Intent to develop regulations that would include provisions for authorizing the incidental take of migratory birds, but that proposal has not been finalized, and consequently the details of such process have not been defined. If a permit becomes available and the CCSM Phase I Project meets the criteria for the permit, it may be prudent for PCW to submit an application for a permit, which we would then be required to consider.

We reviewed and corrected discrepancies to impact descriptions within this EIS, where they were identified. Resources included in this EIS beyond bald and golden eagles (for example, water resources, vegetation and wetlands, mammals, and birds [other than eagles]) comprise the local habitat for eagles, influence eagle productivity and success, and are therefore relevant to the analysis on impacts on eagles from the CCSM Phase I Project. While some individual species of mammals and birds discussed in this EIS may not represent prey species or food sources, we would be remiss in our responsibilities not to disclose potential impacts on these trust resources, or to include new data relevant to the resource discussed. In response to comments received on the Draft EIS, we have reduced descriptions of certain elements of the proposed covered activities in Section 2.2.1.2, removing some redundant text and unnecessary detail while keeping the information needed for context and a complete analysis.

5.6.16 Greater Sage-Grouse

We received 14 comments on the Draft EIS related to greater sage-grouse populations, including the following:

- Encouragement to review the sharp-tailed grouse and greater sage-grouse analysis in the Draft EIS for consistency with the recent Approved Resource Management Plan Amendment (ARMPA) and the Final Environmental Impacts Statement (FEIS) for the ARMPA that was completed in coordination between the BLM and USFWS.

- Suggestion that greater sage-grouse be evaluated in this Draft EIS only as a prey species for eagles because the project has already been reviewed and approved by the State of Wyoming Industrial Siting Council with regard to greater sage-grouse and the site is consistent with the Governor's executive order for greater sage-grouse as it occurs outside any greater sage-grouse core area.
- Request for clarification regarding suspension of access by The Overland Trail Cattle Company (TOTCO) for hunting of greater sage-grouse under areas of its control.
- Suggestion that the description of "water development projects" and "mesic habitat improvements" are identical. If there are no other water development projects to which these two categories refer, the commenter suggested removing one of the categories of measures to avoid confusion.

Commenters also offered several suggestions for greater sage-grouse management that are listed below:

- Monitor the degree of displacement and reduced brood success in greater sage-grouse populations so that information can be used at other project locations
- Monitor the effectiveness of the core areas strategy for greater sage-grouse conservation and make changes if the population declines
- Recommend additional conservation measures, including habitat restoration, conservation, monitoring, and threat reduction for greater sage-grouse
- Review the impacts on greater sage-grouse from once-per-month monitoring activity and consider the burden this requirement places on Wyoming private landowners and the livestock industry
- Require monitoring of greater sage-grouse that is transparent to the public and interested conservation organizations

We have reviewed the Wyoming Greater Sage-Grouse ARMPA and added discussion of the ARMPA where appropriate in the EIS to clarify that the CCSM Phase I Project is consistent with the ARMPA goals and objectives. We also had the opportunity to meet and discuss this topic with the BLM since issuing the Draft EIS, and we identified specific locations in the EIS where language was added to increase consistency with the ARMPA. The potential impacts of the CCSM Phase I Project on greater sage-grouse as disclosed in this EIS are not changed in substance as a result of the project's consistency with the ARMPA.

Additionally, in accordance with the Greater Sage-Grouse Conservation Plan developed by PCW and included in the BLM ROD, PCW will work with the BLM and WGFD to continue to "monitor sage grouse populations within the Ranch to assess population trends and behavioral response [to the project]…for five years post-construction. Monitoring will include annual lek counts in accordance with approved Wyoming Game and Fish Department protocols and a continuation of PCW's GPS telemetry study." We have included a brief description of the monitoring in Section 3.7.3.2.2 of the Final EIS. In addition, the BLM and WGFD will continue long-term and large-scale monitoring of sage-grouse population demographics throughout the species' range in Wyoming. The level of transparency of the results of these studies will be determined cooperatively with the BLM, WGFD, and PCW.

Our analysis, based on available data, does not suggest that local extirpation of greater sage-grouse would occur as a result of the CCSM Phase I Project.

Throughout the Final EIS, we have removed all mention of water development projects and have replaced these where necessary with mesic habitat improvements, which is consistent with what is described in the Greater Sage-Grouse Conservation Plan.

In Section 3.7.3.2.2, we have added a discussion and analysis of impacts on greater sage-grouse due to the increased human activity during post-construction bird and bat fatality monitoring that would be required under an ETP. The post-construction bird and bat fatality monitoring described in the ECP and BBCS are the minimum efforts required to adequately monitor and analyze the impacts from the CCSM Phase I Project on birds and bats as required in the ETP and to guide successful and meaningful adaptive management. We do not find that the disturbance from monitoring, which would be one to two vehicles on 1 day per month during daylight hours, is substantially more of an impact than the presence, operation, and maintenance of the proposed CCSM Phase I Project. We also do not find that the impacts from monitoring, which would occur over 2 years, would be similar in scope to impacts from construction of the CCSM Phase I Project, which would occur over 4 years. We have not found that the post-construction monitoring would be a significant cause of exacerbation of impacts on greater sage-grouse associated with the CCSM Phase I Project.

In response to the comment that discussion of greater sage-grouse be reduced and restricted from the level of analysis provided in the Draft EIS, we believe the information we are providing in this Final EIS is appropriate given the role of greater sage-grouse as a potential eagle pray species and the potential impacts on that species.

5.6.17 Other Wildlife

We received 14 comments on the Draft EIS that discussed impacts on other wildlife. These comments included the following:

- Suggestion that we reduce our analysis of impacts on ungulates beyond reviewing their role as prey or carrion.
- Suggestion that ungulates should be referred to only in the context of serving as carrion because eagles do not take adult ungulates but instead feed on carrion.
- Suggestion to characterize the impacts of the operation of the CCSM Phase I Project as less impactful on ungulates and other mammals than extensive oil and gas development due to greater spacing and the reduced need for road access; suggestion to note that the construction period is the most likely time period for impacts on ungulates to occur.
- Identification of a discrepancy in the possible acreage of long-term modification within mule deer crucial winter range. The Draft EIS indicates that these would be the same under Alternatives 1 and 3; however, Figure 3-4 shows a substantial number of turbines that would be developed under Alternative 1 but not Alternative 3. The commenter recommended that the Final EIS correct this or explain why the impacts would be the same under both alternatives.

- Suggestions that the Final EIS include additional information on the importance of the big game migratory routes that would be disrupted, to what extent the routes would be impacted, and whether mitigation could help avert consequences to these species and, therefore, to eagles.
- Recommendation that classification differences of the operation-based impacts of burrowing owls under Alternatives 1 and 3 be reconsidered. The commenter also noted potential calculation discrepancies in pygmy rabbit burrows and white-tailed prairie dog colonies under Alternatives 1 and 3.
- Concerns regarding our characterization of the methodology used to define the parameters of pocket gopher mounds and suggestion that the Final EIS acknowledge the science and professional judgment used by SWCA and the BLM in developing these parameters.
- Suggestion to remove references to medusahead because it is not found in the vicinity of the CCSM Phase I Project.

We recognize that the permits under consideration for issuance would authorize take only for eagles. Nonetheless, we believe that under our NEPA responsibilities, it is appropriate to share with the public what information we have about the direct, indirect, and cumulative impacts that might arise from the action that we believe may relate to wildlife resources beyond eagles. We have made numerous additions and corrections to text relating to wildlife based on commenter input, including to Sections 3.6.3.2.1, 3.6.3.2.2, 3.6.3.4.1, 3.6.3.4.2, 3.6.3.5.2, and 3.7.3.4.2.

To address comments about eagle preying on big game carrion, we have added “and carrion” to Section ES.3.5 in first sentence, and we have made this change where appropriate in Section 3.6, Mammals. We are confident in the intensity types selected for each impact criteria related to impacts on mammals. We also disclosed in Section 3.6 that studies have shown less displacement of big game in wind energy facilities than has been reported for oil and gas developments. However, given a paucity of data on big game responses to wind energy development, we feel it is prudent to include discussions of oil and gas development as a surrogate.

As described in Section 3.6.3, operation under Alternative 1 would result in long-term modifications to 256 acres of mule deer crucial winter range, and operation under Alternative 3 would affect 222 acres of mule deer crucial winter range. Although fewer turbines would operate under Alternative 3, most disturbance to crucial winter range for mule deer would be associated with the infrastructure components, as shown in Figure 3-4.

We are confident that the Final EIS appropriately describes suspected big game migration routes, their importance, and potential impacts on these migration routes, and therefore eagles, in Section 3.6.3.

We have classified impacts for burrowing owls the same under both Alternatives 1 and 3, and there are no differences to reconsider. We have checked the data for pygmy rabbit burrows and white-tailed prairie dog colonies and corrected the text as necessary in Chapter 3.0 of the Final EIS. It is important to note the buffers described in the text and to understand what infrastructure would be developed under Alternatives 1 and 3 when attempting to compare

the values with the figures. We also note that the scale of the figures may not allow the reader to confirm the numbers of small mammal colonies or burrows described in the text.

We have revised our discussion of operation impacts on big game and greater sage-grouse to include an analysis of impacts from post-construction bird and bat fatality monitoring. The post-construction bird and bat fatality monitoring described in the ECP and BBCS are the minimum efforts required to adequately monitor and analyze the impacts from the CCSM Phase I Project on birds and bats as required in the ETP and to guide successful and meaningful adaptive management. Furthermore, we have not found that the post-construction monitoring would have a substantial impact on big game and greater sage-grouse when considered in proportion to the construction and operation of the CCSM Phase I Project.

We are confident that the Final EIS appropriately describes the importance of and potential impacts on suspected big game migration routes, and therefore eagles, in Section 3.6.3, complete with all necessary impact criteria.

Discussion of whether pocket gopher mounds are more likely occupied by Wyoming pocket gopher or the more common northern pocket gopher is provided in Section 3.6.2.1.4. Griscom and Keinath (2010) developed a diagnostic tool to determine pocket gopher species occupancy by using easily measurable field variables. We are confident that the text in the Final EIS appropriately describes the decision criteria used by PCW's subcontractor (SWCA) when choosing the parameters for the diagnostic tool. The parameters used by SWCA were adopted in the Final EIS, including the appropriate caveats describing their derivation.

Discussion of medusahead has been removed from the Final EIS.

5.6.18 Tribal Concerns

We received five comments on the Draft EIS related to tribal concerns. These included the following:

- Questions about the proposed project's impacts on cultural resources and environmental justice concerns related to Native Americans
- Request for opportunity for us to partner with area tribes on mitigation and monitoring with the creation of a tribal monitor position
- Concerning the handling of dead and injured eagles, a suggestion that appropriate representatives from tribes be offered the opportunity to ceremonially handle dead and injured eagles, including the use and creation of an in-state repository for dead eagles and a rehabilitation program for injured eagles
- Suggestion that priority be given to the Northern Arapahoe Tribe to use feathers and parts of any salvageable eagles that have been killed by wind turbines
- Concern over the tribal consultation process and timely, meaningful involvement of all interested tribes

We expect to continue to work with tribes and with PCW to explore various opportunities that might benefit tribal interests within the context of the regulatory permit conditions. For example, we are currently engaged in discussions with one tribe and PCW regarding the

potential for providing funding to develop capacity for a tribal eagle rehabilitation program. As new mitigation options are developed, some of these may also create opportunities for tribal involvement. We do not have the authority to require PCW to hire or create a position for a tribal monitor; however, we can provide this suggestion as a recommendation to PCW.

Several tribes have requested that salvageable eagles be sent directly to the tribes, with special interest from tribes with a current or historical connection to Wyoming or the specific area of the CCSM Phase I Project. However, in accordance with our regulations, salvageable eagles from the CCSM Phase I Project must be sent to the National Eagle Repository for subsequent distribution for use by Native Americans without regard to the geographic location of the request.

As noted above, following the close of the Draft EIS comment period, we became aware that notification of the availability of the Draft EIS did not go out to all potentially interested tribes as soon as intended. We heard from some tribes that they may not have had sufficient time to review and respond to the Draft EIS. Our consultation efforts with these tribes are ongoing.

5.6.19 Additional Resource Areas

We received 14 comments on additional resource areas. Comments included the following:

- Recommendations that we analyze differences in habitat quality and/or importance between the Chokecherry Wind Development Area (WDA) and the Sierra Madre WDA, especially with regard to vegetation communities and habitat.
- Suggestions that we quantify and disclose the difference in the acreage of both wetland and riparian zones that would be impacted in each WDA, including jurisdictional and non-jurisdictional wetlands. This would help clarify some apparent discrepancies in the Draft EIS over the acreage of wetland impacts.
- Question regarding differences in analyses provided for Alternatives 1 and 3 in the number of turbines and acreage of developed measures. The commenter recommended that the analysis be expanded in the Final EIS to include additional habitat factors.
- Discussion of endangered species anticipated to be impacted by CCSM Phase I Project, including four federally listed fishes of the Upper Colorado River Basin that could be impacted by water depletions associated with the CCSM Phase I Project. These commenters suggested in a few differing contexts that we review and quantify water use associated with construction impacts for Alternatives 1 and 3 to ensure consistency with the Biological Opinion, which allows a maximum of 200 acre-feet of water consumption per year. Additionally, these commenters recommend disclosing our concurrence with the determination that the CCSM Phase I Project may affect and is likely to adversely affect endangered whooping crane, interior least tern, pallid sturgeon, and western prairie fringed orchid, or the threatened northern Great Plains population of the piping plover, in the central and lower Platte River. Finally, these commenters suggested that the Final EIS resolve or explain these differences in conclusions on the impacts on fish habitat and surface water quality.

Section 3.4.3.2 and 3.4.3.4, respectively, describe the differences in impacts to vegetation and habitat from Alternative 1, which would include both the Chokecherry and the Sierra Madre WDAs, and Alternative 3, which would include only the Sierra Madre WDA.

The amount of water use described in the Draft EIS was erroneous. The CCSM Phase I Project would require 336 acre-feet of water, total, during the 5 years of construction. This is estimated at no more than 105 acre-feet per year maximum, with far less during most years of construction. These water consumption estimates are, therefore, in compliance with our Biological Opinion. Water consumption estimates are not readily available for Alternative 3, but we have added text and a range of potential water usage amounts in the Final EIS to help assess impacts on water resources under each alternative.

The acreage of both wetland and riparian zones that would be impacted in each WDA, including jurisdictional and non-jurisdictional wetlands and the amounts of each vegetation type that would be subject to clearing and grading versus long-term modification under Alternative 3, is presented in Section 3.4 and Table 3-9. We have also revised our discussion of impacts on vegetation for Alternative 3 in the Final EIS to include similar analysis methods used for Alternative 1. Specifically, we have included a table and brief discussion in Section 3.4.3.4.1 to illustrate the change in acres of modification between Alternatives 1 and 3.

In Section 3.3.3.2.1 of the Final EIS we state our conclusion that the recovery program for endangered fish species in the Upper Colorado River basin adequately addresses effects on the species, and no additional conservation measures are needed to reduce impacts from the CCSM Project. Similarly, we concurred with BLM's *likely to adversely affect* determinations for Platte River species and critical habitat.

5.6.20 Cumulative Impacts

Cumulative impacts of the project were noted in 39 comments on the Draft EIS. These included the following:

- Several concerns that we did not offer a robust enough current and future analysis of the combined impact of the CCSM Phase I Project and other regional threats to eagle populations, including ongoing take in the EMU
- Suggestion to add future monitoring for cumulative impacts and the quantify ongoing take at the EMU level
- Requests for greater clarity on how eagle population estimates within the LAP are derived
- Suggestion that estimates and causes of golden eagle mortality are inadequate and do not take into account of USFWS's Bald and Golden Eagles Population Demographics and Estimation of Sustainable Take in the United States, 2016 Update (USFWS 2016c), which objectively quantifies causes of mortality (page 4-61) and states that electrocutions are not a leading cause of death for golden eagles
- Concern that the Draft EIS failed to account for certain threats known to be major contributors to golden eagle mortality, including rodenticide and lead poisoning

- Recommendation to include sagebrush in the cumulative impacts section due to its vulnerability to development, and to include reduced mule deer winter range impacts
- Suggestion to update discussion of recent fossil energy and mineral drilling, mining activity, and other wind energy projects in the area, and comment on the need to include a broader conversation about the cumulative positive impacts of wind energy on climate change

The LAP is determined by extrapolating the average density of eagles in the pertinent EMU to the LAP area, which is a 43-mile (bald eagle) or 140-mile (golden eagle) buffer around the boundaries of the CCSM Phase I Project. These distances are based on natal dispersal distances of each eagle species (see Section 2.1.2.3). We acknowledge two limitations in using the LAP method to regulate incidental take. First, eagle density estimates are derived from nesting or late-summer population surveys; therefore, estimates do not account for seasonal influxes of eagles that occur through migration and dispersal. Second, eagle density estimates are not uniform across the BCRs. Current LAP take thresholds allow us to authorize limited take of eagles while favoring eagle conservation in the face of the uncertainty. Given better information on resource selection, seasonal variation in density, and an improved understanding of seasonal changes in eagle density and population-specific movement patterns, we will refine the LAP analysis in the future to better assess potential impacts of projects. In addition, our ECP guidance (USFWS 2013, Appendix F) acknowledges that a refined approach should be used in the future in place of the assumption of uniform eagle density within the EMUs.

The cumulative estimates of eagle fatalities in Chapter 4.0 are based on data collected in databases maintained by both us and WGFD, and therefore are based on actual fatality observations. Although they are subject to numerous biases, as described in Section 4.4.6.6, they are the best available eagle fatality data for the state of Wyoming. The role of electrocutions as a leading cause of eagle fatalities is described in Section 3.8.3.2.2, noting that eagles account for the majority of bird electrocutions reported in several studies, and is shown in Table 4-15. Table 4-15 is specific to mortalities within the LAP boundary for golden eagles. Although poisoning and lead toxicosis are documented as causes of mortality in USFWS 2016c, the results are based on satellite-tagged golden eagles throughout North America. Consequently, the LAP data (which includes “unknown” and “other” categories that could include poisoning and lead toxicosis) was used as the best source of relevant information for the projected impacts analysis.

All projects requiring an eagle take permit will conduct regular monitoring to evaluate direct impacts to golden and bald eagles, and the monitoring results would be available to the public. Monitoring is intended to identify if actual eagle take is on a trend to exceed take thresholds and additional actions might be necessary to prevent unanticipated cumulative impacts to these species. Monitoring results may also document impacts to other sensitive and protected bird species.

Additional analysis was conducted and documented in Section 4.4.4 to review potential impacts to mule deer crucial winter range. Section 4.3.1.5.4 and Table 4-4 were updated to account for recent economic changes affecting mineral and fossil energy projects. Table 4-2 was updated with changes in existing and reasonably foreseeable future wind energy

projects. Sections of the Final EIS have been revised to incorporate additional information on cumulative effects in consideration of the contribution of wind energy projects, especially relative to global climate change. Discussion was added to relevant resources eliminated from detailed evaluation in Chapter 3.0 (Sections 3.2.6, 3.2.13, and 3.2.14), as well as to relevant resources evaluated in Chapter 4.0 (Sections 4.3.1.5.5, 4.4.1, 4.4.2, 4.4.3, 4.4.4, 4.4.5.5, and 4.4.6.5).

Sections 4.3.1, 4.4.1, 4.4.2, 4.4.3, 4.4.6.6.1, 4.4.6.6.2, 4.4.5, and 4.4.7 of the Final EIS have also been revised to reflect updated information provided by commenters regarding the status of past, present, and reasonably foreseeable future activities.

5.6.21 Statements of Support

We received 19 statements of support for Alternatives 1 or 2. Reasons for support included the following:

- Economic improvement, including jobs, tax revenues, and other economic opportunities that the CCSM Phase I Project will bring to Carbon County
- Support for eagle protection measures and number of birds estimated for take
- Support for renewable and clean energy developments
- Support for the adaptive management and additional monitoring as stipulations for the ETP
- Support for continued partnership with the USFWS

We noted all of the statements of support for various alternatives and for the proposed CCSM Phase I Project.

5.6.22 Statements of Opposition

We received 12 statements of opposition to the CCSM Phase I Project based on concerns about eagle fatalities. Several commenters suggested that wind energy projects should not receive priority over wildlife conservation. Another commenter suggested that engineers design a bird-friendly generator in its place. We noted all of the statements of opposition.

Chapter 6.0
List of Preparers

As required by National Environmental Policy Act (NEPA) regulations (40 Code of Federal Regulations [CFR] 1502.17), Tables 6-1 and 6-2 list the people responsible for preparing, contributing to, and reviewing this Environmental Impact Statement (EIS) for standard and programmatic Eagle Take Permits (ETPs) for the Chokecherry and Sierra Madre (CCSM) Phase I Project. We, the U.S. Fish and Wildlife Service (USFWS), have retained HDR as a third-party consultant to assist with the preparation of this EIS. HDR has certified that it does not have any financial or other interest in the decisions to be made pursuant to this EIS.

Table 6-1. U.S. Fish and Wildlife Service

Name	Role	Organization
Tyler Abbott	Field Supervisor	USFWS – WY Field Office
Emily Bjerre	Wildlife Biologist	USFWS – DMBM, Patuxent Wildlife Research Center
Nathan Darnall	Lead Biologist	USFWS – WY Field Office
Michael Dixon	Wildlife Biologist	Former USFWS – Region 6
Louise Galiher	NEPA Assistant Manager	USFWS – Region 6
Kelly Hogan	NEPA Assistant Manager	USFWS – Region 6
Kevin Kritz	Lead Biologist	USFWS – Region 6
Clint Riley	Project Manager; Assistant Regional Director, Migratory Birds	USFWS – Region 6
Brian Smith	Acting Chief, Migratory Bird Management Division	USFWS – Region 6
Casey Stemler	Chief, Migratory Bird Conservation Division	USFWS – Region 6

Table 6-2. HDR

Name	Role	Organization
Tina Adair	Copy Editor	HDR – Anchorage, AK
Sirena Brownlee	Biologist; Birds (Other than Eagles) Analysis	HDR – Denver, CO
Brian Goss	Resources Dismissed and Cumulative Section Lead	HDR – Omaha, NE
Stuart Gottlieb	GIS Lead	HDR – Vienna, VA
Kim Gust	Technical Editor	HDR – Omaha, NE
Erin Hatchett	Biologist; Eagle Analysis	HDR – Fort Worth, TX
Nate Jones	Biologist; Avian and Eagle Analysis Lead	HDR – Anchorage, AK
Tara Kent	Biologist; Administrative Record	HDR – Denver, CO
Scott Krych	Biologist; Eagle Analysis	HDR – Minneapolis, MN
Elizabeth Leclerc	Cultural Resources Lead	HDR – Portland, ME
Anna Lundin	Project Manager	HDR – Denver, CO
Michael Perkins	Biologist; Water, Fish, and Vegetation Analysis Lead	HDR – Salt Lake City, UT
Angela Piner	Assistant Project Manager	HDR – Minneapolis, MN
Kurt Rautenstrauch	Biological Resources Advisor	HDR – Las Vegas, NV
Scott Reed	Project Principal	HDR – Minneapolis, MN
Donna Robertson	Biologist; EIS Section Lead	HDR – Anchorage, AK
Alan Stanfill	Cultural Resources Advisor	HDR – Syracuse, NY
Cathy Storey	Document Manager	HDR – Denver, CO
John Timpone	Biologist; Mammal Analysis Lead	HDR – Boise, ID
Stephanie White	Public Involvement Lead	HDR – Denver, CO

Chapter 7.0
Glossary

A	
accipiters	Small to medium-sized agile hawks most frequently found in forested areas.
activity areas	Locations, particularly near the wind turbine sites, where grasses may be mowed and shrubs may be cut or partially cut for a short period during construction, but no clearing or grading would occur.
advanced conservation practices (ACPs)	"Scientifically supportable measures that are approved by the [U.S. Fish and Wildlife] Service [USFWS] and represent the best available techniques to reduce eagle disturbance and ongoing mortalities to a level where remaining take is unavoidable" (50 Code of Federal Regulations [CFR] 22.3).
aeries	Highly elevated nests of raptors, which are typically substantial structures built in inaccessible locations such as cliffs, mountaintops, or the tops of tall, isolated trees, and which are used year after year.
agency	An organization, company, or bureau that provides some service for another; an administrative division of a government. The ability to act out of free will.
alluvium	A deposit of clay, silt, sand, and gravel left by flowing streams.
apex predators	Predators at the top of the food chain, with no natural predators of their own.
applicant committed measures (ACMs)	Measures to which the Power Company of Wyoming LLC (PCW) has committed that are intended to avoid, minimize, rectify, reduce, or eliminate potential environmental impacts to the extent possible.
B	
best management practice (BMP)	A practice, or combination of practices, that is determined to be an effective and practicable (including technological, economic, and institutional considerations) means of preventing or reducing environmental impacts.

Bird and Bat Conservation Strategy (BBCS)	A document referenced in the USFWS' land-based wind energy guidelines wherein project proponents document their strategies and commitments to avoid and minimize impacts on migratory birds and bats during construction, operation, maintenance, and decommissioning. PCW submitted a BBCS for the Chokecherry and Sierra Madre (CCSM) Phase I Project to USFWS in August 2015 (see Attachment B).
Bird Conservation Regions (BCRs)	Ecologically distinct regions in North America with similar bird communities, habitats, and resource management issues established by the North American Bird Conservation Initiative.
Birds of Conservation Concern (BCCs)	Species, subspecies, and populations of all migratory nongame birds that, without additional conservation actions, are likely to become candidates for listing under the Endangered Species Act (ESA). BCCs are identified by the USFWS in accordance with the 1988 amendment to the Fish and Wildlife Conservation Act.
BLM FEIS and ROD	The Bureau of Land Management (BLM) developed a programmatic Environmental Impact Statement (EIS) analyzing the proposed CCSM Project. The Final EIS (FEIS) was released on July 3, 2012. The Record of Decision (ROD) was signed on October 9, 2012. The term "BLM FEIS and ROD" is used to reference these documents collectively. Otherwise, the terms "BLM FEIS" and "BLM ROD" are used.
buteos	Hawks with robust bodies, long, broad wings, and relatively short, fan-shaped tails.
C	
carrion	The dead and decaying flesh of an animal.
CCSM Phase I Project	A wind energy project with 500 turbines and a variety of supporting infrastructure, to be located in two wind development areas (WDAs): Chokecherry and Sierra Madre. The CCSM Phase I Project would be sited in the western portions of the Chokecherry and Sierra Madre WDAs and is the focus of PCW's Eagle Take Permit (ETP) applications that have triggered this EIS.
CCSM Phase II Project	A separate wind energy project consisting of 500 additional turbines, which may be proposed by PCW in a reasonably foreseeable time period. The CCSM Phase II Project would be sited in the eastern portions of the Chokecherry and Sierra Madre WDAs. The CCSM Phase II Project is considered as a reasonably foreseeable future action in the cumulative impacts analysis, but would require a separate permitting process and National Environmental Policy Act (NEPA) analysis.

CCSM Project	A proposed 1,000-turbine wind energy project located in Carbon County, Wyoming, south of the city of Rawlins. The CCSM Project is divided into two projects. The CCSM Phase I Project, the subject of this EIS, would consist of 500 wind turbines capable of producing 1,000 to 1,500 megawatts (MW) of wind energy and a variety of supporting infrastructure. The CCSM Phase II Project, which could be developed at a later date, would consist of an additional 500 wind turbines capable of producing 1,000 to 1,500 MW of wind energy.
Chokecherry Wind Development Area (WDA)	The northern portion of the proposed project. The Chokecherry WDA is located entirely east of Wyoming State Highway (WYO) 71. Under the development scenario proposed by PCW, the Chokecherry WDA would be divided east-west by a haul road that would be built to serve construction and operation of the CCSM Project. The Chokecherry WDA includes 202 of the 500 turbines proposed for the CCSM Phase I Project.
compensatory mitigation	Actions to reduce eagle mortality or increase carrying capacity to a no-net-loss standard, meaning that the actions either reduce another ongoing form of mortality to a level equal to or greater than the unavoidable mortality, or lead to an increase in carrying capacity that allows the eagle population to grow by an equal or greater amount.
conifers	Cone-bearing trees and shrubs, chiefly evergreens.
cryptogamic crusts	Thin crusts made up of mosses, lichens, algae, and bacteria that promote the germination of potential forage plants.
D	
disjunct seasonal ranges	Areas of habitat that are separated by areas of non-habitat or less favorable habitat.
disturb	As defined under the Bald and Golden Eagle Protection Act (BGEPA), “to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available, (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior” (50 CFR 22.3).

E	
EA1	The first Environmental Assessment (EA) prepared by BLM for the CCSM Project and tiered to the 2012 BLM FEIS. EA1 is titled "Environmental Assessment for Infrastructure Components: Phase I Haul Road and Facilities, West Sinclair Rail Facility, and Road Rock Quarry," and was finalized in December 2014 (BLM 2014).
EA2	The second EA prepared by BLM for the CCSM Project and tiered to the 2012 BLM FEIS. EA2 is titled "Environmental Assessment for Phase I Wind Turbine Development" and is a draft dated March 2016 (BLM 2016a). EA2 analyzes the 500 wind turbines and pads, access roads, and associated components for the CCSM Phase I Project.
Eagle Conservation Plan (ECP)	A plan that documents how an applicant intends to comply with the regulatory requirements for a programmatic ETP and the associated NEPA process by avoiding and minimizing the risk of taking eagles up front, and formally evaluating possible alternatives in siting, configuration, and operation of wind energy projects. Preparation of an ECP is voluntary. For the CCSM Phase I Project, the ECP was prepared to address both the standard and programmatic ETPs.
eagle management units (EMUs)	Regional eagle population management areas defined in the Final EA for the eagle take permit rule (USFWS 2009). For bald eagles, EMUs largely follow USFWS regional boundaries. For golden eagles, EMUs follow BCRs.
eagle productivity	The number of fledglings produced.
eagle take	To "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, or disturb" a bald or golden eagle (50 CFR 22.3).
Eagle Take Permit (ETP)	A permit issued by the USFWS that could authorize take of bald and golden eagles or their nests when the take is associated with, but not the purpose of, an otherwise lawful activity and cannot practicably be avoided. *See also* standard ETP *and* programmatic ETP.
ecoregion	An area within which ecosystems (and the type, quality, and quantity of environmental resources) are generally similar. Also known as an ecological region.
emergent	Type of wetland characterized by rooted herbaceous and grasslike plants and in which vegetation is present for most of the growing season in most years.

experimental advanced conservation practices (EACPs)	ACPs implemented at wind energy facilities on an experimental basis. The USFWS has not currently approved any ACPs for wind energy projects. *See also* advanced conservation practices (ACPs).
F	
fatality	Death or the occurrence of death.
footprint	The amount of space that is covered by something, such as the initial clearing and grading area, construction activities, or project components.
H	
hibernacula	Caves and mines where bats hibernate.
HUC-12 sub-watershed	The smallest type of watershed identified by the U.S. Geological Survey (USGS) and assigned a 12-digit unique identification number known as a hydrologic unit code (HUC).
I	
impaired waterbody	A waterbody that does not attain water quality standards (that is, designated uses, numeric and narrative criteria, and anti-degradation requirements defined at 40 CFR 131).
infrastructure area	The area that encompasses the infrastructure components that would be built for Phase I development.
infrastructure components	Infrastructure needed to support wind energy development for the CCSM Phase I Project. Components include the Phase I Haul Road and Facilities, West Sinclair Rail Facility, and Road Rock Quarry, along with other utilities as described in EA1.
initial clearing and grading area	The total area that would be cleared for construction of the CCSM Phase I Project, including long-term modification areas and areas that would be revegetated and reclaimed following construction.
invasive plant species	A species that is not native to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health (Executive Order [EO] 13112).
L	
lacustrine	Wetland system associated with open water bodies such as lakes, reservoirs, and impounded rivers.
lek	Area where birds gather during the breeding season for community courtship displays to attract mates.
local area population (LAP)	The eagle population within the average natal-dispersal distance from a project footprint. This distance is 43 miles for bald eagles and 140 miles for golden eagles (USFWS 2009).

long-term modification areas	Areas within the initial clearing and grading areas that would be maintained throughout operation of the CCSM Phase I Project and rehabilitated during project decommissioning. Long-term modification areas include areas where aggregate fill material would be placed for wind turbine sites, roads, laydown yards, and other sites that would be used during project operation.
M	
mean inter-nest distance (MIND)	The mean distance between nests of the same eagle species in and near a proposed wind energy project. This distance is used to evaluate which nesting pairs of eagles use the project footprint regularly and are at risk of collision with wind turbines.
mesic	Characterized by the presence of a moderate amount of moisture or water.
meteorological tower	Tower erected to measure meteorological events such as wind speed, direction, and air temperature.
mortality	The death of a large number of individuals.
N	
natal dispersal	The movement between hatching location and first breeding or potential breeding location. The natal dispersal distance is 43 miles for bald eagles and 140 miles for golden eagles (USFWS 2009).
no-net-loss standard	The requirement that compensatory mitigation actions either reduce another existing cause of mortality to a level equal to or greater than the unavoidable mortality, or lead to an increase in carrying capacity that allows the eagle population to grow by an equal or greater amount (USFWS 2013b).
noxious weed	"A plant species designated by federal or state law as generally possessing one or more of the following characteristics: aggressive and difficult to manage; parasitic; a carrier or host of serious insects or disease; or non-native, new, or not common to the United States" (BLM 2007).
O	
obligate	A species that is dependent on a specific habitat for all or a portion of its lifecycle.
Occupied nest	A nest that was occupied at least once during the last 5 years or last 5 years of field surveys, specifically between 2008 and 2012.

occupied nest	A nest used for breeding in the current breeding season by a pair of raptors (particularly eagles). Presence of an adult, eggs, or young, freshly molted feathers or plucked down, or current year's mutes (whitewash) suggest nest occupancy. In years when food resources are scarce, it is not uncommon for a pair of eagles to occupy a nest yet never lay eggs; such nests are considered occupied.
orographic lift	An air mass forced from a low elevation to a high elevation as it moves over rising terrain.
P	
paleontological resources	Fossil evidence of plants and animals.
palustrine	A broad category of freshwater wetlands (such as marshes, bogs, and swamps) dominated by trees, shrubs, emergent herbaceous plants, floating leaved and submergent plants, or mosses and lichens.
parasite	A species that benefits from another species at the expense of the second.
passerines	Perching birds.
Power Company of Wyoming LLC (PCW)	The project proponent and the applicant for the ETPs that have triggered this EIS.
Programmatic Agreement	An agreement developed by the BLM for the CCSM Project in consultation with the Wyoming State Historic Preservation Office, the Advisory Council on Historic Preservation, PCW, and other interested parties. The Programmatic Agreement formalizes the BLM's obligations for identifying and evaluating historic resources, addressing inadvertent discoveries, and mitigating impacts.
programmatic Eagle Take Permit (ETP)	A permit issued by the USFWS for eagle take that may recur through the life of a project and is applicable where the location, timing, and amount of take are all unknown. Issuance of a programmatic ETP requires implementation of conservation measures, and potentially compensatory mitigation, to reduce the potential for eagle take and to meet the no-net-loss standard for eagles within a designated area. The programmatic ETP may be issued for a maximum of a 5-year period. PCW applied for a programmatic ETP for operation of the CCSM Phase I Project.
promontory	Raised mass of land declining abruptly from one side.
Proposed Action in this EIS	The USFWS' decision on whether to issue standard and programmatic ETPs for the CCSM Phase I Project.

R	
raptors	Birds of prey.
right-of-way (ROW) grant	An authorization to use a specific piece of public land for certain specified purposes, such as roads, pipelines, telephone lines, electric lines, and reservoirs, for a specific period of time.
riparian	Relating to or living or located on the bank of a natural watercourse such as a river or stream.
riparian/mesic lowland communities	Areas along the bank of a river or stream that have a moderate or well-balanced supply of moisture.
riverine	Relating to, formed by, or resembling a river; living or situated on the banks of a river or stream.
rotor-swept zone	The airspace through which wind turbine blades spin.
S	
scrub-shrub	Wetland areas dominated by woody vegetation less than 20 feet tall.
secondary food source	A food source used when primary food sources are not available.
Sierra Madre Wind Development Area (WDA)	The southern portion of the proposed project. The Sierra Madre WDA is divided by WYO 71, and the majority of the wind development acreage would be located west of the highway. The Sierra Madre WDA includes 298 of the 500 turbines proposed for the CCSM Phase I Project.
site-specific plan of development (SPOD)	A document that discusses detailed plans to develop a project or a portion of a project. This document is required by BLM as part of a ROW grant application for wind energy projects on lands administered by BLM.
species of concern	"For a particular wind energy project, any species which 1) is either a) listed as an endangered, threatened or candidate species under the Endangered Species Act, subject to the Migratory Bird Treaty Act or Bald and Golden Eagle Protection Act; b) is designated by law, regulation, or other formal process for protection and/or management by the relevant agency or other authority; or c) has been shown to be significantly adversely affected by wind energy development, and 2) is determined to be possibly affected by the project" (USFWS 2012a).

Species of Greatest Conservation Need (SGCN)	Species identified in Wyoming's State Wildlife Action Plan as those "whose conservation status warrants increased management attention, and funding, as well as consideration in conservation, land use, and development planning in Wyoming. SGCN designation can be derived from known population or habitat threats or a lack of sufficient information to adequately assess a species' status" (Wyoming Game and Fish Department [WGFD] 2010b).
stakeholders	Members of the public, non-governmental agencies, and elected officials who may or do have a stake in a proposed action.
standard Eagle Take Permit (ETP)	A permit issued by the USFWS that authorizes individual instances of take (including nest disturbance during construction activities) where the location, timing, and amount of take are all known. PCW applied for a standard ETP for construction of the CCSM Phase I Project.
T	
take	As defined under BGEPA, to "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest, or disturb" (50 CFR 22.3). *See also* eagle take. As defined under the Migratory Bird Treaty Act (MBTA), "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture or collect" a migratory bird (50 CFR 10.12). As defined under the ESA, "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" a species protected under the ESA (16 United States Code [U.S.C.] 1532).
temporal patterns	Time-based patterns.
thermal convection	Vertical atmospheric currents produced by solar heating of the ground, also known as thermals.
traditional cultural property (TCP)	A property that has significance to a community of people, including Native Americans, based on beliefs and customs passed on over time.
turbine hazardous area	Calculated as the 3-dimensional cylindrical volume around a turbine from ground level to a height of 200 meters (650 feet).
U	
undulating	Having a wavy form or surface.
ungulate	Mammal with hooves.
Unoccupied nest	A nest that was not occupied between 2008 and 2012.

unoccupied nest	A nest not selected by a pair of raptors (particularly eagles) for use in the current breeding season. The nest is determined unoccupied by the continuing absence of any adult, egg, or dependent young at the nest over the course of repeated observations during the breeding season. An unoccupied eagle nest may be used by eagles in future nesting seasons and remains protected under BGEPA.
W	
watershed	An area of land where all of the water (rainfall and snowmelt) drains to a common outlet.
wetland	Lands where the water table is usually at or near the surface or the land is covered by shallow water. Wetlands have one or more of the following three attributes: 1) at least periodically, the land supports predominantly hydrophytes (plants specifically adapted to live in wetlands); 2) the substrate is predominantly undrained hydric (wetland) soil; and 3) the substrate is nonsoil and is saturated with water or covered by shallow water at some time during the growing season of each year.
white-nose syndrome (WNS)	A disease caused by a fungus that affects cave-hibernating bats. WNS is estimated to have killed up to 6.7 million bats in the eastern United States and Canada (USFWS 2012d; Reeder and Moore 2013).
Wind Development Area (WDA)	The area surrounding and including the wind turbines. The CCSM Phase I Project includes two WDAs. Within the Chokecherry WDA, the CCSM Phase I Project would include 202 turbines, primarily located west of the Phase I Haul Road. Within the Sierra Madre WDA, the CCSM Phase I Project would include 298 turbines in the areas occurring west of WYO 71.
X	
xeric	Characterized by, relating to, or requiring only a small amount of moisture.

Chapter 8.0
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Note: Non-peer-reviewed literature used in this EIS is denoted with an asterisk (*).

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