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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.

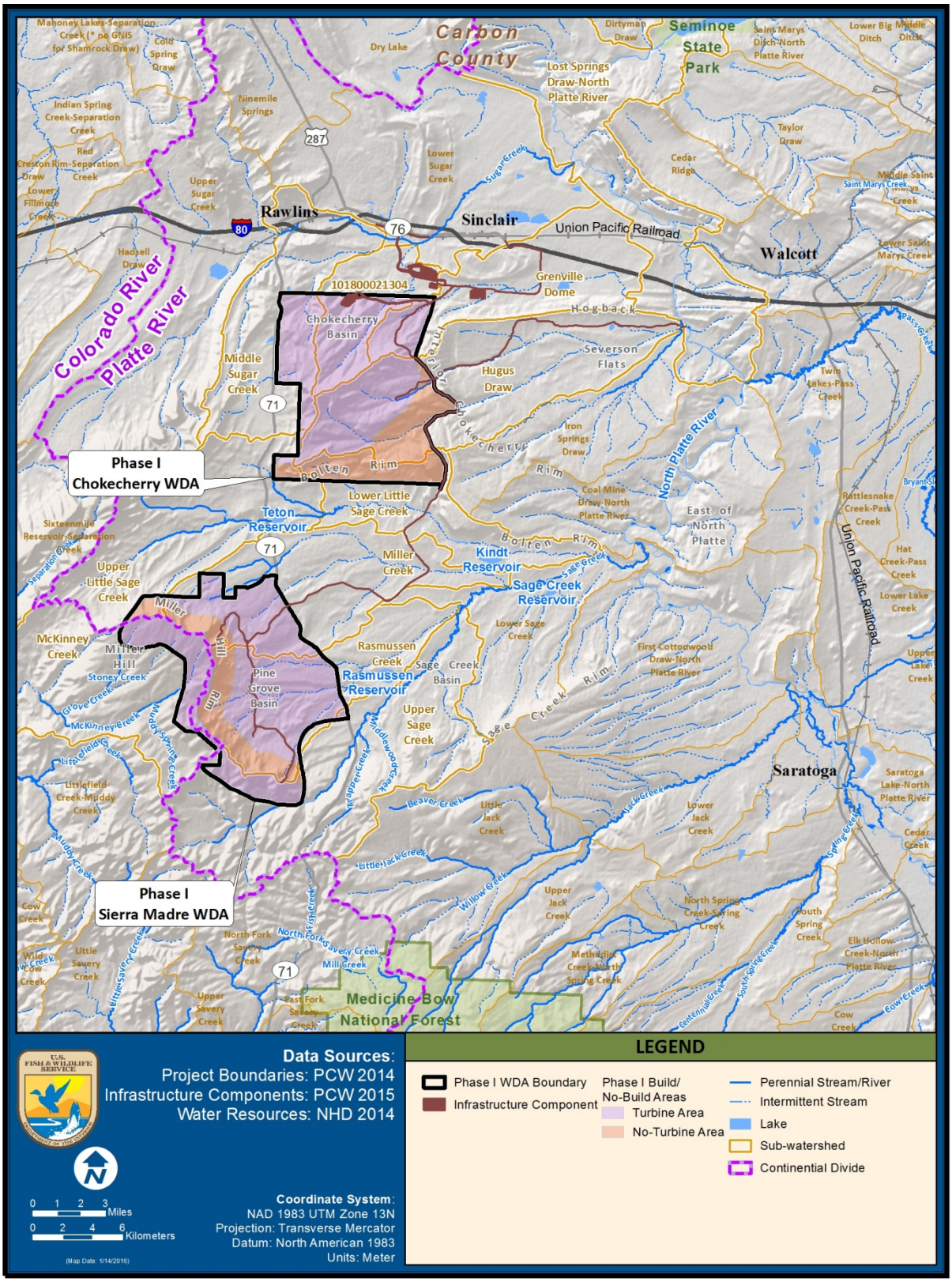

Figure 3-1. Water Resources in the Phase I Development and Infrastructure Areas for the CCSM Phase I Project in Wyoming

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.

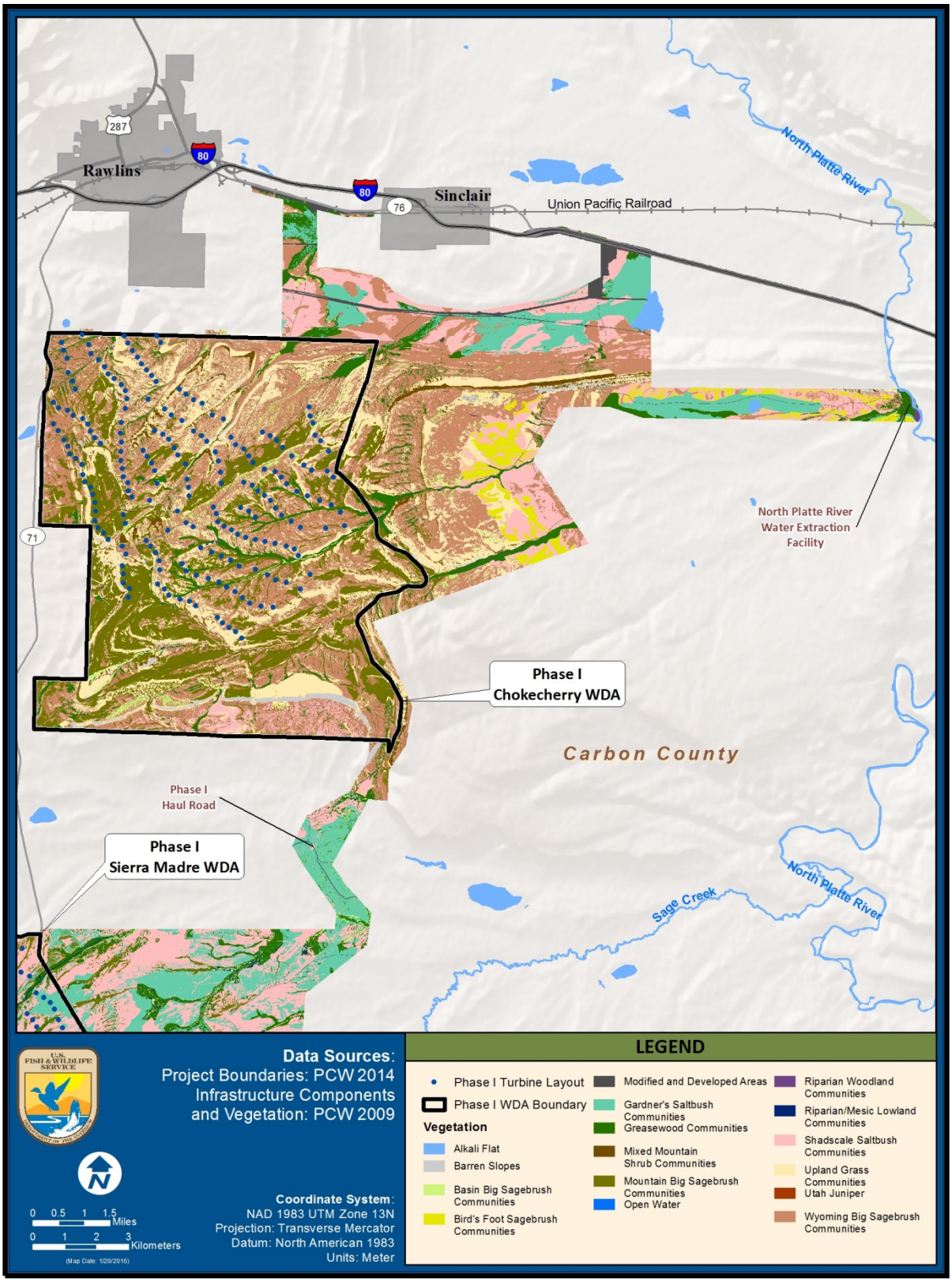

Figure 3-2. Vegetation Communities in the Phase I Chokecherry Wind Development Area and Infrastructure Areas for the CCSM Phase I Project in Wyoming

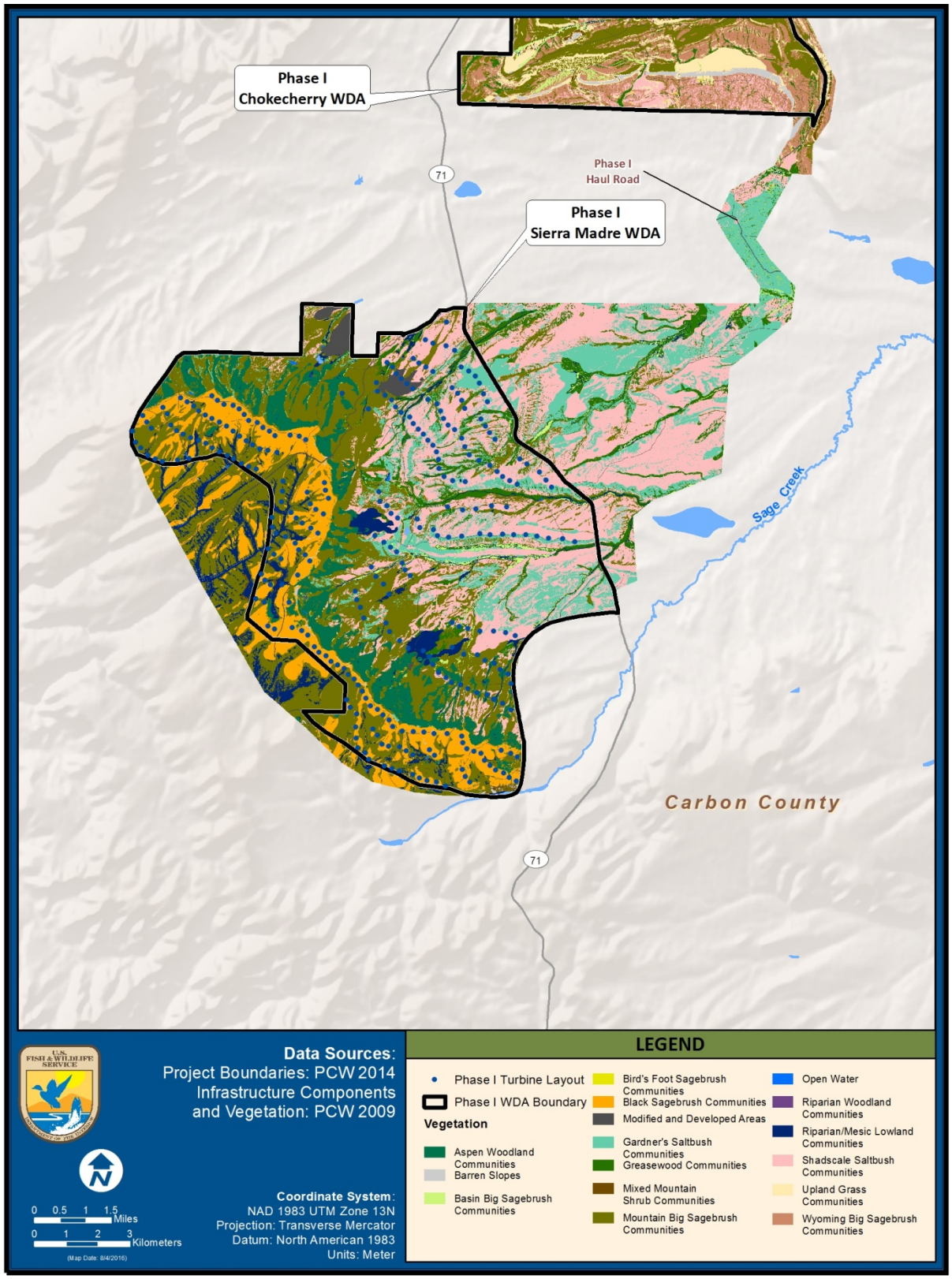

Figure 3-3. Vegetation Communities in the Phase I Sierra Madre Wind Development Area and Infrastructure Areas for the CCSM Phase I Project in Wyoming

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.

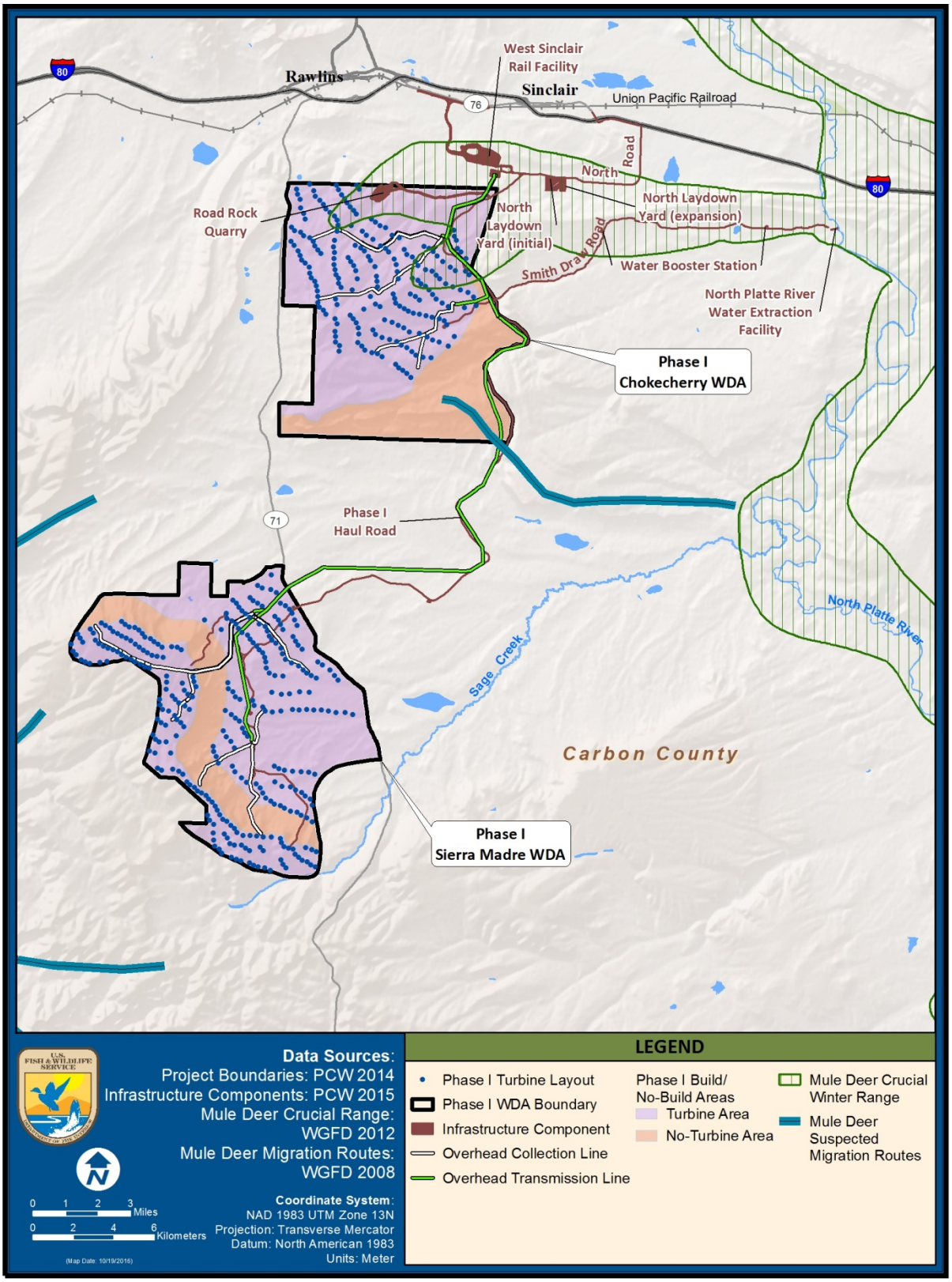

Figure 3-4. Mule Deer Suspected Migration Routes and Crucial Winter Range in and near the Phase I Development and Infrastructure Areas for the CCSM Phase I Project in Wyoming

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.

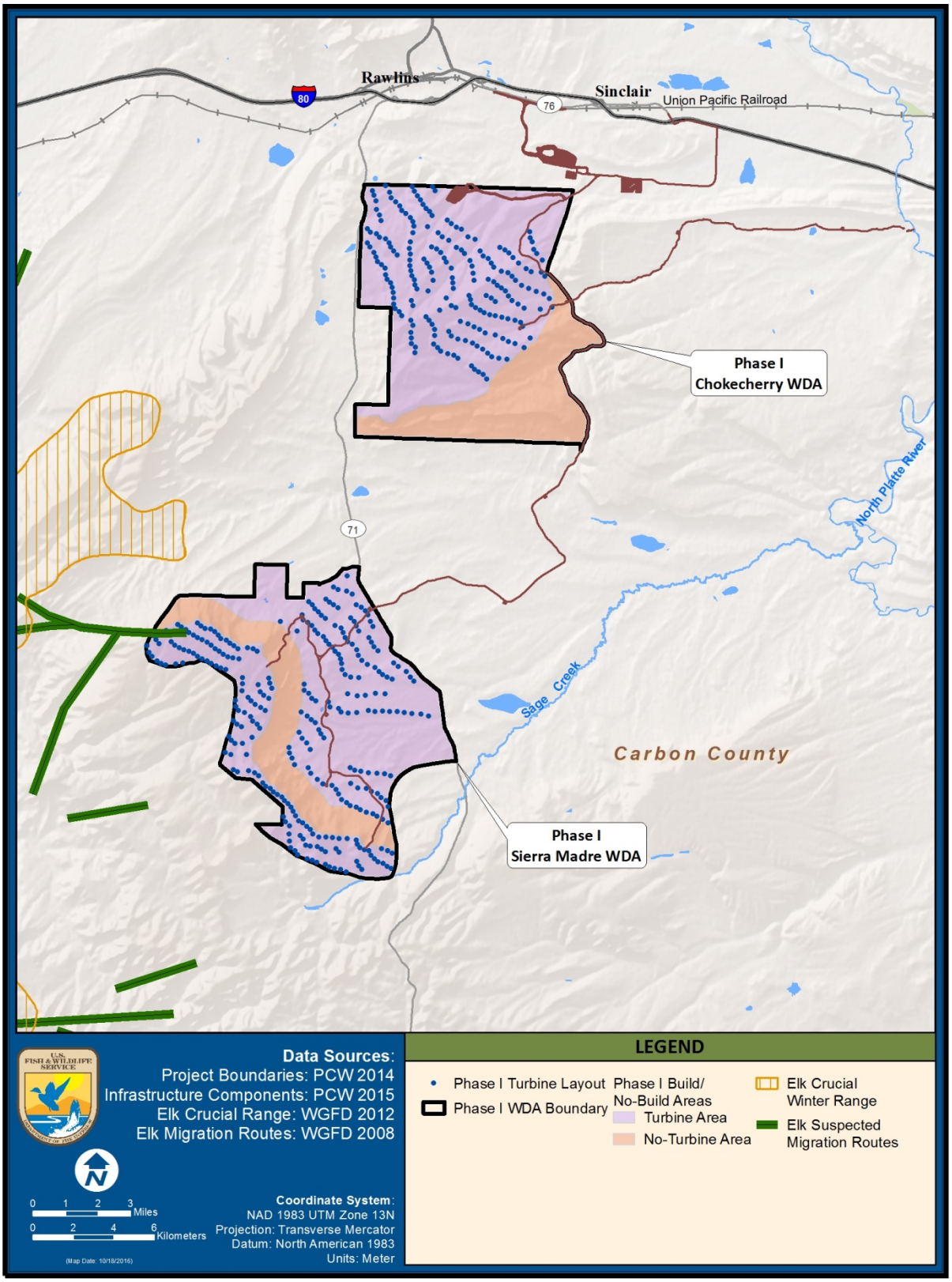

Figure 3-5. Elk Suspected Migration Routes and Crucial Winter Range in and near the Phase I Development and Infrastructure Areas for the CCSM Phase I Project in Wyoming

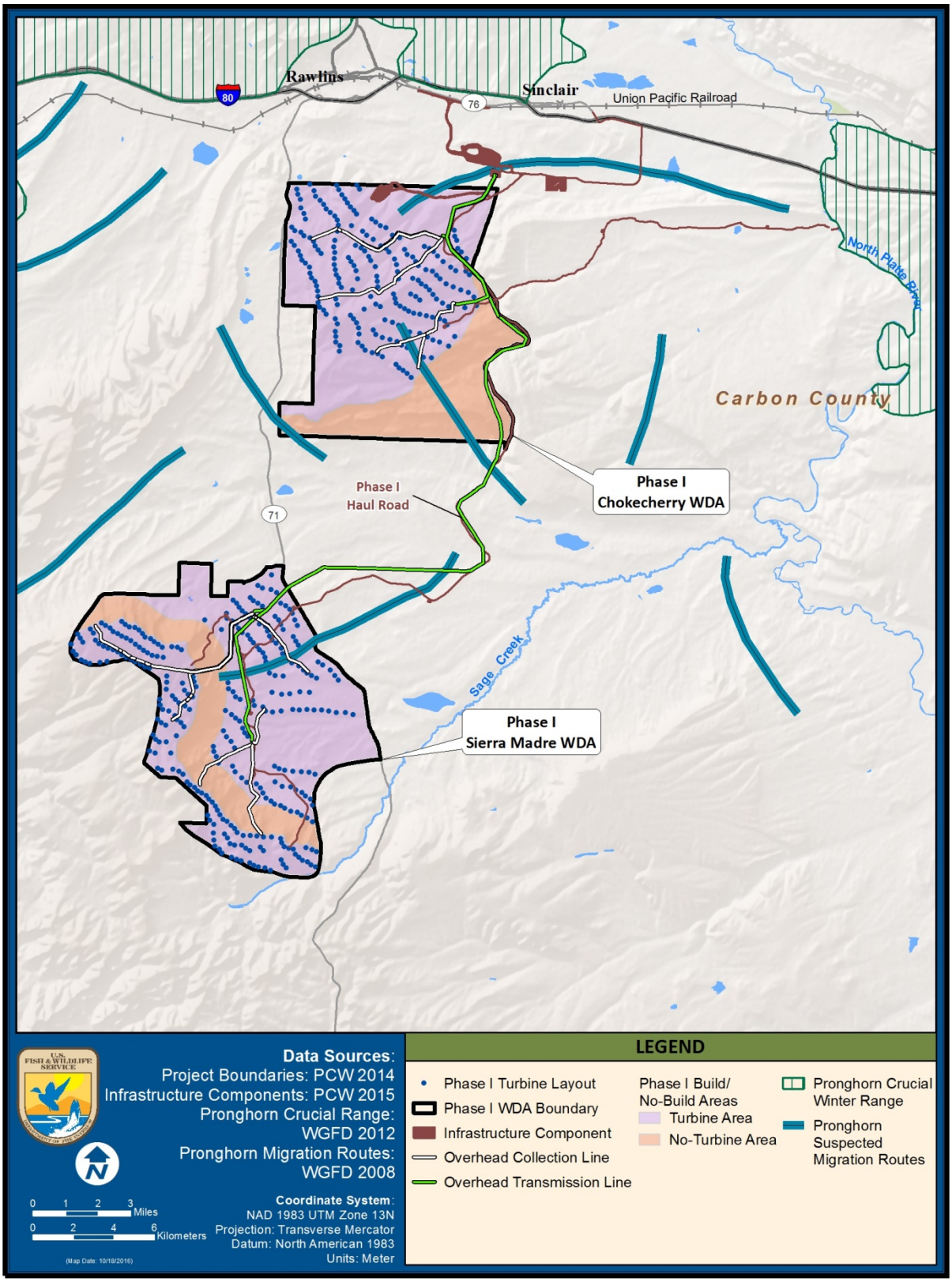

Figure 3-6. Pronghorn Suspected Migration Routes and Crucial Winter Range in and near the Phase I Development and Infrastructure Areas for the CCSM Phase I Project in Wyoming

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).

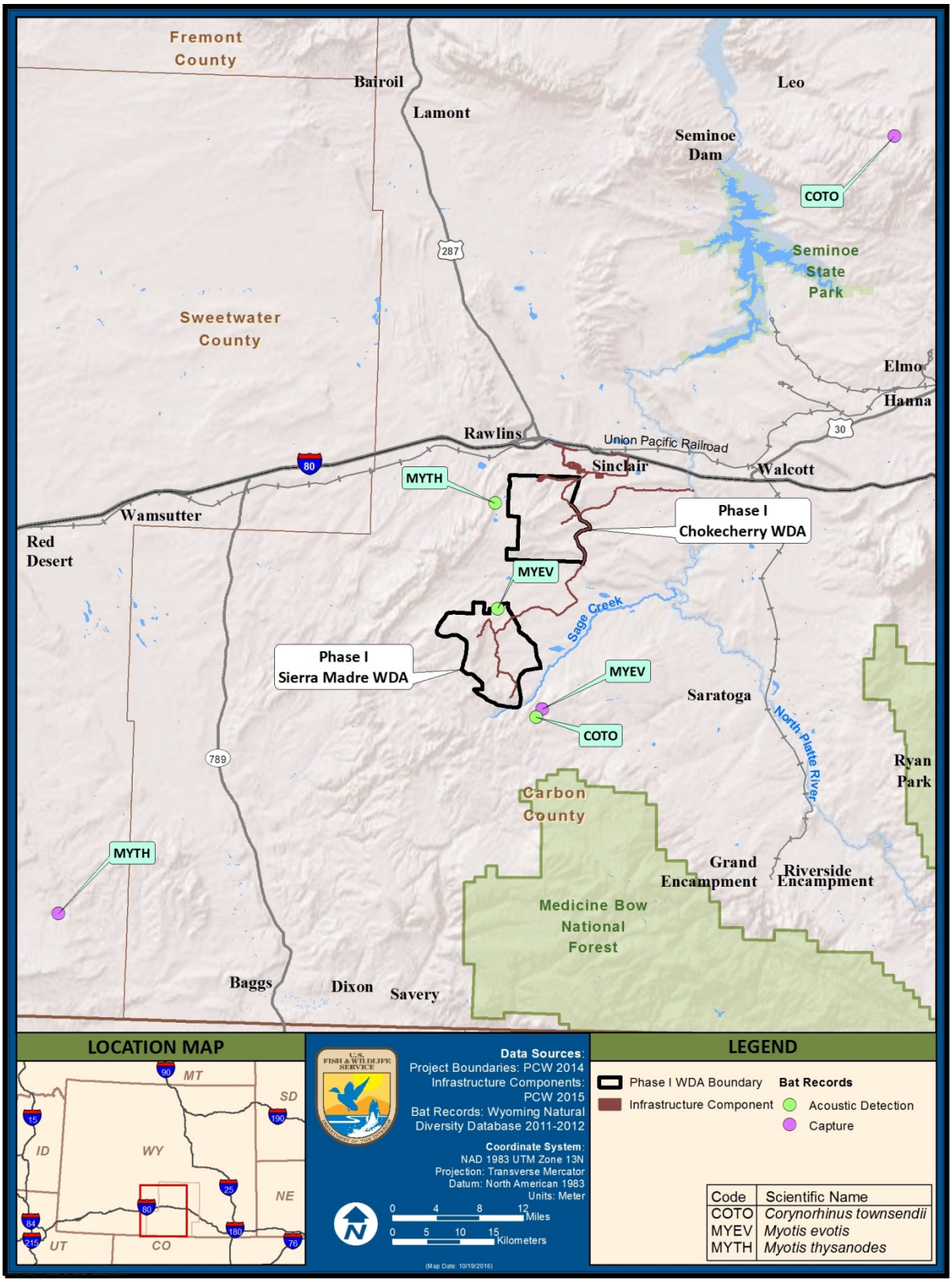

Figure 3-7. Bat Species Distribution in and near the Phase I Development and Infrastructure Areas for the CCSM Phase I Project in Wyoming

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).

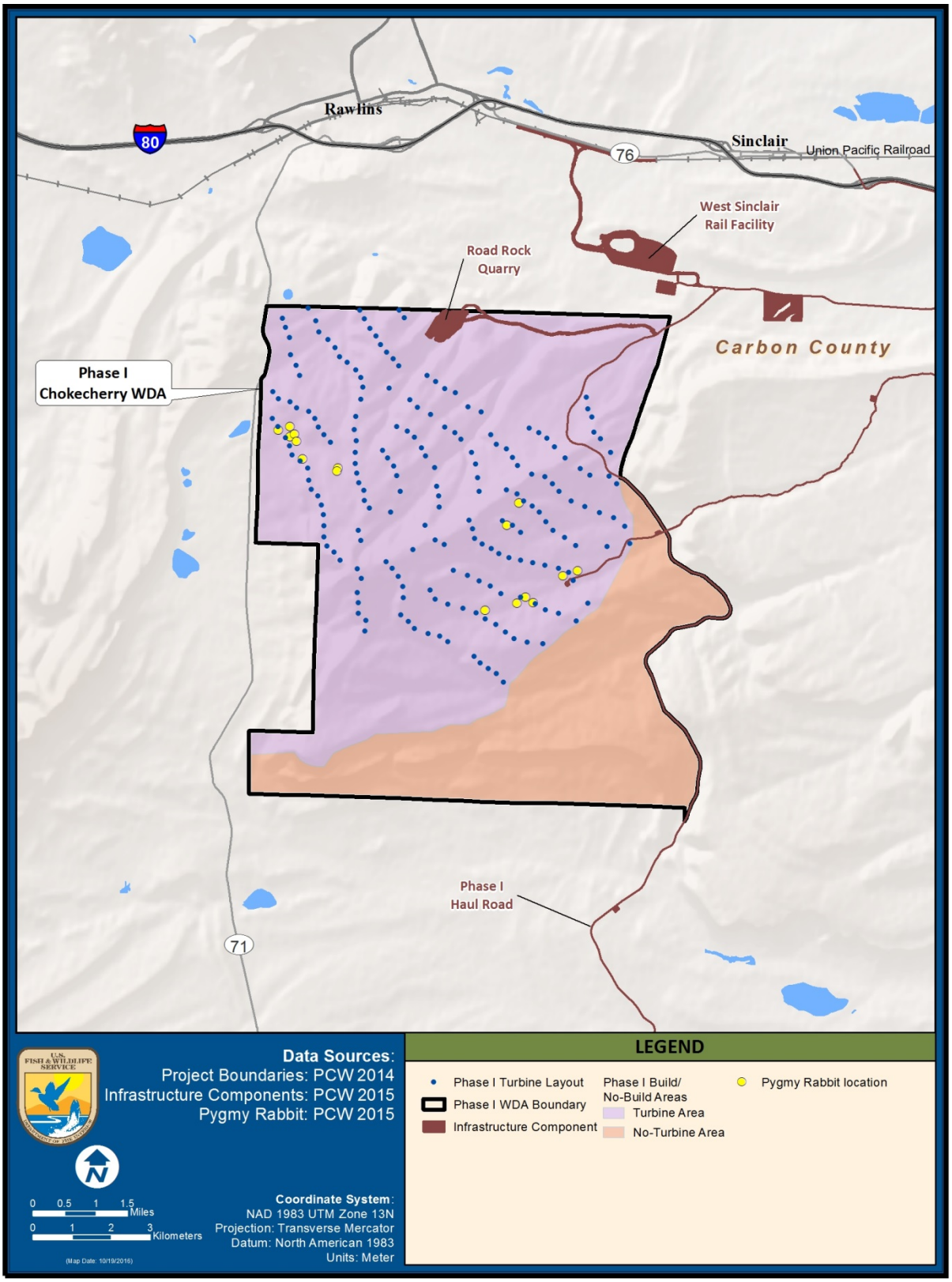

Figure 3-8. Pygmy Rabbit Occurrence in the Phase I Chokecherry Wind Development Area and Infrastructure Areas for the CCSM Phase I Project in Wyoming

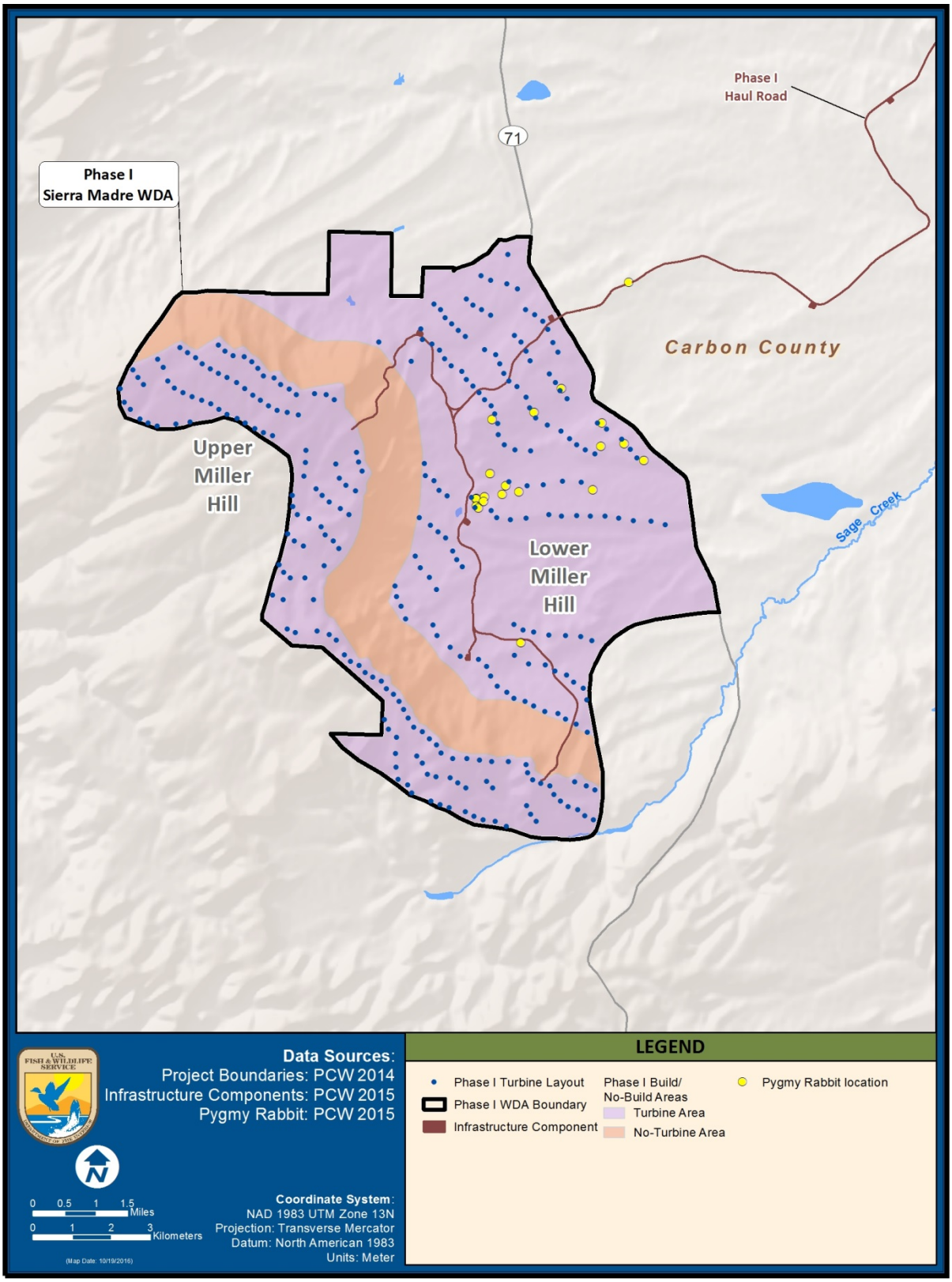

Figure 3-9. Pygmy Rabbit Occurrence in the Phase I Sierra Madre Wind Development Area and Infrastructure Areas for the CCSM Phase I Project in Wyoming

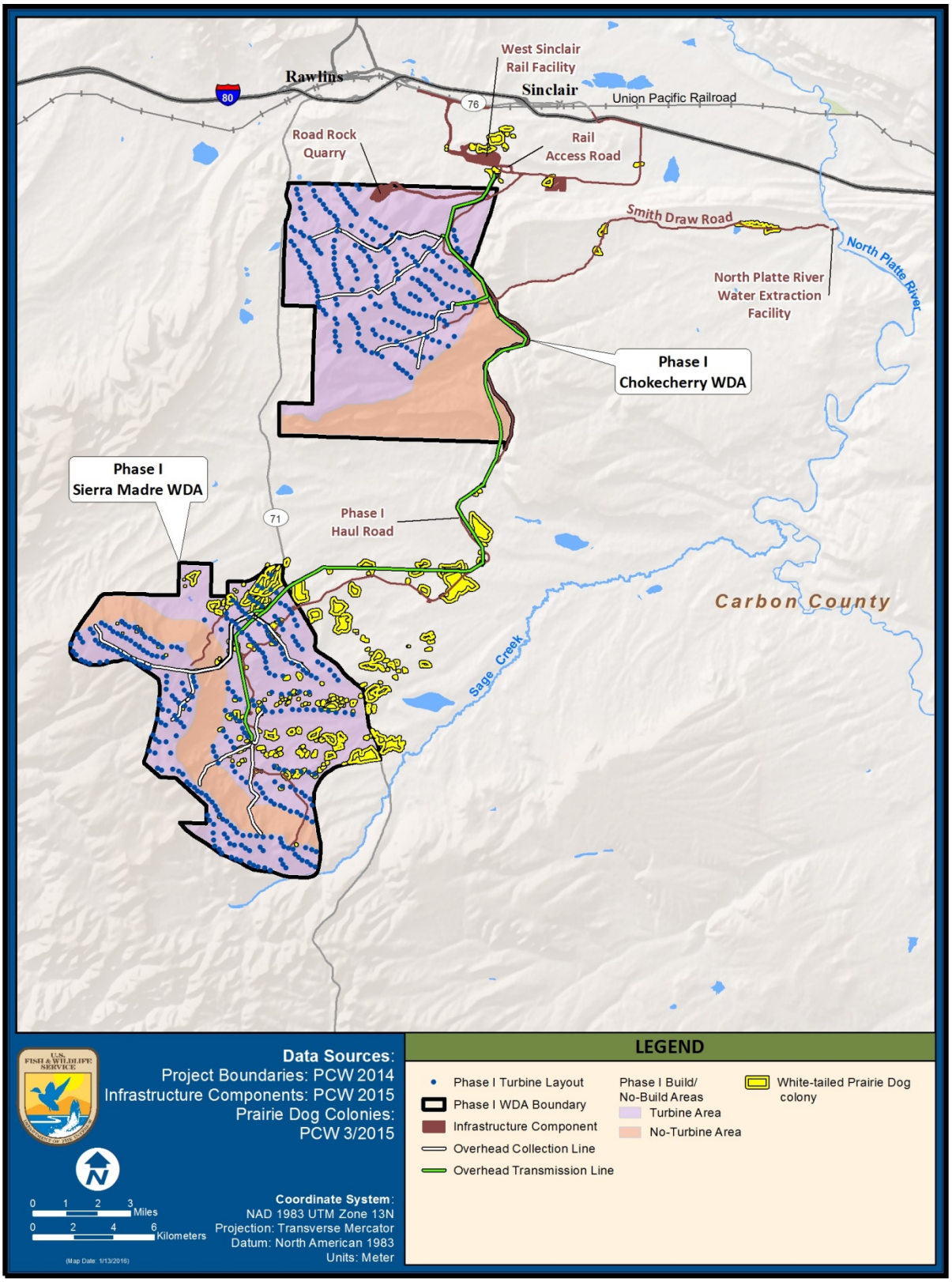

Figure 3-10. Occupied and Unoccupied White-tailed Prairie Dog Colonies in and near the Phase I Development and Infrastructure Areas for the CCSM Phase I Project in Wyoming

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).

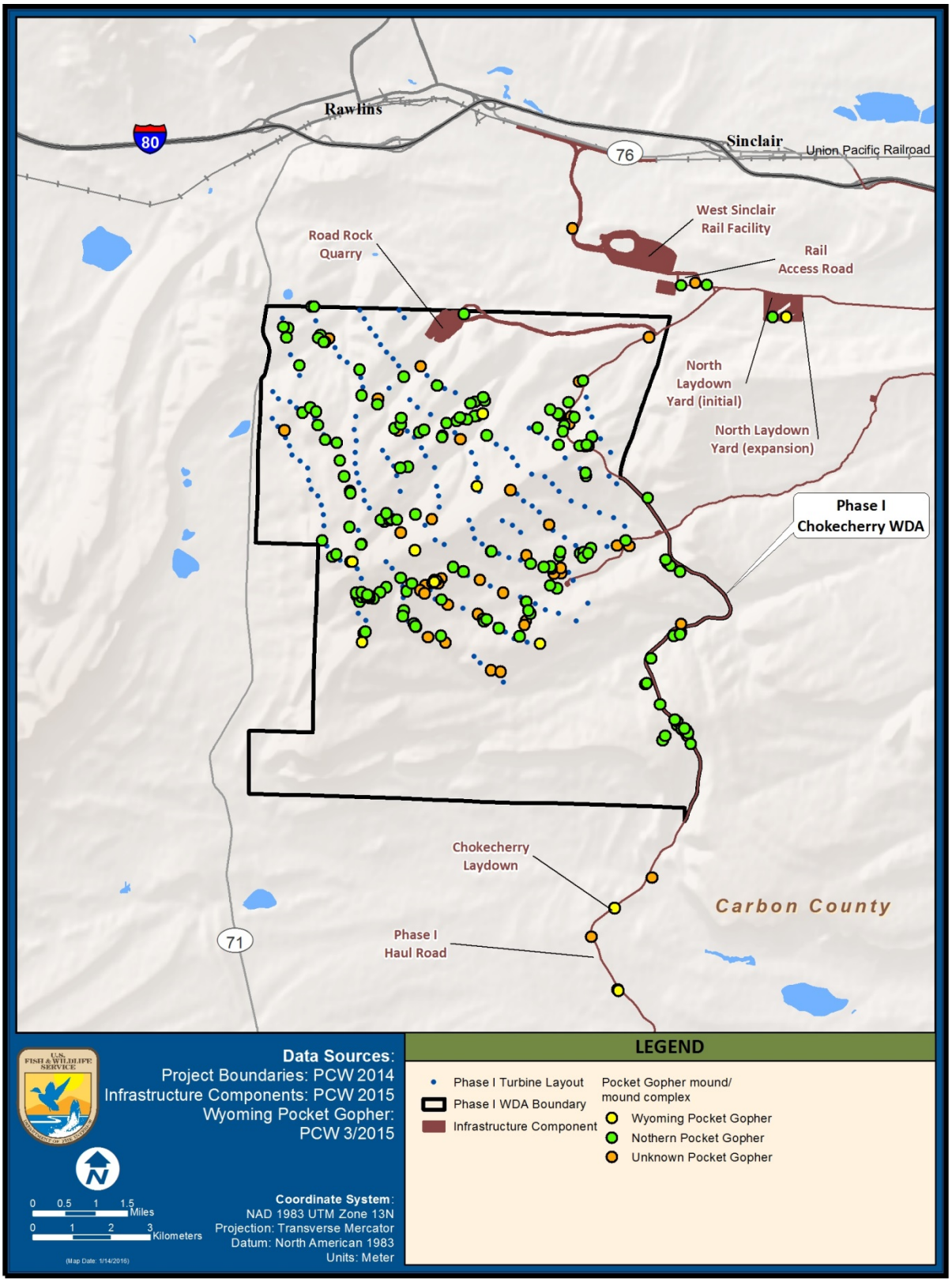

Figure 3-11. Wyoming Pocket Gopher Occurrence in the Phase I Chokecherry Wind Development Area and Infrastructure Areas for the CCSM Phase I Project in Wyoming

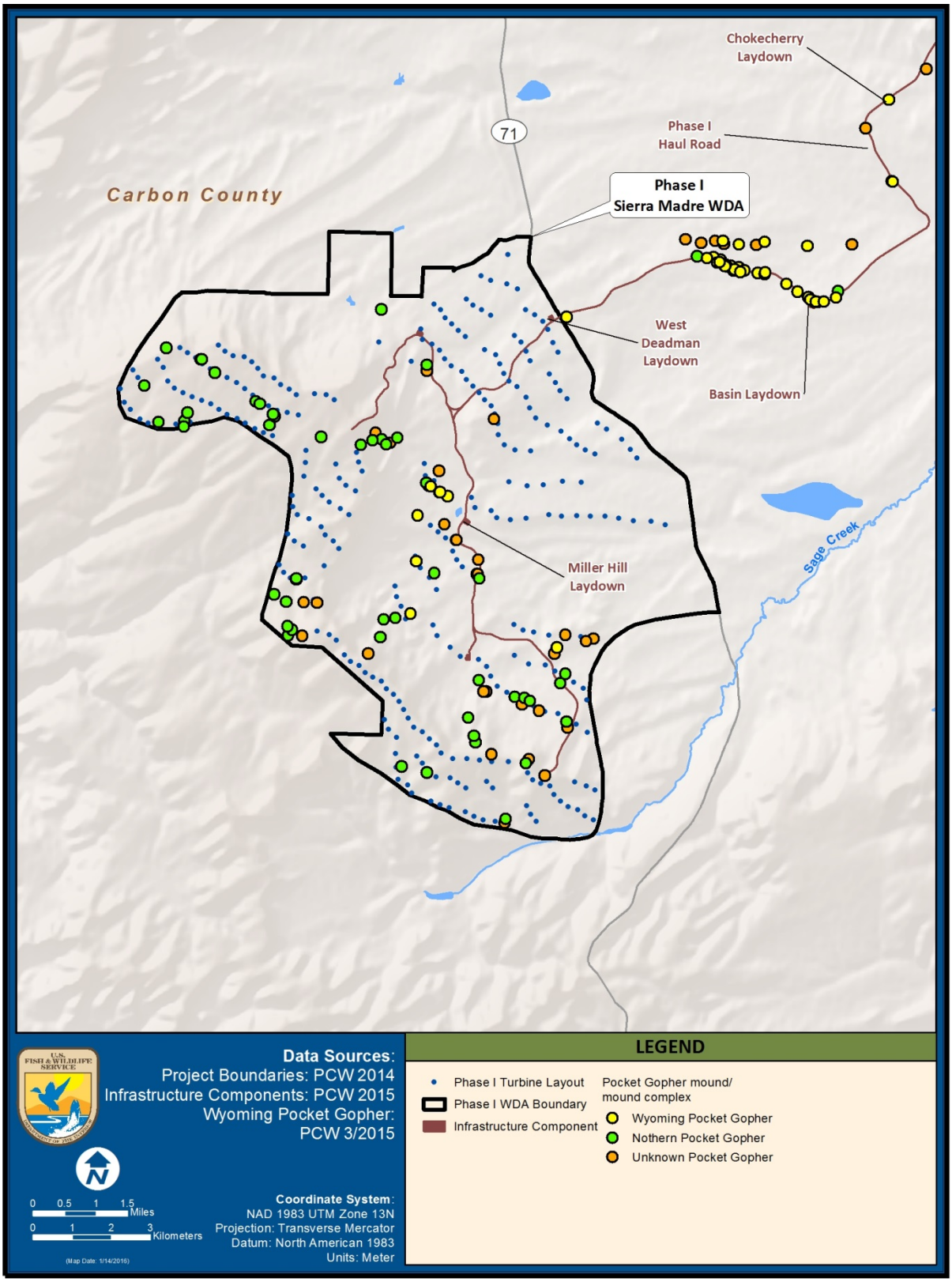

Figure 3-12. Wyoming Pocket Gopher Occurrence in the Phase I Sierra Madre Wind Development Area and Infrastructure Areas for the CCSM Phase I Project in Wyoming

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.

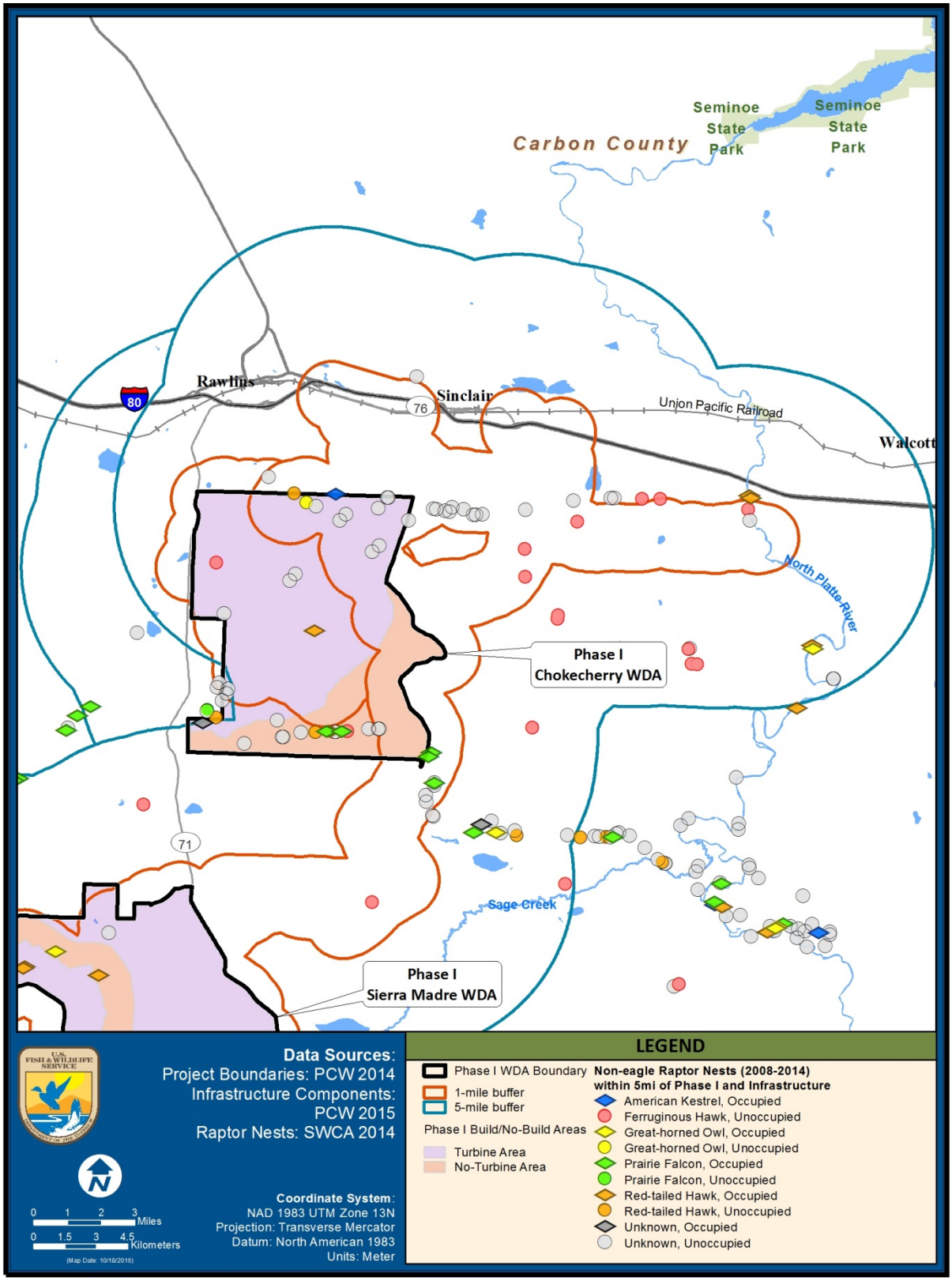

Figure 3-13. Non-Eagle Raptor Nests within 5 miles of the Phase I Chokecherry Wind Development Area and Infrastructure Areas for the CCSM Phase I Project in Wyoming, based on surveys from 2008 and 2011 to 2014

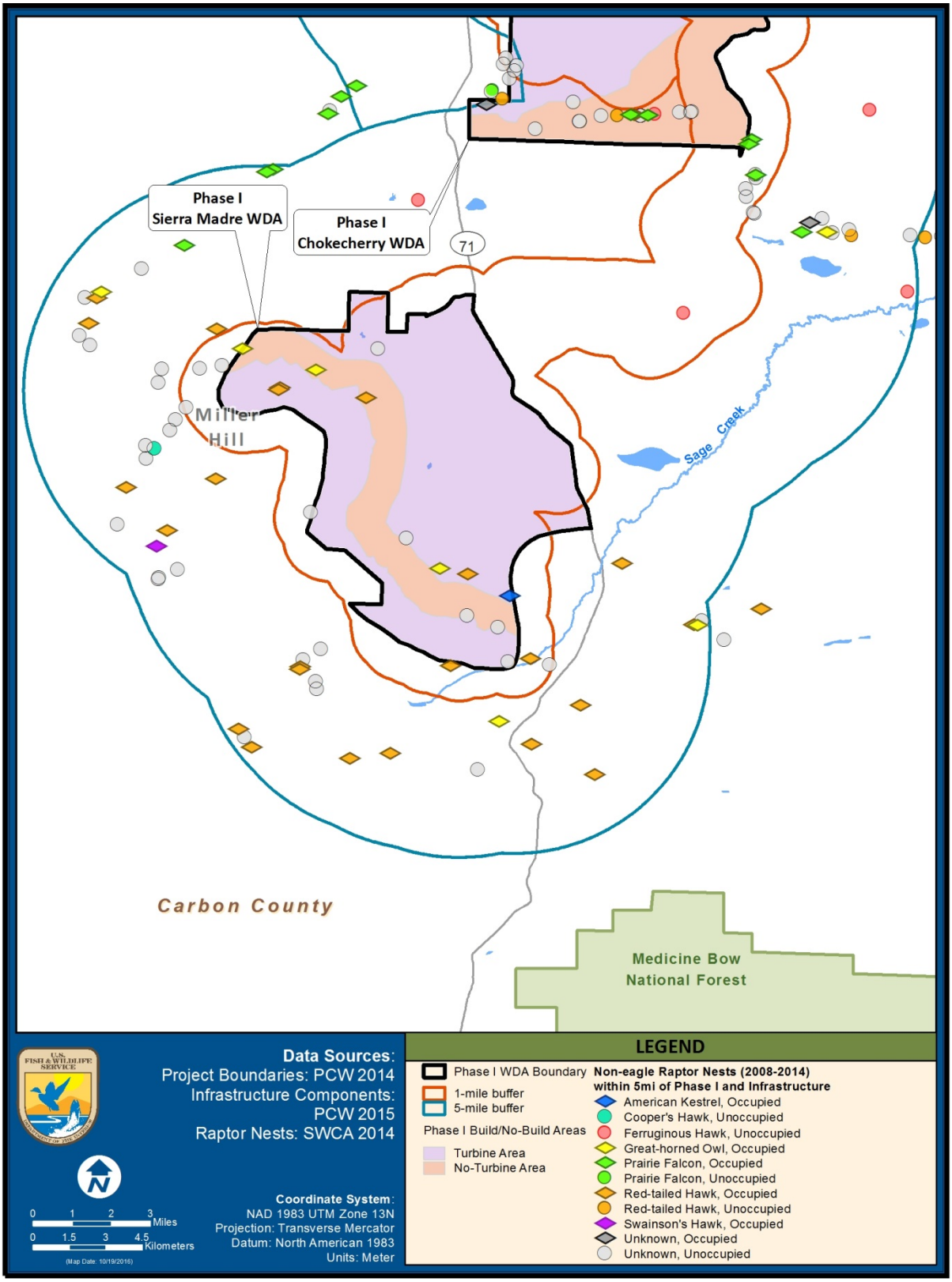

Figure 3-14. Non-Eagle Raptor Nests within 5 miles of the Phase I Sierra Madre Wind Development Area and Infrastructure Areas for the CCSM Phase I Project in Wyoming, based on surveys from 2008 and 2011 to 2014

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).

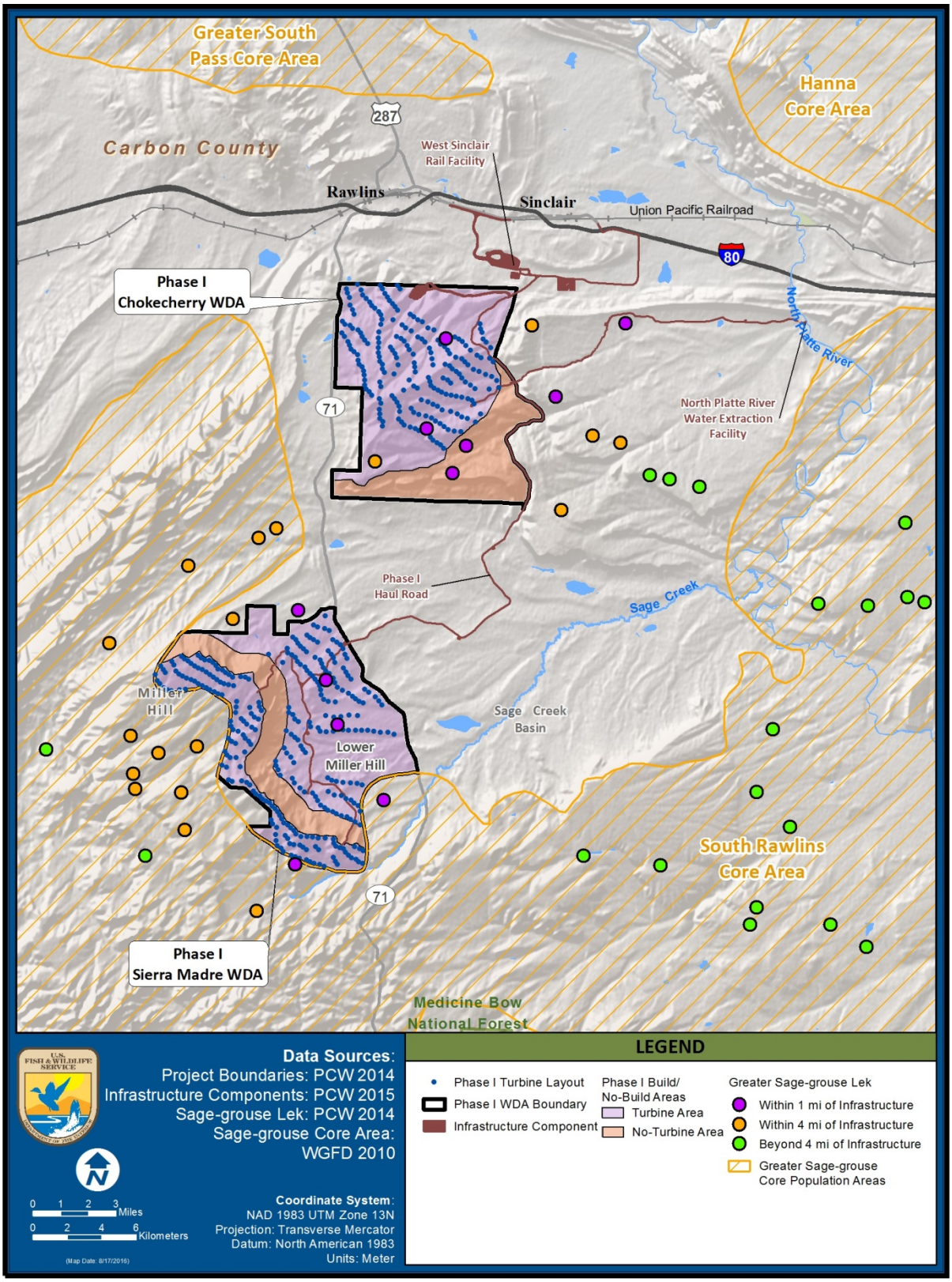

Figure 3-15. Greater Sage-Grouse Leks within 1 and 4 miles of the Phase I Development and Infrastructure Areas for the CCSM Phase I Project in Wyoming, 2010-2014

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.

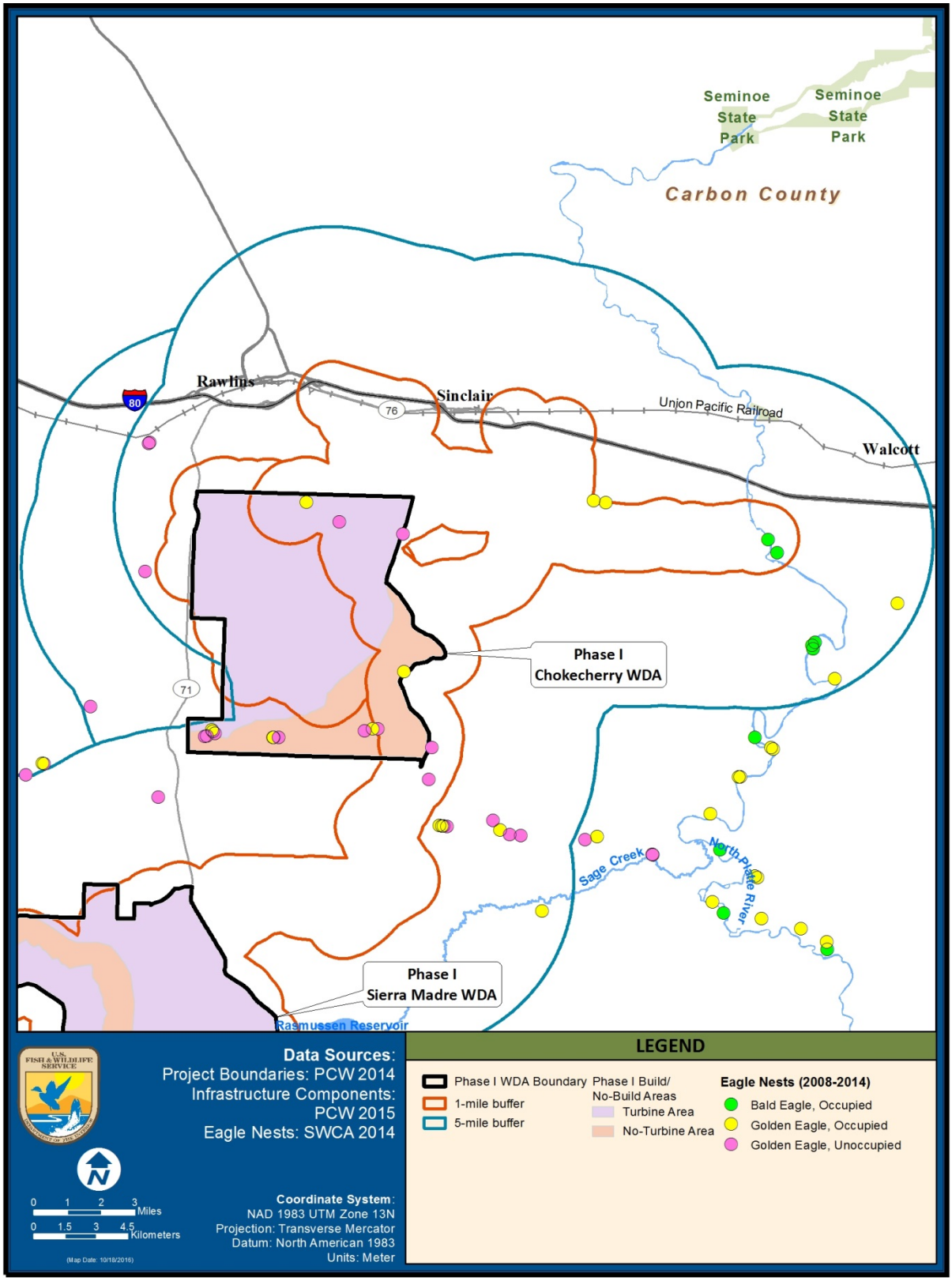

Figure 3-17. Occupied and Unoccupied Eagle Nests in and within 5 miles of the Phase I Chokecherry Wind Development Area and Infrastructure Areas for the CCSM Phase I Project in Wyoming, based on surveys from 2008 and 2011 to 2014

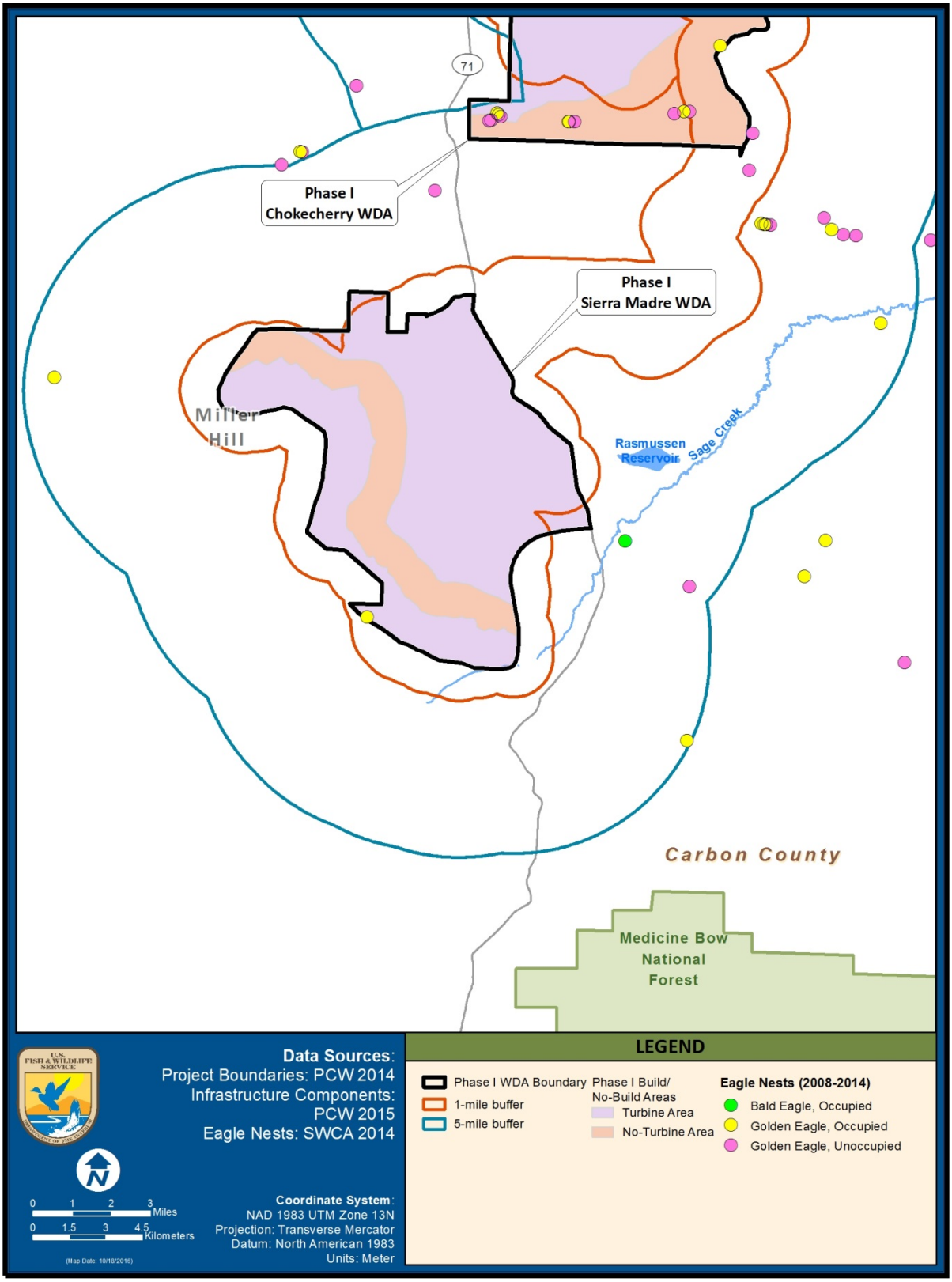

Figure 3-18. Occupied and Unoccupied Eagle Nests in and within 5 miles of the Phase I Sierra Madre Wind Development Area and Infrastructure Areas for the CCSM Phase I Project in Wyoming, based on surveys from 2008 and 2011 to 2014

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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