Attachment 1
Final Environmental Assessment
Alta East Wind Project Eagle Conservation Plan

U.S. Fish and Wildlife Service

Final Environmental Assessment

Alta East Wind Project Eagle Conservation Plan

California

Docket Number FWS-R8-MB-2015-N183
FF08M00000-FXMB12310800000-145

Prepared by:

U. S. Fish and Wildlife Service Pacific Southwest Region
Migratory Birds and Habitats
2800 Cottage Way, W-2650 Sacramento, CA 95825
Contact: Heather Beeler, Eagle Permit Coordinator 916-414-6651

September 2016

Contents

Appendices

Tables

Figures

Acronyms and Abbreviations

ACEC	Area of Critical Environmental Concern
ACP	advanced conservation practice
Alta East	Alta East Wind Project
APLIC	Avian Power Line Interaction Committee
APP	Avian Protection Plan
applicant	Alta Wind X, LLC
BCR	Bird Conservation Region
Eagle Act	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
CDCA	California Desert Conservation Area
CDFW	California Department of Fish and Wildlife
CEQA	California Environmental Quality Act
CFR	*Code of Federal Regulations*
CPUC	California Public Utilities Commission
DEA	Draft Environmental Assessment
EA	Environmental Assessment
ECP	Eagle Conservation Plan
ECP Guidance	Eagle Conservation Plan Guidance
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ESA	Endangered Species Act of 1973, as amended
FEA	Final Environmental Assessment
FEIR	Final Environmental Impact Report
FEIS	Final Environmental Impact Statement
FLPMA	Federal Land Policy and Management Act
FONSI	Finding of No Significant Impact
FR	*Federal Register*
GHG	greenhouse gas
MBTA	Migratory Bird Treaty Act
MM	mitigation measure
MW	megawatt(s)
NEPA	National Environmental Policy Act of 1969
NFWF	National Fish and Wildlife Foundation

Permit	Programmatic Eagle Take Permit
REA	resource equivalency analysis
Region 8	Pacific Southwest Region
ROD	Record of Decision
ROW	right-of-way
RWQCB	Regional Water Quality Control Board
Service	U.S. Fish and Wildlife Service
SR	State Route
turbine	wind turbine generator
U.S.C.	*United States Code*
WDR	Waste Discharge Requirement
WRA	Wind Resource Area

CHAPTER 1

Purpose and Need

1.1 Introduction

We, the U.S. Fish and Wildlife Service (Service), have prepared this Final Environmental Assessment (FEA) pursuant to the National Environmental Policy Act (NEPA) (42 *United States Code* [U.S.C.] 4321 et seq.). This FEA evaluates the effects of issuing a programmatic eagle take permit (permit) under the Bald and Golden Eagle Protection Act (Eagle Act) (16 U.S.C. 668–668d and 50 *Code of Federal Regulations* [CFR] 22.26) for take that is incidental to otherwise lawful activities associated with operation of the Alta East Wind Project as described in the Alta East Wind Project eagle conservation plan (ECP). Our *Eagle Conservation Plan Guidance Module 1: Land-based Wind Energy* Version 2 (Service 2013a; ECP Guidance) recommends that eagle take permit applications include an ECP, or similar documentation, that details the impacts of the project on affected eagle species and how these impacts will be avoided, minimized, and mitigated in order to maintain stable or increasing populations of eagles.

The applicant, Alta Wind X, LLC, is requesting Eagle Act programmatic take coverage for operational activities associated with the Alta East Wind Project (Alta East; project). This company is a former affiliate of Terra-Gen Power, LLC, and current affiliate of NRG Yield, Inc. The applicant has requested a 5-year programmatic take permit for golden eagles (*Aquila chrysaetos*) under the Eagle Act at Alta East. The applicant's ECP (Appendix A) is the foundation of the permit application for the operational Alta East Wind Project (Alta East). The applicant worked closely with the Service and the Bureau of Land Management (BLM) to develop the ECP to assure that it contains commitments to avoid, minimize, and mitigate adverse effects on eagles.

Our consideration to issue an eagle take permit constitutes a discretionary Federal action that is subject to NEPA. The applicant is requesting a permit for the take of three eagles over the 5-year duration of a permit. This FEA evaluates potential impacts that could result from the issuance of the programmatic eagle take permit based on the Alta East ECP or alternatives to the proposed ECP. It is intended to assist us in evaluating effects on the human environment and in assessing the significance of the impacts that could result from the alternatives. "Significance" under NEPA is defined by regulation at 40 CFR 1508.27, and requires short- and long-term consideration of both the context of a proposal and its intensity. As with any NEPA process, if all components have undergone equal analysis, the final proposal may include all or some components of a single alternative. Or, it may include a combination of components from more than one alternative.

1.2 Background

In 2013, the BLM and Kern County authorized Alta Wind X, LLC, to construct and operate a wind energy generation facility with up to 51 wind turbine generators, ancillary facilities, and supporting infrastructure that would generate up to 153 megawatts (MW) of electricity (see Table 1-1). Following construction, NRG Yield acquired Alta Wind X, LLC, from Terra-Gen Power. The project is located on approximately 2,300 acres on the southern side of State Route (SR) 58 in southeastern Kern County, California, within and adjacent to the Tehachapi Wind Resource Area (Tehachapi WRA).

The Tehachapi WRA is an area of existing wind development located in a mountain pass area spreading into the adjacent Mojave Desert. The wind resource area designation is not a legally defined area, but was initially described by the California Public Utilities Commission (CPUC) and wind industry representatives as a boundary for analysis of impacts for the Tehachapi Renewable Transmission Project Environmental Impact Report (EIR) (CPUC and USDA Forest Service 2009). The Tehachapi WRA description is used for the same purpose in this FEA. The Tehachapi WRA currently has more than 5,000 utility-scale wind turbines that produce over 3,000 MW of electricity. Wind development in the Tehachapi WRA began in the early 1980s.

The area hosts a multitude of wind farms, comprising one of California's largest wind resource areas. The WRA is undergoing much repowering activity. The area has multiple generations of wind turbine technology installed. The old generation turbines generate kilowatts, and the modern turbines installed generate up to 3 megawatts.

TABLE 1-1
Summary of Permits and Authorizations Required for Alta East

Permit/Authorization	Responsible Agency	Status
Federal Land Policy and Management Act (FLPMA) Title V Right-of-Way (ROW) Type 3 Grant and for a Plan Amendment (PA)	BLM	Issued May 30, 2013
Final Environmental Impact Statement	BLM	Record of Decision issued May 23, 2013
Final Environmental Impact Report	Kern County	Notice of Determination issued January 29, 2013
Biological Opinion	Service	Issued May 8, 2013
Eagle Take Permit	Service	Submitted March 4, 2013 (pending)
Jurisdictional Determination	U.S. Army Corps of Engineers	Issued May 24, 2012
Streambed Alteration Agreement Notification No. 1600-2013-0002-R4	California Department of Fish and Wildlife (CDFW)	Issued May 14, 2013
Amendment of Streambed Alteration Agreement No. 1600-2013-0002-R4	CDFW	Issued August 13, 2013
Streambed Alteration Agreement Notification 1600-2013-0114-R4	CDFW	Issued August 27, 2013
Incidental Take Permit No. 2081-2013-016-04	CDFW	Issued May 23, 2013
Amendment 1 to Incidental Take Permit No. 2081-2013-016-04	CDFW	Issued June 21, 2013
Amendment 2 to Incidental Take Permit No. 2081-2013-016-04	CDFW	Issued July 12, 2013
Notice of Applicability for coverage under Lahontan Regional Water Quality Control Board (RWQCB) Order No. R6T-2003- 0004, General Waste Discharge Requirements (WDR) for Small Construction Projects, including Utility, Public Works and Minor Streambed/ Lakebed Alteration Projects in the Lahontan Region Excluding the Lake Tahoe Hydrologic Unit (Dredge/Fill WDRs), WDID number 6B151301002.	RWQCB (Lahontan Region)	Issued May 9, 2013
Amended Notice of Applicability under Lahontan RWQCB Order No. R6T-2003- 0004, WDID number 6B151301002	RWQCB (Lahontan Region)	Issued August 16, 2013

The area is located mostly in eastern Kern County, but reaches into northern Los Angeles County (Figure 1-1). Cooler valley air is drawn through the pass to fill the void left by the naturally rising hot desert air. The natural conditions are enhanced by weather patterns and the jet stream that commonly passes over and through Tehachapi. The land in the Tehachapi WRA is diverse, ranging from high desert floor to mountain pass to tall mountains. Elevation spans from 2,500 feet to near 8,000 feet (CPUC 2005).

VICINITY MAP

LEGEND

- Alta East Wind Project Area
- Tehachapi Wind Resource Area Approximate Boundary

3

0 5 10
Miles

FIGURE 1-1
Project Location
Alta East Wind Project
Alta Wind Energy Center Project

The project area is approximately 3 miles northwest of the town of Mojave and approximately 11 miles east of the city of Tehachapi. The project site includes private and federal lands. Federal lands within the project area are under the BLM jurisdiction, and private lands are under the jurisdiction of Kern County. The applicant installed 48 turbines in 2013. Approximately 23 percent of the project's area (593 acres) and 9 of the 48 turbines are located on land managed by Kern County, the rest are on the BLM-managed land. The location of the project site is shown on Figure 1-1. Each turbine has a maximum blade tip height of approximately 410 feet above ground level.

The applicant received a Federal Land Policy and Management Act (FLPMA) Title V Right-of-Way (ROW) Type 3 Grant and Plan Amendment (PA) on May 30, 2013, to construct, operate, maintain, and decommission the portion of the project on BLM-administered lands. The BLM analyzed the environmental effects of its permit action to build and operate the Alta East Wind Project in a Plan Amendment/Final Environmental Impact Statement (FEIS) (BLM 2013a) pursuant to FLPMA and NEPA. The analysis of the environmental effects of the project on the human environment is referred to and incorporated by reference in this document. The BLM is a cooperating agency for this FEA.

The BLM Record of Decision (ROD) authorized construction and operation of Alta East to proceed before an eagle take permit was issued, subject to requirements in the ROD that the conservation practices described in the final ECP be implemented. In the event of take of a golden eagle prior to the issuance of a take permit, the ROW grant requires the applicant to implement measures deemed necessary by the BLM on the operation of wind turbines during hours when eagles are active on site, including curtailment of those specific turbines determined to pose a risk to eagles. Such limitations would apply until a take permit is issued, at which time the terms and conditions of the permit would be in effect. In addition, any unpermitted take of eagles would be a violation of Federal law. The applicant has been advised that the requirements of the BLM ROD and any additional limitations or other measures deemed necessary by the BLM do not constitute an authorization to take eagles nor are they a defense against Eagle Act enforcement.

We issued a biological opinion to the BLM for the project and its effects on federally listed species (California condor [*Gymnogyps californianus*], desert tortoise [*Gopherus agassizii*], and Bakersfield cactus [*Opuntia basilaris* var. *treleasei*]) on May 8, 2013. Our analysis in this FEA addresses the expected impacts from our programmatic eagle take permitting decision on the human environment, with a focus on the project's impacts to eagles and Native American cultural and religious practices. A list of permits and authorizations relevant to this project is provided in Table 1-1. One condition of our biological opinion was that the applicant would place observers in lookouts onsite during daylight hours to look for California condors as well as operate receiver platforms to detect condors with radio transmitters. These observers are also on the lookout for golden eagles. Since commencement of operations, the applicant has voluntarily curtailed turbines when detected eagles were perceived to be at risk of collision.

Kern County approved the project and certified the Final Environmental Impact Report (FEIR) on December 13, 2012, pursuant to the California Environmental Quality Act (CEQA; Kern County 2012). The County EIR included a mitigation measure (MM 4.21-7) that requires the applicant to develop and implement an eagle conservation plan or equivalent to address potential project impacts to golden eagles. In April 2013, the Service issued Version 2 of the *Eagle Conservation Plan Guidance* (ECP Guidance; Service 2013a), which is intended to assist industry in avoiding and minimizing impacts to eagles that might result from site selection, construction, operation, and maintenance of land-based, wind energy facilities. Because the ECP Guidance Technical Appendices (Appendices; Service 2012) were released in advance of the full document, the applicant developed the ECP under the (2012) Appendices. The newer (2013) ECP Guidance was substantially similar to the 2012 Appendices in its approach to recommending a staged approach to site evaluation, identifying conservation measures and advanced conservation practices (ACPs) for eagle conservation, and developing an ECP with the Service. The Eagle Act is the legal foundation of the ECP Guidance.

1.3 Purpose and Need for Action

The purpose of this environmental analysis is to review the impacts of the potential issuance of an Eagle Act permit for programmatic take of eagles at Alta East. The BLM and Kern County previously conducted comprehensive environmental analyses of the impacts of the construction and operation of the project under NEPA and CEQA. This FEA focuses on the potential impacts of issuing an Eagle Take Permit. In responding to the request for a permit, we must ensure: (1) that any take authorized under the Eagle Act is compatible with the Eagle Act's preservation goal of maintaining stable or increasing breeding populations of eagles; and (2) compliance with the Eagle Act and its implementing regulations and permit issuance criteria.

This purpose and need establishes the basis for determining if other feasible alternatives to the applicant's Proposed Action, as described in the ECP (Appendix A), may meet the project's intended purpose and reduce potential effects. Alternatives considered in this analysis are the No-Action Alternative and four action alternatives, including the Proposed Action.

1.4 Regulatory Setting, Authorities, and Guidance

Four primary Federal statutes, the Eagle Act, the Migratory Bird Treaty Act (MBTA, including the associated Executive Order 13186), as well as regulations and guidance under those statutes, NEPA, and Tribal Trust Coordination, provide the basis for our review of the Proposed Action.

1.4.1 Bald and Golden Eagle Protection Act

The Eagle Act (16 U.S.C. 668–668d) makes it illegal to import, export, take (which includes molest or disturb), sell, purchase, or barter any bald eagle or golden eagle or parts thereof. Under the Eagle Act (50 CFR §22.3; 72 *Federal Register* [FR] 31132, June 5, 2007), "take" is defined as to "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, destroy, molest or disturb." "Disturb" is defined as "to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available: (1) injury to an eagle, (2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior, or (3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior" (50 CFR §22.3; 72 FR 31132, June 5, 2007).

With the removal in 2007 of the bald eagle from the Endangered Species Act (ESA) list of threatened and endangered species, we issued new regulations to authorize the limited take of bald and golden eagles under the Eagle Act, where the take that may be authorized is associated with otherwise lawful activities. A final Eagle Permit Rule was published on September 11, 2009 (74 FR 46836–46879; 50 CFR 22.26 and 22.27).

In 2013, the Service amended regulations at 50 CFR 22.26 for permits authorizing take of eagles (78 FR 73704, December 9, 2013). The rule changes the schedule of permit fees set forth at 50 CFR 13.11 by substantially increasing the fees charged for such programmatic permits. Additionally, changes have been made to allow programmatic permits to be transferable to new owners of projects (50 CFR 13.25: transfer of permits and scope of permit authorization) and to ensure that any successors to the permittee are qualified and committed to carrying out the conditions of the permit (50 CFR 13.24: right of succession by certain persons).

The Service is currently evaluating additional proposed revisions to the Eagle Act permit regulations (81 FR 27933, May 6, 2016). However, issuance of this permit would not be subject to the proposed regulations as the Service has not yet made a final decision; therefore, our decision on Alta East's permit application will be in accordance wih the Eagle Act regulations currently in effect.

Under these regulations we can issue permits that authorize individual instances of take of bald and golden eagles when the take is associated with, but not the purpose of, an otherwise lawful activity and cannot practicably be avoided. The regulations also authorize permits for "programmatic" take, which means that instances of "take" may not be isolated, but may recur. The programmatic take permits are the most germane permits for wind energy facilities. However, under these regulations, any ongoing or programmatic take must be unavoidable even after the implementation of ACPs. We developed the ECP Guidance to

provide recommendations for the development of ACPs in support of issuance of programmatic eagle take permits for wind facilities. The Draft Guidance was published in the Federal Register on February 18, 2011 (76 FR 9529), and a revised version was published in May 2013 (78 FR 25758, May 2, 2013).

Although eagles are protected by both the MBTA and the Eagle Act, MBTA take authorization is not required because the Eagle Permit Rule exempts those who hold Eagle Act permits from the requirement to obtain an MBTA permit (50 CFR 22.11[a]).

1.4.2 Migratory Bird Treaty Act

The MBTA protects migratory birds and prohibits the taking, killing, possession, transportation, and importation of migratory birds, their eggs, parts, and nests, except when we authorize take (16 U.S.C. 703; 50 CFR 21; 50 CFR 10). Under the MBTA, "take" is defined as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture or collect." Most actions that result in taking or the permanent or temporary possession of a protected species or nests containing eggs or young constitute violations of the MBTA. We are responsible for overseeing compliance with the MBTA. Most bird species and their occupied nests that occur in the project area are protected under the MBTA. The bird species protected by the MBTA are listed in 50 CFR 10.13. Our Migratory Bird Permit Memorandum (MBPM-2) (Service 2003) dated April 15, 2003, clarifies that the destruction of most unoccupied bird nests (containing no birds or eggs) is permissible under the MBTA. However, unoccupied nests of federally listed threatened or endangered bird species and eagles are protected under ESA (16 U.S.C. 1531, 1543) and the Eagle Act (16 U.S.C. 668), respectively. In the BLM's FEIS for the project, the direct and indirect effects of construction and operation of Alta East on migratory birds was analyzed and disclosed and the applicant was required to prepare an avian protection plan (Appendix B, Bird and Bat Conservation Strategy) that includes measures to avoid and minimize impacts to migratory birds. It must be noted that the MBTA has no specific provision for authorizing incidental take, and issuance of an Eagle Act permit shall not be construed to authorize take of other migratory birds.

1.4.3 Executive Order 13186, Responsibilities of Federal Agencies to Protect Migratory Birds

Executive Order 13186 (Responsibilities of Federal Agencies to Protect Migratory Birds) directs Federal departments and agencies to take certain actions to further implement the MBTA. Federal agencies must ensure that environmental analyses of Federal actions required by the NEPA or other established environmental review processes evaluate the effects of actions and agency plans on migratory birds, with emphasis on species of concern. In addition, Federal agencies must minimize the intentional take of species of concern by: (i) delineating standards and procedures for such take; and (ii) developing procedures for the review and evaluation of take actions. This Executive Order specifies the need to avoid or minimize adverse impacts on migratory birds and bird habitat when conducting agency actions, as well as the need to restore and enhance the habitat of migratory birds.

1.4.4 National Environmental Policy Act

Federal agencies must complete environmental documents pursuant to NEPA (42 U.S.C. 4321 et seq.) before implementing discretionary Federal actions. Such documents help ensure that the underlying objectives of NEPA are achieved: to disclose environmental information, assist in resolving environmental problems, foster intergovernmental cooperation, and enhance public participation. NEPA requires evaluation of the potential effects on the human environment related to the proposed action, reasonable alternatives to the proposed action (if any), and a "No-Action Alternative."

An Environmental Assessment (EA) provides evidence for determining whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI). If we determine that this project has "significant" impacts following the analysis in the EA, then an EIS would be prepared for the project. If not, a FONSI would be signed for the EA approving the alternative selected, and a Set of Findings may be prepared.

We have prepared this FEA pursuant to NEPA (42 U.S.C. 4321 et seq.), its implementing regulations (40 CFR 1500–1508), Department of Interior NEPA regulations (73 FR 61292–61323), and Department of Interior and Service NEPA policy and NEPA guidance. This FEA evaluates the environmental effects of issuing a programmatic eagle take permit under the Eagle Act (50 CFR 22.26).

1.4.5 Coordination with Tribal Governments

Tribal participation is an integral part of the NEPA and the National Historic Preservation Act process, as well as a key component of determining whether to issue an eagle take permit. In accordance with Executive Order 13175 and our Native American Policy, we consult with Native American tribal governments whenever our actions taken under authority of the Eagle Act may affect tribal lands, resources, or the ability to self-govern. This coordination process is also intended to ensure compliance with the National Historic Preservation Act and American Indian Religious Freedom Act. To coordinate with tribes regarding potential issuance of a programmatic eagle take permit, we sent letters to 62 tribes located within 140 miles (the natal dispersal distance of golden eagles) of the project site. Comments were also encouraged and welcomed during the comment period on Draft EA (DEA).

1.5 Scope of Analysis

This FEA considers alternatives for issuance of a permit to take golden eagles at Alta East. It analyzes the effects of our proposed issuance of a 5-year programmatic eagle take permit on the human environment and evaluates impacts over the 30-year duration of the project. The human environment as analyzed in this FEA includes golden eagle populations, climate change, and Native American religious and cultural practices.

Other aspects of the human environment, such as migratory bird and bat populations, human safety, the economy, and other cultural values have been addressed in the FEIS (BLM 2013a) and FEIR (Kern County 2012), and are incorporated herein by reference.

As referenced in the Council on Environmental Quality's NEPA regulations regarding the contents of an EA (40 CFR 1508.9[b]), NEPA Section 102(2)(E) requires federal agencies to develop, study, and briefly describe reasonable alternatives to any proposed action with the potential to result in unresolved resource conflicts. This FEA evaluates the effects of the No-Action Alternative, the applicant-proposed alternative, and three other action alternatives:

- Alternative 1: No Action – Operation of the Project Without an Eagle Take Permit
- Alternative 2 (Applicant Proposed Action): Issue Permit for Applicant's ECP
- Alternative 3: Issue Permit for Applicant's ECP with Additional Monitoring and Mitigation
- Alternative 4: Issue Permit for ECP with Curtailment of Four Ridgeline Turbines when Eagles are Observed
- Alternative 5: Issue Permit for ECP with Radar Deployment, Curtailment when Eagles are Detected

Each alternative's feasibility is evaluated for its ability to meet the Eagle Act permit issuance criteria as described in Section 1.5.2.

1.5.1 Geographic Extent

The geographic scale of the analyses for this FEA is at the project level—the footprint of the Alta East Wind Project and a 10-mile radius around it—and the local-area eagle population level. The local-area population for both eagle species is defined by the dispersal distance of young—43 miles for bald eagles and 140 miles for golden eagles (Service 2009). The Alta East local-area population for bald eagles is within the Service's Region 8, which includes all of California and Nevada and the Klamath Basin in Oregon. The local-area population for golden eagles includes parts of four Federal Bird Conservation Regions (BCRs; NABCI 2013): BCR 33 (Sonoran and Mohave Deserts) BCR 32 (Coastal California), BCR 15 (Sierra Nevada), and BCR 9 (Great Basin) as shown in Figure 1-2 and summarized in Table 4-1.

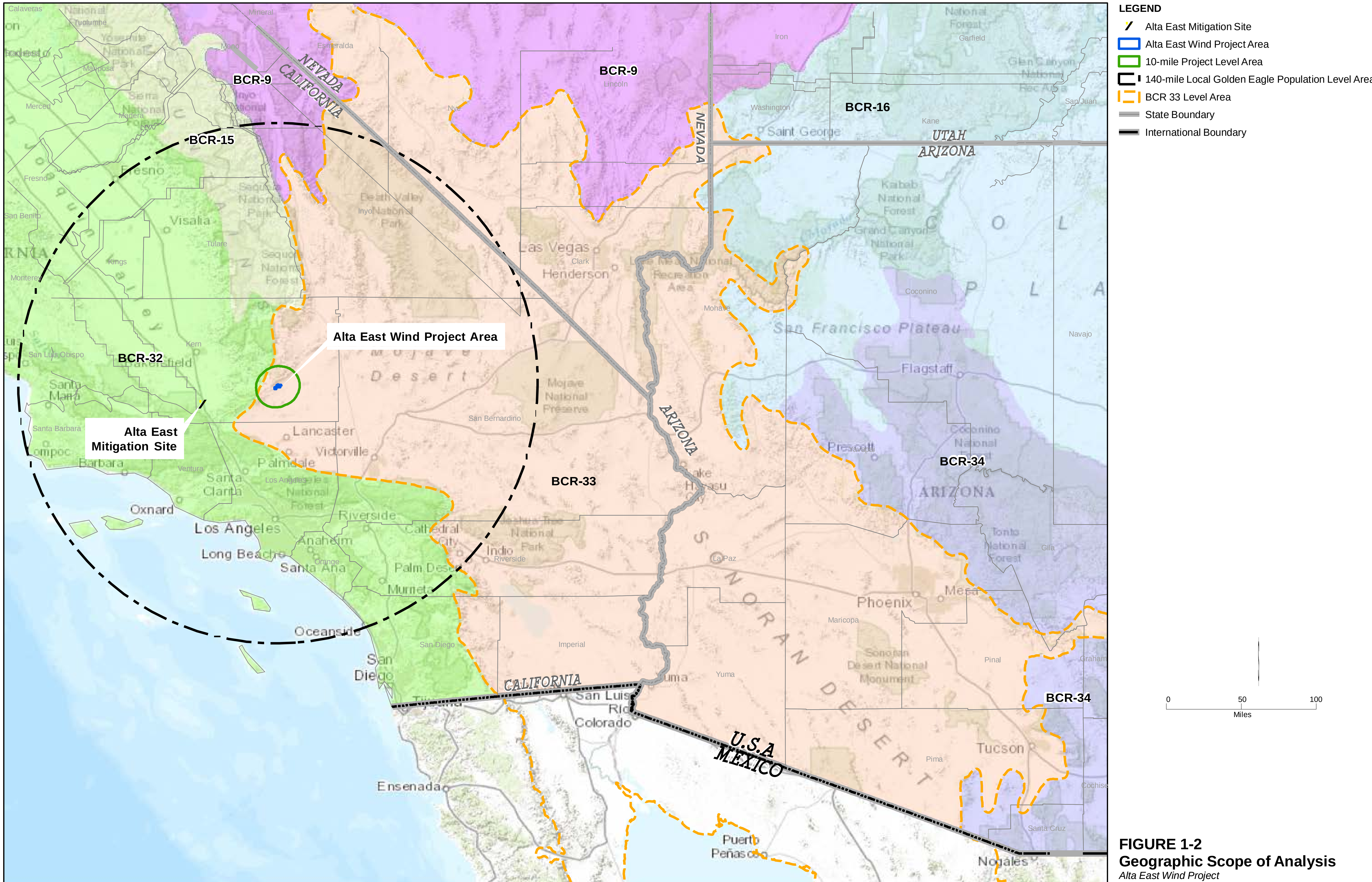


FIGURE 1-2
Geographic Scope of Analysis
Alta East Wind Project

CH2MHILL

1.5.2 Permit Issuance Criteria

In the analysis of alternatives, we consider the degree to which each alternative will conform to the permit issuance criteria for programmatic take permits under the Eagle Act. We may not issue a take permit under the Eagle Act unless the following issuance criteria are met as required in 50 CFR 22.26(f)(1–6):

1. The direct and indirect effects of the take and required mitigation, together with the cumulative effects of other permitted take and additional factors affecting eagle populations, are compatible with the preservation of bald eagles and golden eagles;
2. The taking is necessary to protect a legitimate interest in a particular locality;
3. The taking is associated with, but not the purpose of, the activity;
4. The taking cannot practicably be avoided; or for programmatic authorizations, the take is unavoidable;
5. The applicant has avoided and minimized impacts to eagles to the extent practicable, and for programmatic authorizations, the taking will occur despite application of advanced conservation practices; and
6. Issuance of the permit will not preclude issuance of another permit necessary to protect an interest of higher priority as set forth in paragraph (e)(4) of 50 CFR 22.26.

1.6 Previous Environmental Analysis

Previous environmental analyses were conducted for the Alta East Wind Project; these analyses are available in the FEIS (BLM 2013a) and the FEIR (Kern County 2012).

These documents analyze most of the elements of the project related to the human environment, and consequently allow the current analysis to focus on eagles. The analyses in the FEIS (BLM 2013a) and FEIR (Kern County 2012) are hereby incorporated by reference into this FEA.

The FEIS addressed the following issues, which were identified by agencies, organizations, Native Americans and Tribal Governments, and members of the public during the scoping and public review processes:

- Transmission and communication facilities
- The purpose and need for the Alta East Wind Project
- Visual and aesthetic effects on scenic values and lighting
- Increased wildfire and safety hazard risks
- Construction and operational noise
- Existing and historic cultural resources
- Traffic impacts and potential damage to roads
- Property values and economic impacts
- Biological resources including sensitive and special status species
- Water quality and hydrology, including wetlands and other waters of the US
- Exhaust, dust, and greenhouse gas (GHG) emissions associated with climate change
- Cumulative effects

Since the FEIR was prepared from a joint Draft EIS/EIR, it addressed the same resource areas as the FEIS (although note that Kern County adopted it as a standalone FEIR).

1.7 Scoping and Public Participation

1.7.1 Internal Scoping

We engaged in an internal scoping process in the Pacific Southwest Region from February to May 2013. We worked with regional program leaders to determine the appropriate level of NEPA analysis for the Alta East programmatic eagle take permit application and to develop a range of alternatives to the proposed action.

1.7.2 Public Participation

During the comment period for the BLM Draft EIS for the project, the EPA and numerous environmental advocacy organizations submitted recommendations that the Alta East Wind Project have protective measures in place to protect golden eagles from potential fatalities. The development of Alta East's ECP with our review and input and the BLM's requirement that the applicant implement the protective measures identified in their ECP substantially address the concerns that were raised during the BLM Draft EIS review period.

This DEA was made available to the public for a 45-day public comment period, allowing the public opportunity to provide comments on the content and scope of the document. We received ten comment letters.

1.8 Tribal Trust Coordination

Tribal participation is an integral part of the NEPA process. In accordance with Executive Order 13175 and the Service's Native American Policy, we consult with Native American tribal governments whenever our actions may affect tribal lands, resources, or the ability to self-govern. In addition, we consult with Tribes in consideration of the unique traditional religious and cultural significance of eagles to Native American communities.

1.8.1 Service Tribal Coordination

We initiated tribal coordination for the applicant's permit request through a letter sent to the Native American tribal governments located within a 140-mile radius of the Alta East project and to tribal organizations consulted by the BLM (see Appendix C). Our letter informed them of receipt of the eagle take permit application and preparation of the DEA. We received two letters from tribal governments. One letter was from the Pala Band of Mission Indians and the other was from the Moapa Band of Paiutes.

1.8.2 BLM Tribal Coordination

As described in detail in Section 5.2.3 of the FEIS (BLM 2013a), the BLM conducted government-to-government coordination with federally recognized and other Native American Tribal groups in accordance with several authorities including, but not limited to, NEPA, the NHPA, the American Indian Religious Freedom Act, Executive Order 13175, and Executive Order 13007. As explained below, the BLM has engaged in extensive outreach in connection with Alta East and has only received limited, and in some cases no, concerns and questions about the project, all of which have been addressed. The BLM has determined that no historic properties will be affected by the project.

Initial coordination outreach was conducted by the BLM in August 2008. Formal invitation letters were submitted to the Kern Valley Indian Council, the Tubatulabals of the Kern Valley, the Nuui Cunni Interpretative Center, and the Monache Inter-Tribal Council. Although these communities are not currently federally recognized, they were invited to apprise the BLM of any comments or concerns regarding the project, which was referred to at that time as the Sun Creek Project because these communities have expressed interest in Alta East. No comments were received by the BLM at that time from these communities.

A second letter was sent to these Tribal organizations in October 2009 informing them that the applicant had submitted a Type II application to the BLM requesting authorization to erect two meteorological towers within the area of potential effect per Section 106 of the NHPA. An invitation was extended in the letter requesting notification as to whether any cultural resources or Traditional Cultural Properties important to them would be affected by Alta East. No comments were received by the BLM at that time from these communities.

A third set of invitation letters was provided to these Tribal organizations in February 2011. The focus of this letter was to alert the Tribal communities of the specific details of Alta East and request notification as to

whether any cultural resources or Traditional Cultural Properties important to them would be affected by Alta East. No comments were received by the BLM at that time from these communities.

The BLM reaffirmed its commitment to government-to-government coordination in the July 15, 2011, Notice of Intent (76 FR 41817) and provided other public notices about the project to provide reasonable notice of and seek input about how potential project-related changes could affect the use of sacred sites or their physical integrity. Individual government-to-government meetings with Indian Tribes provided a separate forum for Tribes to share information and concerns openly and candidly in an individual context, apart from other consulting parties and about other issues not necessarily related to the Section 106 process.

Another round of Tribal coordination letters was submitted on October 24, 2012, to five federally recognized Tribes in the surrounding region: Bishop Paiute, Big Pine Paiute, Ft. Independence Paiute, Lone Pine Paiute-Shoshone, and Timbisha Shoshone. These Tribes were apprised of the project's details and were invited to provide the BLM with any comments or concerns regarding whether any cultural resources or Traditional Cultural Properties important to them would be affected by Alta East. The BLM continued government-to-government coordination in a face-to-face meeting with the Timbisha Shoshone Tribe on April 9, 2013, and also made follow-up phone calls to the Tribes on April 12, 2013. No comments have been received by the BLM from these Tribes.

In summary, the BLM has received no follow-up responses to coordination and outreach efforts with Tribes and Tribal communities about Alta East, nor has the BLM received any information about areas of Tribal cultural significance within the project area.

1.9 Service ESA Consultation

In December, 2012, the BLM requested formal consultation on its proposed issuance of a ROW grant for Alta East pursuant to Section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.). The BLM prepared a biological assessment in which it assessed the effects of its proposed action on federally listed species identified in the project area (BLM 2012). In our biological opinion, dated May 8, 2013, we analyzed the effects of the proposed action on the federally endangered California condor and Bakersfield cactus, and the federally threatened desert tortoise (Service 2013b). In our biological opinion, we concluded that the proposed action was not likely to jeopardize the continued existence of these species. Because the action was not proposed within and would not affect critical habitat for the California condor or desert tortoise, and because we have not designated critical habitat for the Bakersfield cactus, we did not address critical habitat in our biological opinion.

As set forth in our biological opinion, Alta Wind X, LLC, will address potential effects on the California condor through implementation of a Condor Monitoring and Avoidance Plan, an Adaptive Management Strategy, and numerous other protective avoidance and minimization measures. In addition, the applicant will fund conservation measures that are likely to result in benefits to the California condor by addressing existing threats within its range.

The Condor Monitoring and Avoidance Plan includes the use of full-time observers and a VHF-detection system (because most of the California condors are equipped with VHF transmitters) to monitor for and detect California condors and to direct curtailment of turbines if a California condor approaches within 2 miles of the Alta East project boundary. The Adaptive Management Strategy will be implemented if there is increased risk to California condors due to an increase in the numbers of California condors in the area, a change in their flight patterns in a manner that brings them closer to the project site, and/or fewer birds equipped with VHF transmitters. We expect this strategy to include the transition to radar or some other alternative to the VHF-detection system that can detect California condors not equipped with VHF transmitters.

We concluded that the proposed action was not likely to jeopardize the continued existence of the California condor because its population in the wild is increasing (albeit, in large part, through the release of captive bred birds), they are not currently flying through the action area, and we expect the proposed

avoidance and minimization measures to be effective in limiting the loss of California condors. Our biological opinion included an incidental take statement for California condor in which we anticipated that over the 30-year life of the project, one California condor is likely to be killed as a result of being struck by a turbine blade. We included an incidental take statement in the biological opinion because California condors continue to expand their range, which could include the action area, their numbers in the wild are increasing, and the VHF-detection system cannot detect birds that are not wearing transmitters.

The applicant will implement numerous measures to avoid and reduce the mortalities of desert tortoises including use of experienced biologists to conduct clearance surveys and monitoring during construction, operation, and maintenance. We anticipate few desert tortoises will be injured or killed because clearance surveys will be conducted and detected individuals will be captured and moved from harm's way. In addition, the project area is not located within any areas that are important to the long-term conservation of the desert tortoise.

The applicant will avoid known clumps of the Bakersfield cactus and will transplant cactuses that it cannot avoid. In addition, the project area is not within an area that we consider important to the recovery of the Bakersfield cactus.

CHAPTER 2

Alternatives

2.1 Introduction

The Council on Environmental Quality's NEPA regulations (40 CFR 1508.9[b]) require EAs to develop, study, and briefly describe a reasonable range of alternatives to a federal action and evaluate how those alternatives can resolve resource conflicts. This chapter describes the alternatives we considered during preparation of this FEA and alternatives that were considered but eliminated from further consideration.

Under Alternatives 2 through 5, if Alta East submits an updated application/ECP, we may issue a new permit after the initial 5 years pending our review. That review and every subsequent review would include an evaluation of eagle take at the project site, the effectiveness of adaptive management measures, and the results of any additional monitoring of eagles in the project area, which may include life-of-project mortality monitoring by a third-party consultant.

2.2 Alternatives Analyzed in this FEA

2.2.1 Alternative 1: No Action – Operation of the Project Without an Eagle Take Permit

Under the No-Action Alternative, we would take no action or would deny the permit application and would not issue an eagle take permit. The wind project would continue to operate without a take permit being issued. However, the applicant would, without limitation, implement the draft ECP (Appendix A), including the conservation practices described within as required by their BLM ROW grant. Should eagle take occur without an Eagle Act take permit authorization, the BLM ROW grant requires the applicant to implement limitations and other measures deemed necessary by the BLM on the operation of nearby turbines during hours when eagles are active on site, which may include curtailment of those specific turbines determined to pose a risk to onsite eagles.

We consider this alternative because NEPA requires evaluation of a No-Action Alternative. The Service will respond to the permit application either by issuing a take permit or denying a permit. Under the No-Action Alternative, we could deny the permit application because it fails to meet one or more of several issuing criteria under 50 CFR 22.26 as described in Section 1.5.2, or because we have determined that the risk to eagles is so low that a take permit is unnecessary. We have determined that the risk to golden eagles is above the level where no permit would be recommended, so the No-Action Alternative would only be selected through a denial.

Under this alternative, the applicant's draft ECP would be implemented and annual post-construction golden eagle mortality monitoring would be conducted for the life of the project as imposed by the BLM ROD starting in Year 1 of project operation. The BLM ROD stipulates compliance with the Eagle Act, which would not be possible if an eagle take occurred under this alternative because any such take would not be authorized pursuant to an eagle take permit. As stated previously, the applicant is aware that the requirements of the BLM ROD and any additional limitations or other measures deemed necessary by the BLM do not constitute an authorization to take eagles nor are they a defense against Eagle Act enforcement.

2.2.2 Alternative 2: Issue Permit for Applicant's ECP

Under this alternative, we would issue a 5-year permit to take up to three eagles under the applicant's implementation of the ECP with associated conditions, as allowed by regulation. The permit would incorporate all conservation commitments described in the ECP (Appendix A). The project would entail the operation of up to 51 turbines for 30 years and the implementation of ACPs outlined in the ECP. The

applicant would provide compensatory mitigation by retrofitting 92 power poles.[1] Under this alternative, the applicant's proposed adaptive management process and mortality monitoring would be implemented as outlined in their ECP and presented in Table 2-1.

TABLE 2-1
Summary of Advanced Conservation Practices Using A Stepwise Approach

Step	Threshold or Trigger	Advanced Conservation Practices
Step I	One eagle taken	Assess eagle fatality to determine if cause or risk factor can be determined (e.g., season, time of day, weather, presence of prey/carrion, fire, or other event) and management response is warranted. Coordinate with Service. Take is within the permitted level and fully mitigated.
Step II	Two eagles taken within any 36-month period.	Assess eagle fatality to determine if cause or risk factor can be determined (e.g., season, time of day, weather, presence of prey/carrion, fire, or other event) and management response is warranted. Of primary concern is if there are common elements between the two eagle fatalities that indicate more concentrated evaluation of the cause of mortality should be performed. Coordinate with Service to determine if: 1. Immediate response or management action is needed 2. A longer term action plan or management response plan should be developed 3. Study plans should be modified or extended Take is within the permitted level and fully mitigated.
Step III	Three eagles taken within the 5-year permit period	Assess eagle fatality to determine if cause or risk factor can be determined (e.g., season, time of day, weather, presence of prey/carrion, fire, or other event) and management response is warranted. Coordinate with Service. If appropriate (e.g., threshold is reached within 4 years of permit duration), the following ACPs will be considered for implementation in coordination with Service. • Employ onsite biological monitor(s) during daylight hours to curtail turbine(s) when an eagle approaches the turbines. Monitors will be stationed within the highest areas of measured or perceived risk. Consult with Service on development of curtailment protocol. • Deployment of a radar-based or other system to potentially deter eagles from approaching turbines or curtail turbines when an eagle approaches the turbines. Consult with Service to evaluate the development and deployment of the system. • Initiate eagle behavior studies (eagle point counts at high-risk locations, sample interval and season determined based on existing fatalities and operational eagle use data). • Conduct a minimum of 1 year of mortality monitoring designed specifically to evaluate the effectiveness of the biological monitor, or deterrent or curtailment system. Take is within the permitted level and fully mitigated.
Step IV	Four or more eagles taken within the 5-year permit period	Initiate coordination with Service to determine curtailment schedules based on evaluation of data collected to date. Options may include limited curtailment based on spatial and temporal locations of eagles. Focused eagle movement and mortality monitoring will be implemented for a minimum of 1 year to enhance ability to identify and respond effectively to the risk issues. Deploy radar-based or other deterrent or curtailment system if determined effective, or initiate/continue development of radar-based or other deterrent or curtailment system. In coordination with the Service and the BLM, determine other appropriate actions necessary to minimize and compensate for additional impacts to eagle populations and/or request modification of Programmatic Take Permit.

[1] The Applicant's ECP (Appendix 1) states that 74 utility pole retrofits would offset predicted take. See Section 2.3.5 for the explanation as to why our REA output is greater than that originally proposed by the Applicant.

2.2.3 Alternative 3: Issue Permit for Applicant's ECP with Additional Monitoring and Mitigation

Under this alternative, we would issue a 5-year permit to take up to three eagles under the applicant's implementation of the ECP with associated conditions, as allowed by regulation. The project would entail the operation of up to 51 turbines for 30 years.

The applicant would provide compensatory mitigation by retrofitting 92 power poles in Year 1 of permit issuance to compensate for the predicted take of eagles. To offset the high level of cumulative impacts to golden eagle populations in the local-area, this alternative would require a total of 1.5 compensatory mitigation rates. This equates to an additional 46 power pole retrofits, for a total of 138. All power pole retrofits would be completed within Year 1 of permit issuance.

The permit would incorporate all conservation commitments described in the ECP (Appendix A), implementation of the applicant's adaptive management plan (Table 2-1), and the addition of fatality monitoring for all turbines during the first year. Thresholds or Triggers would be implemented based upon mortality studies or carcasses discovered; whichever is greater.

The additional fatality monitoring consists of monitoring all turbines monthly for at least the first year after permit issuance. This would provide assurances that any potential eagle take is detected. Subsequent annual monitoring will be determined in coordination between the Service and the applicant based on the results of the first year's additional fatality monitoring.

2.2.4 Alternative 4: Issue Permit for ECP with Curtailment of Four Ridgeline Turbines when Eagles Are Observed

Under this alternative, we would issue a 5-year permit to take up to three golden eagles with associated conditions, as allowed by regulation. The permit would incorporate all conservation commitments described in the ECP (Appendix A), including an onsite observer during daylight hours to monitor for eagles and condors. It would stipulate that the project operator execute operational restrictions to curtail the four ridgeline turbines as eagles are detected to further avoid and minimize potential take of eagles.

The permit would include all of the commitments to conservation and monitoring in the existing permit application, plus the following additional measures:

- The daytime observer would identify eagles approaching the four ridgeline turbines from an observation tower (or elsewhere in the landscape as appropriate) and authorize curtailment when an eagle is observed within 1 mile of any of these four turbines, and;
- A detailed curtailment protocol would be developed in coordination with the Service.

This curtailment strategy is currently being implemented on a voluntary basis by the applicant at Alta East while they await a programmatic eagle take permit decision by the Service.

The applicant would provide compensatory mitigation by retrofitting 92 power poles in Year 1 of permit issuance. The permit would incorporate all conservation commitments described in the ECP (Appendix A). The adaptive management approach would be implemented as described in the ECP and presented in Table 2-1 under Alternative 2.

2.2.5 Alternative 5: Issue Permit for ECP with Radar Deployment, Curtailment when Eagles Are Detected

Under this alternative, we would issue a 5-year permit to take up to three golden eagles with associated conditions, as allowed by regulation. The permit would incorporate all conservation commitments described in the ECP (Appendix A), including an onsite observer during daylight hours to monitor for eagles and condors, and would also require a radar detection system to monitor for eagles. The permit would also stipulate that the project operator execute operational restrictions to curtail turbines throughout the facility as eagles are detected by the radar system to further avoid and minimize potential take of eagles.

The permit would include all of the commitments to conservation and monitoring in the existing permit application, plus the following additional measures:

- An eagle radar detection system would be installed as soon as an eagle take permit is issued to the applicant or within one year of initiation of operation, whichever date is later.
- A biologist would monitor the radar system and would be authorized to implement curtailment of all turbines at the Alta East facility when an eagle is observed within 1 mile from any turbine.
- Rather than follow 18 months of "radar training" (to begin developing an algorithm specific to golden eagles, as described in the ECP), the applicant would deploy the radar to compliment the observer in the observation tower upon issuance of a take permit or within one year of initiation of operation of the facility, whichever date is later.

The applicant would provide compensatory mitigation by retrofitting 92 power poles in Year 1 of permit issuance. The permit would incorporate all conservation commitments described in the ECP (Appendix A). The adaptive management approach would be implemented as described in the ECP and presented in Table 2-1 under Alternative 2.

2.3 Key Elements of Alternatives

Applicant-committed measures included in the ECP and the BLM FEIS (BLM 2013a) would be applied to all alternatives, including the No-Action Alternative. Applicant-committed measures common to all alternatives were described in the ECP (Appendix A) and BLM's FEIS and ROW grant for Alta East and are summarized below.

2.3.1 Project Macro-siting

The applicant specifically selected the Tehachapi area for developing the Alta East Wind Project because of the extensive existing wind energy development in the region and proximity to available transmission facilities.

Macro-siting project design modifications were made in large part to minimize potential impacts to eagles. The project layout initially proposed by the applicant was a 318-MW project consisting of up to 106 turbines on 2,592 acres. However, site-specific studies documented eagle nesting and use in the areas north and west of the project boundary. In response, the project boundary was modified in June 2010 to eliminate areas in the north and west. The 2010 boundary revision resulted in a 2,272-acre project layout with 97 turbines capable of producing 291 MW that was identified as the Preferred Alternative in the BLM Draft EIS because it was the alternative having the least potential for impacts to golden eagles.

2.3.2 Micro-siting of Project Features

Micro-siting project design modifications were made by the applicant to minimize potential impacts to eagles. Turbine locations were revised to avoid areas of documented eagle use based on 2 years of eagle survey data indicating that some eagle use of the project area may occur during the construction, operation, and decommissioning phases of the project.

In February 2013, the applicant substantially reduced the scope of the project in response to the BLM FEIS and Service concerns about golden eagle risk. Through careful revision to optimize generation capacity while minimizing turbines located in areas posing a relatively higher risk to eagles as identified in resource studies, the 291-MW, 97-turbine project was further reduced to 153 MW with 51 turbines, and then reduced again, resulting in a final project layout of 137 MW with 48 turbines. The turbine model was changed to the 103RD 2.85 MW, which has a smaller rotor radius, and thus, a smaller rotor-swept area.

The revised layout is discussed in detail in the ECP (Appendix A). With the revised layout and reduction in the number of turbines, we estimated the risk to eagles to be reduced in half (Appendix D).

All other project features have been located away from the higher elevations and rugged topography that is associated with the eagle use documented to the north, west, and central areas of the project site.

2.3.3 Minimizing Impacts

The design measures implemented to minimize direct impacts and potential take of golden eagles include: buried collector lines, flight diverters, free-standing meteorological towers, and power line configurations that minimize electrocution risk.

Measures to be implemented during the operation of the plant are described in the ECP and include: environmental training, carcass removal, full-time biological monitoring, and formal and informal biological monitoring.

2.3.4 Predicted Take

In the ECP Guidance (Service 2013a), we provided a mathematical model that estimates fatality risk at wind project sites. The model relies on a logical assumption that there is a positive relationship between the number of minutes eagles are present in the air near turbines, the amount of hazardous air space, and the risk of collisions by eagles. The results of the model predict the number of eagles taken per year at the project site. The eagle mortality estimate helps the Service and the applicant develop an ECP that includes avoidance and minimization measures, monitoring, adaptive management, and compensatory mitigation.

We use the take estimate and other information to determine if the level of predicted take, with the offsetting measures proposed in the ECP, is compatible with the Eagle Act (50 CFR 22.26) permitting standards; to manage for stable or increasing breeding eagle populations, or “no net loss” (Service 2009).

Alta East’s ECP contains a risk analysis that incorporates the anticipated impacts of the project on eagles based on the results of site-specific surveys (Chatfield et al. 2010a, 2010b, and 2011). The ECP presents a range of fatality estimates based on three different approaches: regression analysis, eagle use-mortality rate comparison, and modeling using the Service-recommended Bayesian Collision Risk Model (Service 2013a).

We rely on the Bayesian Approach in our consideration of the requested permit. Risk factors such as eagle use, interaction with other birds, prey availability, topography, absence of perch structures, residency status, and flight style were used to support the take prediction. Using the Bayesian model, the ECP predicts that the project would result in the mortality of approximately 0.5 golden eagles per year during operations—rounded up to three eagles over a 5-year period. This is based on the 80th quantile, indicating that we expect the number of eagle fatalities would be less than or equal to the prediction 80 percent of the time. Our independent analysis of eagle risk from the Alta East ECP using the Bayesian Collision Risk Model (Service 2013a; Appendix D) corroborates the estimate prepared by the applicant (Appendix E).

Take Evaluation under Curtailment Program

In a comment letter on the DEA, Kevin Martin of Terra-Gen Power provided data related to Alta East’s request for the Service to use their proposed risk assessment approach. We evaluated risk using the informed curtailment data provided by Alta East and the project's first-year mortality monitoring study results. The Service agrees that a different method may be appropriate to analyze risk for this project. The method consists of implementing experimental ACPs to minimize and avoid eagle take. However, we determined that the available data do not allow us to validate the effectiveness of the curtailment program in a statistically meaningful way at this time. More information is needed to refine take predictions for future permit terms. We will work with Alta East to refine their mortality monitoring study design to better inform eagle risk for potential future permit renewals under the curtailment program, which we consider to be an experimental ACP.

2.3.5 Compensatory Mitigation

Service Eagle Policy

To calculate compensatory mitigation, we used a Resource Equivalency Analysis (REA) to quantify the number of power pole retrofits needed to offset the take of golden eagles at a wind project (see Appendix G of the ECP Guidance [Service 2013a]). We used utility pole retrofits to eliminate electrocutions because:

- High-risk power poles cause quantifiable adverse impacts to eagles;
- The "per eagle" effects of high-risk power pole retrofitting are quantifiable and verifiable through accepted practices;
- Success of and subsequent maintenance of retrofitting can be monitored; and
- Electrocution from high-risk power poles is known to cause eagle mortality and this can be corrected.

We use informed modeling to estimate the potential for eagle take, as described in Stage 3 of the ECP Guidance (see Appendix D of the ECP Guidance [Service 2013a]). This fatality prediction is one of several fundamental variables that we use to populate the REA (see Appendix G of the ECP Guidance [Service 2013a]). The REA generates a project-area eagle impact calculation (debit), expressed in bird-years, and an estimate of the quantity of compensatory mitigation (credit) (e.g., power pole retrofits) necessary to offset this impact. The REA and fatality estimate both consider the age of the eagle in their calculations and assume that the age distribution of eagles killed at wind facilities will be the same as the age distribution of eagles in the wild (i.e., 20% juvenile, 35% sub-adult, 45% adult). These estimates come from information contained in the 2009 Final Environmental Assessment for the Eagle Rule (Service 2009). In the REA, this age distribution is used in both the debit and credit sides of the calculations. As we learn more about the actual age distribution of eagles that are taken at wind facilities through the adaptive management process, we will be able to improve the models. In order to mitigate for the predicted loss of eagles, retrofitted poles must be maintained for 10 years in order to achieve no net loss of golden eagles for the 5-year permit period.

Effectiveness of Power Pole Retrofits

Power line structures provide perching, roosting, and nesting substrates for raptors and other birds. Power line structures can present electrocution hazards to birds when less than adequate separation exists between energized parts. Eagle and other raptor electrocutions have been well documented and studied since the 1970s (APLIC 2006). The *Suggested Practices for Avian Protection on Power Lines* manual (APLIC 2006) includes a thorough review of scientific literature and summarizes other non-published information available at the time of publication. Research on the topic is ongoing. In Colorado, a study determined that raptor electrocution rates decreased by 47 percent within a few years of a utility company implementation of a retrofit program (Lehman et al. 2010). In Spain, researchers compared electrocution mortality rates at a set of retrofitted poles and a set of poles that were not retrofitted. Retrofitted poles experienced a significant reduction in avian mortality rates whereas poles not made bird safe lacked reduction in electrocution mortality rates (Tint et al. 2010). A long-term study in Spain determined that the combination of constructing new power poles to be avian safe and retrofitting existing poles resulted in significantly fewer Spanish Imperial Eagle electrocutions. The decline in eagle electrocution rates occurred while population of eagles increased and the number of electric utility lines also increased (Lopez-Lopez 2011). In the western U.S., the electric utility, PacifiCorp, has conducted avian risk assessment surveys throughout its service territory for 16 years. Initial results of these surveys in the early 2000s led to changes in retrofitting products and techniques to improve effectiveness. For example, the industry has learned that perch discouragers are not an effective tool to prevent electrocutions and can actually increase the electrocution risk to eagles and other raptors (Guyonne et al. 1999; PacifiCorp, unpubl. data, personal communication, Sherry Liguori). Likewise, differences between other after-market avian protection products can influence retrofitting effectiveness and longevity. PacifiCorp has used adaptive management to refine its Avian Protection Plan (APP) to increase the effectiveness and durability of avian protection retrofits. In a subset of poles with initial surveys, retrofitting, and follow-up surveys conducted between 2008-2015 in Utah,

Wyoming, and California (*n*=12,975), there was a 100 percent reduction in eagle mortalities and a 71 percent reduction in overall bird mortalities (mortalities included both electrocutions and power line collisions; PacifiCorp, unpubl. data, personal communication, Sherry Liguori). Retrofitting effectiveness for overall bird mortalities was less than that for eagles largely because of common raven nests on retrofitted transformer poles, which increased fire and subsequent raven mortality risks. The introduction of a recent publication, *Power Pole Density Informs Spatial Prioritization for Mitigating Avian Electrocution* (Dwyer et al. 2016) further summarizes some of the recent scientific literature on avian electrocutions. Scientific literature and other available data validate the effectiveness of retrofitting electric utility poles at reducing eagle mortalities.

REA Calculations

Under each action alternative, the applicant would either contract with an electric utility company or deposit compensatory mitigation funds, calculated using the REA as described in our ECP Guidance (Service 2013a), in the Service's Pacific Southwest Region Bald and Golden Eagle Mitigation Account with the National Fish and Wildlife Foundation.

Under all action alternatives, the applicant would provide compensatory mitigation for eagles by retrofitting electric utility poles. The intent is to minimize the potential for electrocutions in this area and ensure that the effects of eagle take caused by Alta East are offset. As illustrated in Table 2-2, the various action alternatives consider a range of 92 to 138 utility poles to be retrofitted to offset impacts.

The difference between the Applicant's REA presented in their ECP (Appendix A) and the Service's REA results is related to the annual take rate input into the REA spreadsheet. Based upon the predicted number of annual eagle fatalities at Alta East, the Applicant used the 0.5 eagle per year take rate as an input into their REA, which indicated 74 utility pole retrofits would provide adequate compensatory mitigation.

In accordance with our established policy for inputting data into the REA the Service rounded our eagle model take prediction for the 5-year permit up from 2.5 to 3 eagles for this potential authorization. We correspondingly adjusted the annual take rate we input into the REA as demonstrated below:

Applicants REA input

$$2.5 \text{ eagles } \div 5 \text{ years } = 0.5 \text{ eagles per year}$$

Applicant's REA output

74 utility poles retrofits owed

Service's REA input

$$3 \text{ eagles} \div 5 \text{ years} = 0.6 \text{ eagles per year}$$

Service's REA output

92 utility pole retrofits owed

This is the input we utilized for our REA and this is why our calculation of mitigation owed differs from that presented in the Applicant's draft ECP which states 74 poles are sufficient. The difference in the Applicant's REA calculation and our calculation is presented above. Our REA indicates 92 utility pole retrofits will offset direct impacts to eagles resulting from Alta East operations. Therefore, 92 retrofits is the number of retrofits we used in our analysis of Alternative 2.

To address cumulative impacts to the local-area population of golden eagles, Alternative 3 considers a 1:1.5 compensatory mitigation rate. This equates to 138 power poles proposed to be retrofit under Alternative 3. The number of retrofits was derived using our REA (Service 2013a, Appendix D).

Finally, we worked with a utility company to identify high-risk utility poles appropriate for eagle compensatory mitigation. We selected the Alta East mitigation site based on an area identified as having

higher than average electrocution rates. The retrofits are not duplicative of the utility company's other obligations to retrofit poles within their system as explained below.

Utility Company's Avian Protection & Retrofitting Policy

Incidental take of eagles take is a known problem on utility power lines and utility companies have a responsibility to rectify eagle take caused by electrocution and line collision. Therefore, prior to proposing a mitigation package for Alta East, we evaluated multiple candidate utility companies' avian protection policies. We found Pacific Gas &Electric (PG&E) and possibly Southern California Edison to be the candidate to receive the applicant's mitigation funds to retrofit lines for the proposed permit because of their current avian policy and the concentration of utility lines within the same BCR as Alta East.

PG&E followed the Avian Power Line Interaction Committee (APLIC) model to develop their companywide APP. The primary focus of PG&E's APP is to reduce raptor mortality while also improving system reliability. It incorporates construction techniques that follow the suggested practices in a PG&E engineering document. Key elements of PG&E's APP include construction of all new and reconstructed facilities in designated areas with avian safe construction and materials, retrofitting over 4,000 poles annually, including retrofitting incident pole and adjacent poles associated with a raptor electrocution incident within 90 days.

Similarly, SCE has recently developed a company-wide APP. The Service is in the process of reviewing SCE's APP and may find them to be a good candidate to receive the applicant's mitigation funds.

High Risk Pole Identification

We worked with PG&E to identify high electrocution risk utility poles for appropriate eagle compensatory mitigation. PG&E collects information about golden eagle incidents to support their reporting commitments and requirements of their APP and federal permits. In addition, the Federal Special Purpose Utility Permit requires reporting to the Service whenever an eagle electrocution or collision incident is discovered. PG&E used the golden eagle incident data to identify candidate poles for retrofit with the primary objective of reducing golden eagle mortality.

A thorough evaluation of the incident data collected over 10 years found no single common or leading risk factor when comparing the incidents on a pole-by-pole basis. Historic and recent incidents of golden eagle mortality varied widely in circumstance. However, when the evaluation was conducted on a circuit-by-circuit basis, a trend did emerge related to the volume of golden eagle incident by circuit. Certain circuits within the PG&E system have incurred a higher frequency of golden eagle mortality. PG&E's data indicated a need to identify and prioritize circuits with the highest incidents of eagle mortality and identify candidate poles within for retrofit.

Alta East Mitigation Site Selection

PG&E's Tejon 1102 circuit was identified as a high-priority area for retrofits. This site is a potential mitigation site for Alta East. The Tejon 1102 circuit is located in Kern County, California south of the city of Bakersfield at the base of the Grapevine Pass. The Tejon 1102 circuit experienced four known golden eagle mortalities in 2013. It should be noted that PG&E discovered these eagle fatalities incidentally by personnel working on utility lines. Although PG&E already retrofitted a section of line in response to these incidents and plans to retrofit more in the future, we believe prioritizing further retrofits within this type of habitat will benefit the local-area eagle population. An alternate compensatory mitigation site may be selected if another similar area appropriate for mitigation is identified prior to permit issuance.

NFWF Eagle Mitigation Account

We established an Eagle Mitigation Account with the National Fish and Wildlife Foundation (NFWF) to facilitate the eagle permit process in our Pacific Southwest Region. Deposits to this account will be used to accomplish specified conservation practices as identified in permits issued under the Eagle Act.

Under all Action Alternatives, Alta East would deposit compensatory mitigation funds into the NFWF Eagle Mitigation Account. Within 30 days of permit issuance, the applicant would make the initial deposit into our

NFWF Eagle Mitigation Account. Further deposits would be required if the funds run out before the required retrofits are completed.

Retrofit Effectiveness Monitoring

As required by the CPUC, PG&E established inspection cycles and record-keeping protocols for their utility distribution equipment. These requirements are set forth in General Order 165 (CPUC 1997). In general, utilities must patrol (walk, drive, or fly by) their systems once a year (in urban areas) or once every 2 years (in rural areas). PG&E must conduct detailed inspections every 3 to 5 years, depending on the type of equipment. For detailed inspections, utilities' records must specify the condition of inspected equipment, any problems found, and a scheduled date for corrective action. PG&E submits an annual report summarizing inspections made, equipment condition observed, and repairs made. The Service finds this inspection schedule to be acceptable for the purposes of the project's compensatory mitigation effectiveness monitoring. Once the retrofits are made for Alta East's mitigation, PG&E has agreed to maintain them.

Conclusion

Based on the available data sets, we have determined that retrofitting poles within PG&E's Tejon 1102 circuit will satisfy the compensatory mitigation requirement for the proposed Alta East programmatic eagle take permit.

2.3.6 Post-Construction Monitoring

As part of the applicant's mortality monitoring and reporting program, Alta Wind X, LLC, will complete post-construction monitoring and reporting to determine whether estimated eagle fatalities are consistent with predicted operational outcomes at the Alta East project. Post-construction monitoring will enable the applicant to document eagle fatalities if they occur and identify factors associated with eagle fatalities that might warrant additional ACPs to specifically address the identified risk factor.

Fatality Studies

The applicant will perform post-construction eagle mortality monitoring during the first three consecutive years of operation to evaluate if the risk assessment was correct. Fatality study results will be used as part of an adaptive management framework to implement increasingly rigorous ACPs as described in the ACP Step-wise Table (Table 2-1).

At a minimum, post-construction mortality monitoring includes four types of surveys:

1. General avian mortality and injury surveys consisting of transect surveys at 33 percent of the turbines twice per month,
2. Eagle-specific surveys consisting of transect surveys at the remaining 67 percent of the turbines twice per year,
3. Visual inspection of the area around all turbines once per month, and
4. Incidental fatality monitoring consisting of opportunistic discovery of fatalities.

Details of the mortality surveys are described in Section 2.5.1 of the ECP.

For all eagle injuries or deaths caused by project activities or operation, the applicant will consult with us in accordance with the ECP's Stepwise response process outlined in Table 2-1 of this document and Section 3.0 of the ECP. If the post-construction eagle mortality monitoring data indicate that the project is resulting in unanticipated levels of eagle take, the applicant will implement Step IV of the adaptive management process outlined in the Stepwise table (Table 2-1).

ACP Thresholds and Triggers (See Table 2-1) would be implemented based upon fatality study estimates at Alta East, known mortalities, or a combination as determined appropriate by the Service.

Nesting/Breeding Monitoring

Alta Wind X, LLC, will conduct post-construction breeding monitoring of eagle territories within 10 miles of the project during the first 3 years following the issuance of a programmatic eagle take permit. All known nests within the 10 miles will be visited at least two times per year during the breeding season using established protocols (Pagel et al. 2010). Surveys will determine if nests are active and evaluate productivity. Post-construction breeding monitoring will include aerial surveys. Survey results will be provided annually to the BLM and the Service within 90 days of survey completion.

2.3.7 Adaptive Management

Under all action alternatives, the applicant would implement ACPs as appropriate. ACPs are defined in 50 CFR 22.3 as "scientifically supportable measures that are approved by the Service and represent the best available techniques to reduce eagle disturbance and ongoing mortalities to a level where remaining take is unavoidable." Each action alternative has stepwise adaptive management steps that would be taken as eagle mortality occurs. The stepwise approach provides a framework in the event that additional conservation measures or compensatory mitigation prove necessary. The stepwise approach outlines the thresholds at which the applicant will implement experimental ACPs and relies on coordination with our staff. The table elaborates the management actions that are to be taken when specific take thresholds are reached; it is not intended to limit or preclude other equivalent ACPs that are identified in coordination with us, or that may be developed as a result of new information, techniques, or science. After a take threshold is reached, we will evaluate the corresponding step and determine the approaches necessary to maintain the "no net loss" standard for eagle populations.

2.4 Summary of Alternatives

Table 2-2 provides a summary of the commitments for each of the alternatives considered.

2.5 Alternatives Considered but Eliminated from Detailed Study

The BLM evaluated seven alternatives in the FEIS, and of these, four were project alternatives that corresponded to different layouts and/or levels of energy production while the other three were based on the BLM's specific administrative actions. The BLM identified the Reduced Project North Alternative – 97 Wind Turbine Generators as the Preferred Alternative, but issued the ROD for only 51 turbines within the 97-turbine layout. Because the ROD authorizes only the 51-turbine layout, and not a layout for 97 turbines, the 97-turbine layout was eliminated from further study because it was not authorized by the BLM.

The project design options listed below were not selected by the BLM through its NEPA process and therefore we eliminated them from further study:

- Issue Permit for Proposed Action – 106 Wind Turbine Generators
- Issue Permit for Revised Site Layout Alternative – 106 Wind Turbine Generators
- Issue Permit for Reduced Project North, 97 Wind Turbine Generators
- Issue Permit for Reduced Project Southwest Alternative – 87 Wind Turbine Generators
- Issue Permit for Reduced Project Layout – 44 turbine design (elimination of the 4 ridgeline turbines primarily in Section 28 and the 3 northernmost turbines in Section 27/34)

TABLE 2-2
Summary of Key Components of Alternatives

	Alternative 1 – No Action	Alternative 2 – Issue Permit for Applicant's ECP	Alternative 3 – Issue Permit for Applicant's ECP with Additional Monitoring and Mitigation	Alternative 4 – Issue Permit for ECP with Curtailment of Four Ridgeline Turbines when Eagles are Observed	Alternative 5 – Issue Permit for ECP with Radar Deployment, Curtailment when Eagles are Detected
Predicted Take:					
Annual	0.5	0.50 [a]	0.5	0.46 [a]	0.50
5 Years (rounded up)	3	3	3	3	3
Mortality Monitoring:					
Number of Years	3	3+	3+	3+	3+
Frequency of fatality searches (percent of turbines)	Twice/month at 33%	Twice/month at 33%	Twice/month at 33%	Twice/month at 33%	Twice/month at 33%
	Twice/year remaining 67%	Twice/year remaining 67%	Monthly 100%	Twice/year remaining 67%	Twice/year remaining 67%
	Informal monthly inspections 100%	Informal monthly inspections 100%		Informal monthly inspections 100%	Informal monthly inspections 100%
Compensatory Mitigation		92 poles	138 poles	92 poles	92 poles
Curtailment Implementation		Following third eagle take	Following third eagle take	Four ridgeline turbines when eagle within 1 mile; then, same as Alternative 2	All turbines when eagle within 1 mile

[a] See Appendix D for Bayesian analysis simulations of Alternatives 2 and 4.

CHAPTER 3

Affected Environment

3.1 Introduction

This chapter provides background on the environmental resources that are evaluated in the context of the Federal action and alternatives. Specifically, this chapter describes the physical environment, climate change, and eagle use and demographics.

3.2 Setting Discussions

3.2.1 Physical Environment

The Alta East site is located in the western Mojave Desert, partially within the foothills of the Tehachapi Mountains. The region is characterized by rolling hills and desert flats, as well as the Tehachapi and Piute Mountains at the southern end of the Sierra Nevada. Many of the foothill and desert areas support operating wind facilities. The region is located at the confluence of three ecotones: the Sierra-Tehachapi-Mojave Ecotone, the Central Valley Ecotone, and the Antelope Valley Ecotone (see Figure 3.17-1 of the BLM FEIS provided in Appendix F), all of which are located in BCR 33. As such, a variety of vegetation communities occur in the general region, including various desert scrub communities (most commonly creosote bush and saltbush scrubs), Joshua tree and pinyon/juniper woodlands, and conifer woodlands at higher elevations. Riparian habitats also occur in some areas, but are generally not widespread on the desert floor or foothill areas. Several areas have high biodiversity because of the region's location at the desert-mountain transition zone. There are a number of disjunct localities where plants and animals range into the western Mojave Desert far from their primary distribution (BLM 2005). This chapter discusses the affected environment as it relates to eagle ecology. Other environmental topics were covered in the BLM FEIS.

The vicinity of the Alta East site is sparsely developed and rural. Land uses in and adjacent to the project area consist of open space with scattered residences, off-highway vehicle use, wind developments, and livestock grazing. Existing developments within and surrounding the Alta East area include ROWs for underground pipelines; underground portions of the Los Angeles Aqueduct; Southern California Edison electric transmission lines; Union Pacific Railroad siding, which is a short stretch of railroad track used to store rolling stock or enable trains on the same line to pass; and a Los Angeles Department of Water and Power electric transmission line easement. The Cameron Ridge segment of the Pacific Crest Trail passes northwest of the project area, north of SR 58. Existing wind developments occur adjacent to the west side of the Alta East site, and additional wind developments have been approved adjacent to portions of the site to the north, east, and south. An active mine (undetermined ore) is located adjacent to the northwestern site boundary.

The Tehachapi WRA, located within eastern Kern County (Figure 1-1), is California's largest wind energy resource area, and is currently responsible for over 40 percent of California's wind energy generation. The Tehachapi WRA currently consists of more than 3,400 wind turbines that produce approximately 4,600 MW of power as of November 2013 (Kern County 2013a, b). Wind plants in this area produce more power than any other wind development in the United States. Most of the Tehachapi WRA's old-style turbines were installed between 1981 and 1986. Between 1986 and 1989, about another 100 MW worth of turbines went online. Between 1990 and 2005, very few additional turbines were installed, but between 2005 and 2013, approximately 1,852 MW of turbines were installed (Kern County 2013b). An additional 1,000 MW has been approved by Kern County for construction (Kern County 2013b). During the late 1990s, wind power plant owners started repowering their existing turbines by removing the older turbines and replacing them with newer models.

Of the approximately 2,300 acres that constitute the Alta East site, approximately 1,700 acres are on federal land administered by the BLM. The Alta East site is designated by the BLM as Multiple-Use Class M (Moderate Use) and Unclassified in the California Desert Conservation Area (CDCA) Plan (BLM 2013b). This class provides for a wide variety of present and future uses such as mining, livestock grazing, recreation, energy, and utility development. Class M management also is designed to conserve desert resources and to mitigate damage to those resources that may be caused by permitted uses. Twenty-one acres of unclassified public lands occur within the project site. Unclassified lands are scattered and isolated parcels of public land in the CDCA that have not been placed in multiple-use classes. These parcels are managed on a case-by-case basis, per the BLM Land Tenure Adjustment Element.

The remaining approximately 600 acres of the approximately 2,300-acre Alta East site are on privately owned land, under the jurisdiction of Kern County. These lands have a zoning designation of A (Exclusive Agriculture), A WE (Exclusive Agriculture – Wind Energy Combining District), and A FP (Exclusive Agriculture, Floodplain Combining). The purpose of the WE combining district is to promote the use of an alternative to fossil-fuel-generated electrical power in areas of Kern County that have been identified to have suitable wind resources. The WE combining district contains specific development standards that apply to all construction and siting of turbines within this zone (Kern County 2012; BLM 2012).

The Alta East Wind Project is adjacent to the Middle Knob Area of Critical Environmental Concern (ACEC) to the northwest (see Figure 3.17-1 of the BLM FEIS in Appendix F). This ACEC was designated to protect several sensitive species, including Kern buckwheat, flax-like monardella, and various raptors. Management of this area includes requirements for avoidance of all covered species of plants and animals, designation of vehicle routes of travel to ensure compatibility with the purposes of the ACEC and with the Pacific Crest Trail, and a prohibition on new wind energy development on public lands (BLM 2005).

Elevations in the project area range between 3,000 and 4,300 feet above mean sea level. Elevation generally decreases from the west to the east, with the Tehachapi Mountains to the north and the Horned Toad Hills within the western and central portions of the site. Narrow, steep-walled ephemeral drainages are common in the central portion of the site. Ephemeral water features on the site trend in a northwest to southeast direction. Cache Creek traverses the northern portion of the site, south of and roughly parallel to SR 58.

Cache Creek is intermittent to ephemeral in the project area, and no perennial water sources or riparian vegetation occur onsite.

3.2.2 Climate Change

The possible impact of the proposed action on climate change and the impact of climate change on eagles in the region are addressed in this section. The FEIS (Sections 3.3 and 4.3, BLM 2013a) and the FEIR (Section 4.3, Kern County 2012) for Alta East provide a thorough review of the wind energy project's greenhouse gas (GHG) emissions and climate change effects and are incorporated by reference. As a wind energy project, Alta East itself would have no primary direct carbon dioxide emissions from electricity production during operation; however, there are other minor sources of GHG emissions that result from site operations, including the use of off-road equipment, on-road vehicles used for inspection and maintenance, and personnel commuting. During its operation, Alta East is likely to result in a large indirect reduction in GHG emissions due to the displacement of electricity generated by fossil fuel-fired power plants, offset by a small increase in GHG emissions due to the loss of carbon uptake from the removal of vegetation and minor sources of GHG emissions. Our issuance of a programmatic eagle take permit will contribute additional minor sources of GHG emissions that result from eagle monitoring operations, including the use of vehicles and equipment used for monitoring and commuting. The following analysis of climate change will focus on the effect of the Service's proposed action (issuing a programmatic eagle take permit) on climate change and the effects of climate change on the proposed action and the affected resource (golden eagle).

According to the Intergovernmental Panel on Climate Change (IPCC 2007), there is abundant evidence of global climate change based on observations of increases in global average air and ocean temperatures,

widespread melting of snow and ice, and rising global average sea level. The IPCC predicts that changes in the global climate system during the twenty-first century are very likely to be larger than those observed during the twentieth century and global warming of about 0.4°F per decade is projected for the next 2 decades. According to the U.S. Global Change Research Program's draft National Climate Assessment (USGCRP 2013), U.S. average temperature has increased by about 1.5°F since 1895 with the next few decades projected to see another 2°F to 4°F of warming in most areas. In the Southwest U.S., scientists have shown that annual mean temperatures, the length of the freeze-free season, and the frequency of heat waves have all increased significantly over the last 100 years (Kunkel et al. 2013). Climate model projections for the next 50 to 100 years indicate there will be significant increases in annual mean temperatures of 1°C (1.8°F) to 5°C (9°F), increases in the number of hot days (maximum temperature of more than 95°F), and decreases in annual mean precipitation across the southern portions of the Southwest, with the California region exhibiting the greatest reduction in precipitation (Cayan et al. 2013; Kunkel et al. 2013). For the Mojave Desert ecoregion, there is general consensus across multiple models that by 2070 temperatures will increase by 1.9°C (3.4°F) to 2.6°C (4.7°F) and precipitation will decrease by 7 to 65 mm (PRBO 2011).

The warming climate and its effects or potential effects on wildlife has been well documented (reviewed in Inkley et al. 2004). In a review of research evaluating the effects of recent climate change, McCarty (2001) noted that, while scientists have documented the response of species to interannual or geographic variations in climate, they lack sufficient information to understand or predict the responses to the kinds of long-term trends in climatic conditions that have occurred in recent decades. However, changes in the timing of avian breeding and migration and a northward expansion of the geographic range in North American birds have already been documented (McCarty 2001; Peterson 2003; LaSorte and Thompson 2007).

Predicting impacts to eagles from the issuance of a programmatic eagle take permit and the local effects of climate change is subject to changes or fluctuations in such variables as land use, vegetation, predation dynamics, parasites, prey abundance or cycles of prey abundance, and changes in human behavior that leads to increased disturbance (Mustin et al. 2007). Raptors in general may be able, through behavioral adaptations such as dispersal to areas with better conditions, to mitigate some of the predicted impacts from climate change (Wichmann et al. 2005).

The North American Bird Conservation Initiative's (NABCI) State of the Birds 2010: Report on Climate Change (NABCI 2010), assessed the relative vulnerability of each U.S. bird species, based on five biological aspects of sensitivity to climate change, as well as the exposure of each species' habitat to climate change in the near future. The results indicate that most bird species in arid lands show lower overall vulnerability and golden eagle was not listed as a vulnerable species (NABCI 2010). Nevertheless, the report notes that arid lands are predicted to become warmer and drier and that many arid land birds are at increased risk because of drought and the potential for summertime temperatures greater than they can tolerate.

A recent study by California Department of Fish and Wildlife and Point Reyes Bird Observatory (Gardali et al. 2012) of California's at-risk bird species determined that golden eagle was not one of the state's most vulnerable species to climate change, based on the intrinsic characteristics of an organism that make it vulnerable and the magnitude of climate change expected for each species. No specific observations about golden eagles were made in the published study; however, the golden eagle climate change vulnerability score is available on the following website: http://data.prbo.org/apps/bssc/index.php?page=climate-change-vulnerability.

Although golden eagle was not considered one of the most vulnerable species, the authors did note that, of all the ecoregions in California, the deserts, Central Valley, and low elevation Sierra Nevada are predicted to experience the most extreme hot weather events for extended periods and that habitat suitability is likely to decrease for the majority of taxa.

Although the issuance of a programmatic eagle take permit may add minor sources of GHG emissions that result from eagle monitoring operations, including the use of vehicles and equipment used for monitoring

and commuting, we do not consider these emissions meaningful in the context of climate change, particularly where Alta East is likely to result in a large indirect reduction in GHG emissions due to the displacement of electricity generated by fossil fuel-fired power plants. In our FEA on our proposal to permit take as provided under the Eagle Act, we did not anticipate significant impacts from the proposal when coupled with climate change impacts (Service 2009).

3.3 Biological Environment

3.3.1 Bald Eagle

Bald eagles are not known in the project vicinity, and no bald eagles were observed during 2 years of preconstruction surveys or during a 2-year study in the Tehachapi Wind Resource Area by Anderson et al. (2004). Bald eagles in southern California are associated with reservoirs, lakes, and rivers, where they winter and where their breeding range is expanding. These Southern California areas include the Channel Islands and inland water bodies (Lakes Cachuma, Lake Casitas, Lake Hemet, and lakes within the San Bernardino Mountains, among others). Because they have not been documented in or near the project vicinity, the potential for their take was not analyzed in the ECP, and the risk of their take is considered to be very low, so are not considered further in this document. However, we will consider the need for bald eagle monitoring, studies, and permitting if bald eagle observations expand into the project area. If a bald eagle injury or fatality were to occur, the stepwise approach to ACPs would be applied, and we would work with the applicant to determine if there is a need to amend the programmatic eagle take permit to include bald eagles.

3.3.2 Golden Eagle

General Conditions

Golden eagle habitat typically includes rolling foothills, mountain areas, sage-juniper flats, and desert. Golden eagles prey mostly on hares, rabbits, and rodents, but will eat other mammals, birds, reptiles, and some carrion. This species needs open terrain for hunting such as grasslands, deserts, savannahs, and early successional stages of forest and shrub habitats (Zeiner et al. 1988-1990).

Golden eagles are known to nest and forage throughout the 10-mile-radius of the local project area. While observations of foraging and nesting individuals have typically been more numerous at higher-elevation project sites in the Tehachapi and Piute Mountains, golden eagles have been recorded during avian use surveys in eastern Kern County wind development sites evaluated in the region in recent years (BLM 2013a). In addition, golden eagles are known to be at risk of collision with wind turbines (Hunt 2002).

Population

Golden eagles are distributed throughout the Northern Hemisphere primarily between 20° and 70° N latitudes (Watson 1997). In North America, the species is most abundant west of 100° W longitude from the arctic slope to central Mexico (Kochert et al. 2002). The golden eagle is a permanent resident and migrant throughout much of California.

In our 2009 Eagle Rule final EA, we estimated the total golden eagle population in the western United States (west of approximately 100° west longitude) to be 32,593 eagles (Service 2009). Millsap et al. (2013) estimated the population of golden eagles for the most recent decade for the western United States to be 31,370 to 33,460 golden eagles. Nielson et al. (2010) estimated the population of golden eagles in the western United States, not including California, to be 20,722 eagles (90% confidence interval: 16,317 to 25,948;), and, based on the ratio of golden eagles aged as juveniles to the total number of golden eagles observed, estimated that a total of 1,962 (90% confidence interval; 1,120 to 2,930) juvenile golden eagles were present in the western United States. Blancher et al. (2007) estimated the population of golden eagles in California to be approximately 2,000 birds using the Breeding Bird Survey data and the Partners in Flight population modeling.

The regional golden eagle population size within BCR 33 is estimated to be 600 individuals, with approximately 147 nesting pairs and an estimated annual production of 90 fledglings (Service 2009). Based on data collected during the 2 years of avian surveys for the Alta East project, from 3 to 11 eagles were observed during Year 1 of the avian point count surveys in and around the project area, and from 3 to 8 eagles were observed during Year 2 (see the ECP in Appendix A). Golden eagles constituted less than 2 percent of all birds observed during any of the four seasons evaluated.

Avian studies at Rising Tree Wind Resource Area (Kern County 2013) yielded no or very low eagle use in the project area. The result is consistent with findings at Alta East, where eagle use was higher to the north but diminished to the south of the study areas. Rising Tree is south of Alta East, where it would be expected that use would be low. Alternately, results of avian surveys at North Sky River (Erickson et al. 2011) and Pine Tree (Tetra Tech 2013) yielded more frequent observations of golden eagles. Pine Tree and North Sky River are approximately 7 and 10 miles north of the Alta East project area, respectively.

Raptor Nest Surveys

Surveys for nesting golden eagles were conducted within the Alta East site and a 10-mile buffer consistent with the *Interim Golden Eagle Technical Guidance: Inventory and Monitoring Protocols and other Recommendations in Support of Golden Eagle Management and Permit Issuance* (Pagel et al. 2010). The methods and results for the surveys are briefly described below. Detailed information for each survey or set of surveys can be found in the ECP (Appendix A).

Aerial Surveys

To evaluate the project area eagle population and identify if any eagle concentration areas exist within the project area, aerial surveys were conducted in 2010 and 2011 and are summarized in Table 3-1. The locations of all known active and inactive eagle nests within 10 miles of the project area are shown in Figure 3-1. Aerial eagle nest surveys were conducted via helicopter in April and May, 2010, and again in February, April, and June, 2011 (Chatfield et al. 2010a; 2011).The objective of the surveys was to locate nests that may be subject to disturbance or displacement effects from project construction or operation. While active (eggs, young, or incubating adults observed) and inactive (no eggs, young, or incubating adults observed) nests of all raptor species were recorded, the survey specifically targeted golden eagles.

No active eagle nests were located within the project boundary during the 2010 and 2011 surveys (see ECP Figures 7 and 8). Four active nests were identified during these surveys (Table 3-1) within 10.0 miles of the project area, and one additional nest was located 10.9 miles from the project. Additionally, in 2010 nine inactive nests and in 2011 eight inactive nests that could have potentially been constructed or used by golden eagles were documented within the survey area, the closest of which was approximately 2.3 miles northwest of the nearest proposed turbine.

TABLE 3-1
List of Active Nests Identified During 2010 and 2011 Eagle Nest Surveys

	Distance from project (mi), direction	Substrate	Aspect	Comments
Active nest, 2010	4.2, northwest	Cliff ledge	Northeastern	2 nestlings, May 2010
Active nest, 2011	4.1, northwest	Cliff ledge	Northwestern	Nest failed, June 2011, nest very close to the active 2010 nest
Active nest, 2011	4.5, north	Rock outcrop	Northwestern	1 nestling, June 2011
Active nest, 2011	7.6, north	Cliff	North	2 nestlings, June 2011

Ground-based raptor nest surveys were also conducted in conjunction with fixed-point bird use surveys during the peak of the breeding season (March–June) in both 2010 and 2011, when target species would be

actively incubating eggs or attending young. If nesting species, status, or outcome could not be determined from aerial surveys, ground-based follow-up visits were made provided the nest site could be accessed from the ground. More details regarding survey methodology can be found in *Avian Baseline Studies at the Sun Creek Wind Resource Area, Kern County, California, Final Report May 2009 – May 2010 (*Chatfield et al. 2010a) and *Avian Baseline Studies at the Alta East Wind Resource Area Kern County, California Final Report, July 10, 2010 – June 1, 2011* (Chatfield et al. 2011).

Aerial eagle nest survey results for other wind projects in the Tehachapi WRA were reviewed to compare results with the data from Alta East surveys. Eagle nesting habitat in the Tehachapi WRA is concentrated in the mountainous areas north of Alta East, and on Soledad Mountain to the south. The Rising Tree and Addison Wind Draft EIRs (Kern County 2013a, 2013b) present eagle nest data, but no additional nests are documented that were not found during the Alta East surveys. Surveys conducted for North Sky River in 2012 found 59 golden eagle nests within 10 miles of that project of which ten were active (CH2M HILL, 2011). Surveys conducted for Pine Tree in 2012 found 66 golden eagle nests within 10 miles of that project, of which thirteen were active (Tetra Tech 2013). The North Sky River and Pine Tree nests were located throughout the mountains north of Alta East, and included all of the nests found north of Alta East during the Alta East nest surveys.

Avian Use Surveys

Western EcoSystems Technology, Inc., conducted golden eagle point count surveys at in the vicinity of the project about once per week from May 2009 through May 2010 (Year 1) and July 2010 through June 2011 (Year 2) to assess avian use of the Alta East site (Table 3-2; Chatfield et al. 2010a, 2010b, 2011). The objective of the fixed-point bird use surveys was to estimate the seasonal, spatial, and temporal use of the Alta East site by birds, particularly eagles and other raptors. Eagle observations are summarized in Table 3-2. Detailed information for each survey or set of surveys can be found in the ECP (Appendix A).

TABLE 3-2
Golden Eagle Observations During Fixed Point Avian Use Surveys

	Eagle Groups	Individual Sightings	Mean Use*
Year 1	7	11	0.04
Year 2	7	8	0.03

*Golden eagle mean use: number of individuals observed per 800 m plot per 30-minute survey

During Year 1, bird use surveys were conducted at six points within the project area as defined in 2009. Based on Year 1 survey results, the project area was revised to eliminate proposed turbines to the north of SR 58 where 4 of 11 individual eagle sightings were made. In addition, three avian point count locations were moved for the Year 2 study to align with the new project area.

3.3.3 Eagle Mortality Associated with Human Activity

Raptors in general are killed by starvation, disease, predation, electrocution, shooting, trapping, poisoning, and vehicle/aircraft collisions (Newton 1979). Analyses of records of raptors brought in to veterinary hospitals frequently cite trauma as the leading source of morbidity and mortality, with a majority of cases directly related to human activity (Deem et al. 1998; Harris and Sleeman 2007; Richards et al. 2005; and Wendell et al. 2002). Some of the trauma is from persecution. *Six percent of the golden eagle admissions to the Colorado State University Veterinary Teaching Hospital during 1995 to 1998 were from gunshot.* Another source of eagle mortality is illegal killing for purposes of commercial gain from wildlife trafficking.

Typical activities that may be disruptive or detrimental to eagles occurring throughout the project region, although very limited on the project area, include illegal shooting, off-highway vehicle activity, loss of habitat to development through non-wind-industry-related development, and general encroachment into nesting territories.

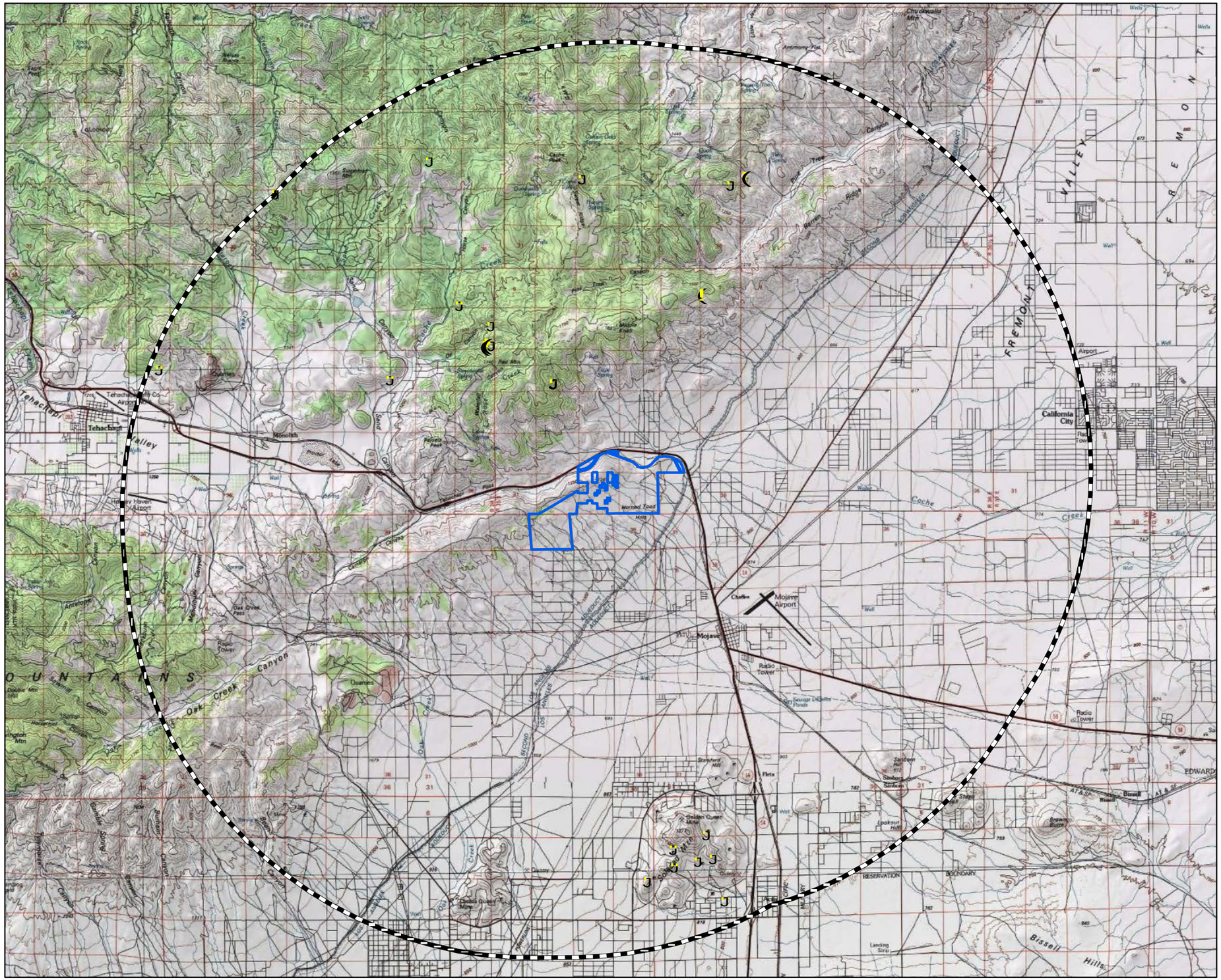


FIGURE 3-1
Golden Eagle Nest Survey Results, 2010—2011

Alta East Wind Project
Alta Wind Energy Center Project

CH2MHILL

BAO \\ZINFANDEL\PROJ\TERRAGENPOWERLLC\387639ALTAWINDCENTER\2_GENERAL\GIS\387639ALTAWINDCENTER\MAPFILES\ALTAWINDCENTER\WRA_464668\FIG3-1_EAGLE.MXD KMINO 1/23/2014 9:51:15 AM

According to Kochert et al. (2002), humans are the leading cause of golden eagle mortality, either directly or indirectly. A compilation of the causes of 4,300 bald and golden eagle deaths during the early 1960s to mid-1990s found that humans caused more than 70 percent of recorded deaths, with accidental trauma (for example, collisions with vehicles because birds were scavenging road kill, power lines, and other structures) being the primary factor (27%), followed by electrocution (25%), illegal shooting (15%), and poisoning (6%) (Franson et al. 1995). These major threats continue to affect golden eagles today. Lead poisoning is a concern for golden eagles in parts of their western range, including Washington state, where elevated lead levels in blood have been detected in more than half the birds tested (Watson and Davies 2009; Kelly et al. 2011). Individuals likely ingest lead by feeding on injured or dead small mammals or deer shot by hunters.

Lead shot and bullet fragments in the carcasses and viscera of game and other animals can pose a hazard to raptors. Diurnal raptors are one of the main avian groups affected by lead toxicosis (Miller et al. 2002), and lead poisoning accounts for an estimated 10 to 15 percent of the recorded post-fledging mortality in bald eagles and golden eagles in Canada and the United States (Scheuhammer and Norris 1996). Craig et al. (1990) noted that 12 of 16 (75%) eagles found in Idaho during a 9-year period had lead exposure, and suggested that lead poisoning in golden eagles may be a greater problem than previously believed. Bald eagles and golden eagles admitted to The Raptor Research Center at the University of Minnesota had a 17.5 percent incidence of lead poisoning before the 1991 federal ban on lead shot for hunting waterfowl and a 26.8 percent incidence of lead poisoning after the ban (Kramer and Redig 1997).

Electrocution is also a major source of mortality, particularly for immature birds, and the species is the most commonly electrocuted raptor in the United States (Harness and Wilson 2001; Lehman et al. 2007 and 2010). Many power pole designs place conductors and ground wires close enough together that a large bird like a golden eagle can touch them simultaneously with its wings or other body parts causing electrocution (Lehman et al. 2007). The majority of electrocutions are associated with low-voltage power lines or those with transformers, rather than high-voltage power lines (Lehman 2001; Lehman et al. 2007).

Expanding wind energy development represents another concern for golden eagles. The western United States has been the focus of extensive wind energy development (Service 2009). Between 1999 and 2011, installations of new wind turbine facilities increased the national wind-energy-generation capacity by 1,798 percent. California, which was ranked third in terms of installed capacity in 2011, has seen its capacity grow by 142 percent over the same period (USDOE 2013).

Commercial wind turbine facilities and their impacts to birds in the United States surfaced in the late 1980s and early 1990s at the Altamont Pass WRA, a facility then containing some 6,500 turbines on 189 km^2 (73 mi^2) (46,720 acres) just east of San Francisco Bay, California (Davis 1995). Orloff and Flannery (1992) estimated that several hundred raptors were killed each year at Altamont due to turbine collisions, guy wire strikes, and electrocutions. Smallwood and Thelander (2005) estimated 28 to 34 golden eagle deaths per year at the Altamont Pass WRA between March 1998 and September 2001. Pagel et al. (2013) summarized documented cases of bald and golden eagle mortality at wind energy facilities in the contiguous United States, excluding the Altamont Pass WRA, during 1997-2012, and found a minimum of 85 eagle (79 golden eagle and 6 bald eagle) mortalities at 32 wind energy facilities in 10 states with most (78.8%) of these mortalities occurring during 2008–2012. Of the 85 reported eagle fatalities, 27 (31%) were reported to have occurred at 13 wind projects in California. The authors suggest their findings underestimate the number of eagles killed at wind facilities due to lack of rigorous monitoring and reporting of eagle mortalities.

Anderson et al. (2004) studied the Tehachapi WRA avian use and mortality rate from 1996 to 1998, and concluded that raptor use was the “clearest factor related to raptor fatalities” in the Tehachapi WRA. No bald eagles were observed during his study, and only two golden eagles were observed. No eagle fatalities were recorded during the study, though raptors accounted for more than a third (34.6%) of all bird fatalities.

CHAPTER 4

Environmental Consequences

4.1 Introduction

In this chapter, we describe the environmental consequences (impacts and effects) of the No-Action Alternative and four action alternatives on the environmental resource. This provides for the scientific and analytic basis for comparison of alternatives. The alternatives listed below are evaluated on the basis of the 30-year project lifespan.

- Alternative 1: No Action – Operation of the Project Without an Eagle Take Permit
- Alternative 2 (Applicant Proposed Action): Issue Permit for Applicant's ECP
- Alternative 3: Issue Permit for Applicant's ECP with Additional Monitoring and Mitigation
- Alternative 4: Issue Permit for ECP with Curtailment of Four Ridgeline Turbines when Eagles are Observed
- Alternative 5: Issue Permit for ECP with Radar Deployment, Curtailment when Eagles are Detected

4.2 Impacts Analysis for Take of Golden Eagles

4.2.1 Approach and Methods

In determining the significance of effects on eagles, we screened each alternative against the Eagle Act's Permit Issuance Criteria (Chapter 1, Section 1.5.2). We used recently developed tools such as Bayesian analysis (consistent with Appendix D, "Stage 3—Predicting Eagle Fatalities," of the ECP Guidance [Service 2013a]); Resource Equivalency Analysis (consistent with Appendix G, "Examples Using Resource Equivalency Analysis to Estimate the Compensatory Mitigation for the Take of Golden and Bald Eagles from Wind Energy Development," of the ECP Guidance [Service 2013a]); and Cumulative Effects Analysis (consistent with Appendix F, "Assessing Project-Level Take and Cumulative Effects Analyses," of the ECP Guidance [Service 2013a]). We have also used some qualitative analysis based on our knowledge of the wind resource area, attendance at local technical meetings, discussions with other local experts, and studies of local eagle populations.

To address the effects of golden eagle take on cultural practices, we assessed whether the Proposed Action or alternatives would substantially burden a Tribe's free exercise of its religion.

4.3 Effects Common to Alternatives

All alternatives have the potential to result in permitted or unpermitted take of eagles.

4.3.1 Direct and Indirect Effects

Multiple old and new-generation wind projects (i.e., using larger, widely spaced turbines) currently operating in the Tehachapi WRA contribute to eagle fatalities. Eagle injuries and fatalities are caused by direct collision with turbine blades, while the primary potential indirect effect is habitat displacement. The level of direct mortality caused by wind farms in the local-area population is provided in detail below. As indicated in the Bayesian analysis, we believe that the number of eagle fatalities in the Tehachapi WRA could be higher than that currently reported from post-construction monitoring or other incidental detections in view of limited search intervals, limited search areas, and limited reporting of mortalities.

4.3.2 Mortality and Demographics

The effect of turbine-related golden eagle fatalities on the local population is dependent on the age, status, and origin of the individual eagle. Direct mortality of golden eagles could adversely affect local survival and

fecundity, and could thereby affect local and possibly regional populations. The biological impact of killing an eagle within the Tehachapi WRA on the overall population depends on the type of eagle killed: a breeding adult, a juvenile, or a floater.

Losing a breeding adult has the most immediate and significant effect because it has survived to breeding age—studies show that less than half the population reaches breeding age—and because it helps maintain the population by successfully rearing offspring. Breeding eagles have established territories and nests and are mated. Losing a juvenile also has an adverse effect by reducing the number of individuals that may survive to become reproducing adults.

Similarly, take of non-nesting floaters could have adverse consequences for the population. A sizable number of floaters are needed for healthy, stable populations of raptors in general (Hunt 1998). Floaters function as replacement breeders for territory-holding birds that die. If the local floater population is robust, they quickly fill territories that have lost a breeding adult, helping to maintain stable populations through time. If the local floater population is not robust, loss of a breeding adult can be a more severe effect because the territory is not quickly filled. The size of the floater population is uncertain and difficult to measure in this WRA. We presume that reductions have likely occurred and are attributable to local wind power development.

Overall eagle mortality rates are higher for younger eagles, especially juveniles, than for adults, and this fact is taken into account in our REA. The REA and fatality estimates both consider the age of the eagle in their calculations. They assume that the age distribution of eagles killed at wind facilities will be the same as the age distribution of eagles in the wild (i.e. 20% juvenile, 35% sub-adult, 45% adult). These estimates come from information contained in the 2009 EA for the eagle permitting regulations Final Rule (Service 2009). In the REA, this age distribution is used in both the debit and credit sides of the calculations. As we learn more about the actual age distribution of eagles that are taken at wind facilities through the adaptive management process, we will be able to improve the models.

4.3.3 Local Effects

Four active nests were identified in 2010 and 2011 within 10 miles of the project area: one nest approximately 4.1 miles northwest of the project area, one approximately 4.2 miles northwest of the project are, one approximately 4.5 miles north of the project area and one approximately 7.6 miles north of the project area (Figure 3-1).[2] The two first nests are assumed part of the same nesting pair. Inactive nests were also identified; the closest inactive nests were 2.3 and 4.0 miles to the north. Nesting survey results are detailed in the ECP. Nesting adults and juveniles from these nests are at risk of nest abandonment, injury, or mortality from project operations. Our evaluation of existing foraging and operational conditions finds that the two nests nearest to the project area are at greatest risk. Eagles generally hunt prey from favored perches near regular updrafts, which allow soaring to heights sufficient for them to efficiently scan their hunting areas (Johnsgard 1990). Prey studies were not conducted for the Alta East project; however, eagles were observed infrequently and those observed were not hunting or foraging. Additionally, no prominent active perches were detected after careful evaluation of the project area.

The specific fatality estimates for each alternative are described below in Section 4.4 under “Assessment of Alternatives.”

Each alternative involves power pole retrofits as compensatory mitigation for take of eagles. Such retrofits are anticipated to protect eagles from electrocution. It is difficult to predict whether the birds saved will be breeding adults, juveniles, or floaters; however, our REA assumes that the losses to electrocution are proportional to the demographic distribution of the population. Avoided fatalities will help to offset project-related fatalities (i.e., collisions with turbines or other facilities), thereby benefitting the eagle population as

[2] A fifth nest was 10.9 miles from the project area, so is not included in this discussion.

a whole. Pole retrofits are also expected to benefit other raptors that may be susceptible to electrocution. Eagles from nearby BCRs could also be affected, both adversely by the wind project and beneficially by pole retrofits.

4.3.4 Cultural Effects

Eagles and their feathers are revered and considered sacred in many Native American traditions. Operation of the project, including the take of eagles, is not expected to interfere with cultural practices and ceremonies related to eagles, or to affect the ability to utilize eagle feathers in a manner consistent with federal law. Further, eagles that are found will be sent to our repository and, if in good condition, will be made available for these practices under permit. Therefore, we do not anticipate any adverse effect on cultural practices.

4.3.5 Other Priority Uses

Other priority uses described in our regulations include safety emergencies, Native American use for rites and ceremonies, activities necessary to ensure public health and safety, renewal of programmatic nest-take permits, and resource development or recovery operations (for inactive golden eagle nests only). Operation of the project, including take of eagles, is not expected to interfere with other priority uses or permits because a no-net-loss standard is expected to be achieved under the action alternatives.

4.3.6 Cumulative Effects

Introduction

This cumulative effects section is intended to evaluate effects on golden eagles as required by NEPA (CFR 1508.8) and the Eagle Act's permitting regulations. As part of its permit application review process (50 CFR 22.26 (f)(1) and Service 2009), we are required to evaluate and consider effects of programmatic take permits on eagle populations at three scales: (1) the eagle management unit/BCR, (2) local-area, and (3) project area. Our evaluation also considers cumulative effects. We incorporated data provided by the applicant, other data on mortality, and additional information on population-limiting effects, in preparation of this cumulative impact assessment.

The purpose of this cumulative effects evaluation is to identify situations where take, either at the individual project level or in combination with other present or foreseeable future actions and other limiting factors at the local-area population scale, may be approaching levels that are biologically problematic or which cannot reasonably be offset through compensatory mitigation. The scale of our analysis is a 140-mile radius around the project site. Climate change effects are addressed at the end of this section.

Eagle Take Policy

The preamble to the Eagle Permit Rule regulations (74 FR 46836, September 11, 2009) states that, "we will initially implement this rule only insofar as issuing take permits based on levels of historically authorized take, safety emergencies, and take permits designed to reduce ongoing mortalities and/or disturbance. Future projects seeking programmatic permits would need to minimize their own take of golden eagles to the point that it is unavoidable and also reduce take from another source to completely offset any new take from the new activity."

To ensure that any authorized take of eagles does not exceed the Eagle Act's preservation standard, we set regional thresholds (i.e., upper limits) for take of each species of eagle, using methodology in the Final EA of the Eagle Permit Rule (Service 2009). We used estimates of population levels of eagles in each region and set take thresholds based on estimates of sustainable take in published literature (upper limits on the number of eagle mortalities that can be allowed under permits each year in the BCR and regional management areas).

Our analysis in the 2009 Final EA identified take thresholds greater than zero for bald eagles in most regional management units. At the time, however, we determined that golden eagle populations might not be able to sustain any additional unmitigated mortality, and set the thresholds for this species at zero for BCR level

populations in all regional management units. This means that any new authorized take of golden eagles must be at least equally offset by compensatory mitigation (specific conservation actions to replace or otherwise make up for the loss of each eagle associated with a project).

We also recommend measures to ensure that local eagle populations are not depleted by take that would be otherwise regionally acceptable. The local area population is based on the median distance to which eagles disperse from the nest where they are hatched to where they settle to breed. We specified that take rates must be carefully assessed, both for individual projects and for the cumulative effects of other activities causing take, at the scale of the local-area eagle population (a population within a distance of 43 miles for bald eagles and 140 miles for golden eagles).

We identified recommended take rates of between 1 and 5 percent of the total estimated local-area eagle population as benchmarks, with 5 percent being at the upper end of what might be appropriate under the Eagle Act's preservation standard. Appendix F of the ECP Guidance – Module 1 (Service 2013a) provides a full description of take thresholds and benchmarks, and provides suggested tools for evaluating how these apply to individual projects.

As described in the ECP Guidance Appendix F (Service 2013a), we used a top-down approach for this assessment to: (1) identify numbers of eagles that may be taken safely at the national level (i.e., a national-level benchmark); (2) allocate take opportunities among regional eagle management units (Service 2009) as a function of the proportion of eagles in each unit (i.e., regional and BCR-level benchmarks); (3) further allocate take opportunities to the local-area population scale as a function of inferred eagle population size at the regional or BCR scale (this approach assumes, in the absence of better population data, a uniform distribution of that population); and (4) incorporating benchmarks that can be used to assess the likely probable sustainability of predicted levels of take at the local-area population scale. Through a spatial accounting system, permitted take is managed to ensure that the benchmarks also consider cumulative effects at the local-area population scale as a guard against authorizing excessive eagle take at this scale.

The Eagle Act's permit regulatory standard under 50 CFR 22.26 allows us to authorize take of bald or golden eagles only if we determine that the take is compatible with the preservation of the bald eagle and the golden eagles. For purposes of the Eagle Act take permit regulations, we defined ''compatible with the preservation of the bald eagle or the golden eagle'' to mean ''consistent with the goal of stable or increasing breeding populations'' sometimes simplified as "no-net loss" to the population. We must deny the permit unless the applicant commits to compensatory mitigation measures that would offset the take to the level where it is compatible with the preservation of eagles. In situations where the level of baseline take exceeds the policy benchmark of 5% of the local-area eagle population, we may require additional compensatory mitigation from applicants to not only offset the project related impacts but to reduce cumulative impacts to the local-area eagle population.

Alta East Local-Area Population

For this analysis, past, present, and reasonably foreseeable projects comprise wind energy facilities operating in the Tehachapi, Pacheco Pass, Altamont Pass, and San Gorgonio WRAs, and ongoing utility operations. The anticipated take at Alta East was factored into our Tehachapi WRA annual take analysis. We did not include other sources of fatalities, such as vehicle strikes, illegal hunting, and poisoning, because too few quantitative data were available for these sources. Using an assumption that the take benchmark of 5% of the local-area population is sustainable, we extrapolated an acceptable level of take for each BCR within Alta East's local-area population (Table 4-1). Based on our calculations, if we were to stay within the 5% management goal benchmark, no more than 28 golden eagles should be removed from this local-area population annually.

To evaluate ongoing cumulative impacts for the local-area population, we followed the guidance provided in Appendix F of the ECP Guidance (Service 2013a). Utilizing this process, we estimated annual golden eagle fatality rates within a 140-mile radius around the Alta East Wind Project area. This analysis included available data or estimates in golden eagle dispersal areas from other wind projects within the Tehachapi,

Pacheco Pass, Altamont Pass, and San Gorgonio WRAs and from other wind projects not associated with these WRAs and that are reasonably likely to occur (i.e., have a signed ROD and/or ROW grant). Our analysis also included electric transmission and distribution line mortality data where available. It is important to note that it is difficult to estimate take at many operating wind energy and electric power lines because most documented mortalities are incidental finds not associated with standardized monitoring and/or are based on incomplete assessments. However, the information we have allows us to summarize these quantitative and qualitative assessments of existing take for purposes of estimating cumulative effects.

TABLE 4-1
Service Golden Eagle Management Units and Local Area Population Estimate

Eagle Management Unit	Estimated Population Size[a]	BCR Size (mi^2)[a]	Golden Eagle Density (mi2)[b]	Percent of BCR[c]	Estimated Local-Area Population[d]	5% of Local-Area Population[e]
BCR 33 – Sonoran and Mojave Desert	600	95,593	0.0063	24%	144	7
BCR 32 - Coastal California	960	63,919	0.0150	40%	387	19
BCR 15 - Sierra Nevada	84	20,414	0.0041	17%	14	1
BCR 9 - Great Basin	6,859	269,281	0.0255	0.3%	23	1
TOTAL					**568**	**28**

[a] Taken directly from Service 2009.

[b] BCR eagle density = population size/BCR size.

[c] The percent of the BCR that is within 140 miles of the project footprint.

[d] The local-area is the project footprint with buffer radius of 140 miles (the average natal dispersal distance for the golden eagle)

[e] A take rate of 5% is the Service's upper benchmark for take at the local-area population scale. The local-area 5% benchmark = (Local-area*Regional Eagle Density)*0.05.

We used the Bayesian modeling approach (Appendix D of the ECP Guidance [Service 2013a]) and available data to estimate take of eagles at the Tehachapi WRA. We recognized two distinctive geographic areas within the Tehachapi WRA and calculated two different annual golden eagle take rates accordingly. The northeastern portion of the WRA is more rugged and mountainous, supporting a higher density of nesting eagles and available data suggests a higher fatality rate here. Although the southwestern portion of the WRA, within which the Alta East is located, includes some foothills, it is primarily characterized by flat valley floors. Available data suggests a lower fatality rate here.

Eagle fatalities have been documented at wind energy projects operating in the Tehachapi WRA. In the northeastern section of the WRA, the North Sky River project reported two eagle mortalities to date. One in January 2013 and another in January 2015. The Pine Tree project documented nine mortalities between 2009 and 2012. In the southwestern section, two fatalities have been documented at the Alta-Oak Creek Mojave project. In addition, we know of one other injured eagle found in the southwestern section of the WRA.

The North Sky River project consists of approximately 162 MW of wind energy generation capacity with 100 turbines installed in 2012. It is located 10.5 miles north of Alta East within topography substantially more rugged. Vegetation is typified by pinyon-juniper woodland and oak woodland on the west side of the project and grasslands and chaparral scrub on the east side of the project. The North Sky River environmental documents contain information on numerous sightings of golden eagles and golden eagle nests (Kern County 2012; Erickson et al. 2011; CH2M HILL 2011).

The Pine Tree project consists of approximately 135 MW of wind energy generation capacity with 90 turbines installed in 2009 and 2010. It is located approximately 7 miles north of the Alta East site, and immediately south of North Sky River, and is also located within more rugged topography.

The Alta-Oak Creek Mojave project consists of approximately 720 MW of wind energy generation capacity with 150 turbines installed during 2010 and an additional 140 turbines installed during 2011. It is located approximately 3 miles to the south of the Alta East, within the foothills of the Tehachapi Mountains. The topography is a plateau that gradually slopes northwest and southeast. Vegetation consists primarily of shrubs and forbs.

For the Shiloh IV eagle take permit application (Service 2013d) and the Desert Renewable Energy Conservation Plan draft EIS (DRECP 2014), we extrapolated take rates for each project in the northwestern portion of the Tehachapi WRA to be five golden eagles per year and two eagles per year for each southwestern WRA project and estimated an overall annual mortality rate in the Tehachapi WRA of 31 golden eagles.

To estimate take of eagles at the Altamont Pass WRA, we examined mean annual take rates for golden eagles at the Altamont Pass WRA during 2005–2010 (Leslie et al. 2012). Mean annual take rates ranged from 26 to 88 golden eagles with rates declining in the more recent years. As required by settlement agreements with the California Attorney General some wind projects were required to reduce mortality of four key raptor species, including the golden eagle, through management actions including removal of high risk and hazardous turbines and seasonal turbine shutdowns. We anticipate that as old generation wind facilities either decommission or re-power with fewer larger turbines in the Altamont Pass WRA, efforts aimed at reducing and minimizing take would be implemented and annual take rates decrease accordingly. Based on the most recent information, we estimate annual take rates of 46 golden eagles for the Altamont Pass WRA.

Although no mortality data was available for the Pacheco Pass WRA, which consists of one wind project owned and operated by International Turbine Research, we thought it important to include in our cumulative effects analysis. This WRA is located about 70 miles south of the Altamont Pass WRA and has similar habitat located within Pacheco State Park. Given the high quality nesting and foraging habitat present and limited information about the wind farm itself, we qualitatively estimated a take rate for the Pacheco Pass WRA to be at least 9 golden eagles a year.

Limited data were available for the San Gorgonio Pass WRA; however, several eagle mortalities have been reported over the years. This WRA is located about 120 miles south of the Tehachapi WRA and is a narrow, low-elevation pass bordered by high-elevation mountains. Vegetation includes components of both the Mojave and Colorado deserts. Anderson et al. (2000) predicted lower risk at San Gorgonio WRA than at Altamont or Tehachapi. The area supports 1 or more resident pairs and floaters travel through the pass.

Given the limited information about this WRA, we qualitatively estimated an annual take rate for the San Gorgonio Pass WRA to be 21 golden eagles.

Other wind energy projects that are reasonably likely to occur, have golden eagle local-area populations that overlap with Alta East's, have annual golden eagle take estimates, and that are not implementing up-front advanced eagle detection and avoidance measures were also included in our analysis (Table 4-2). We included the Tule wind energy project in California, the Searchlight wind energy project in Nevada, and the Mojave wind energy project in Arizona in our analysis. We did not include the Ocotillo Express wind energy project in California in our analysis because that project is implementing advanced avoidance measures including radar-controlled video tracking of golden eagles and a full-time golden eagle biological monitor to observe eagles in the area and curtail turbines when eagles are at risk of collision.

We used available utility electrocution and collision data to estimate take by BCR and at the local-area population level. Based on data available, on average, 10 golden eagle fatalities are reported annually within BCR 32. We extrapolate that 4 of the 10 eagles taken are within the project's local-area population.

As described above and summarized in Table 4-2, we used the Service's Bayesian model framework to estimate annual take from the Tehachapi WRA, compiled data from Altamont Pass WRA, and utility electrocution and collision data and extrapolated take rates. We also qualitatively estimated take at the Pacheco Pass WRA and San Gorgonio WRA. We used the take estimates from other wind projects not

associated with WRAs that were developed as part of their eagle conservation and avian protection planning documents. We estimate a total take of 48 golden eagles annually within the Alta East local-area population, or 8 percent of the local-area population (Figure 4-1).

TABLE 4-2
Alta East Local-Area Population Annual Eagle Take Calculations

Project	LAP mi^2	Estimated Annual Take	Overlap	Estimated Annual take within Alta East LAP
Tehachapi WRA	60,395	31	53,107	27
Altamont Pass WRA	46,949	46	1,874	2
Pacheco Pass WRA	43,178	9	9,073	2
San Gorgonio Pass WRA	52,582	21	24,133	11
Tule Wind	30,578	6	10,239	2
Searchlight Wind	65,107	0.1	13,715	0
Mojave Wind	66,431	0.5	8,155	0
Electric Utility (BCR 32)	63,919	4	25,258	4
TOTAL				**48**

Notes: We estimated the annual golden eagle mortality rate within the Alta East local-area population (LAP) using the following equation:

(Sum of take within Alta East LAP/Alta East LAP)*100 = annual rate of mortality within Alta East LAP; (48/568)*100=8%)

Conclusion

This is a conservative range of estimates of population-level effects that are protective of the species. Based on our assessment, fatalities at the Techachapi WRA have the largest overall impact on the eagle population. However, eagle mortality in that and other WRAs may change over time as individual wind projects within the WRAs reach their lifespan and are decommissioned or repowered and re-sited. This conservative approach was adopted to ensure that undocumented fatalities are addressed.

Many of the wind energy facilities that are responsible for ongoing golden eagle fatalities within the local-area population were in operation prior to 2009. As discussed in the Eagle Take Policy section above, the Service's objective is to manage the species by authorizing take at a level that is less than 5% of the local area population annually. However, in areas such as this, where the annual ongoing fatality of eagles is well above this benchmark, our goals will be focused on additional mitigation and overall reduction of ongoing eagle mortality. Here, to mitigate for the loss of eagles from Alta East, power poles would be retrofitted and maintained for 10 years in order to achieve no net loss of golden eagles for the 5-year permit period. In addition, as presented in Alternative 3, we may require additional compensatory mitigation to offset the cumulative impacts because annual take already exceeds 5% of the local-area golden eagle population. We independently verified the accuracy of the applicants' eagle risk model analysis presented in the Alta East ECP (Appendix A). We will continue to encourage measures to reduce mortality at the sources identified here, including at the Alta East project.

At the same time, the context of the cumulative effect must also be considered. While the incremental effect of the project is small the project would contribute to local and possibly regional adverse effects on the species. We anticipate that, by issuing a permit, we would ensure that take of eagles would be offset through the implementation of ACPs and the compensatory mitigation; retrofitting electric utility poles. The retrofitting of additional utility power poles will also help accomplish our population goal for eagles. In addition, by implementing the ACPs, the applicant will contribute information on the effectiveness of

experimental ACPs, and may lead to technological innovations to minimize avian impacts associated with turbine operations. Because the applicant would offset take through compensatory mitigation, and may reduce the amount of actual take (compared with our take estimates for the project) through the implementation of experimental ACPs, there would be no significant adverse cumulative effects contributed to golden eagle populations by issuance of a programmatic eagle take permit for the Alta East project.

Climate Change

The effects of climate change on eagles and other migratory bird species in the region is treated as a cumulative impact because it occurs later in time. Over the life of the project, the project area is anticipated to shift to a warmer and dryer climatic regime. The ultimate effect of these changes on golden eagles in the project area and the region is difficult to predict. While the population dynamics might change locally, the species might be resilient more broadly because golden eagles survive on a wide variety of prey species and range across a broad gradient of climatic zones (Kochert et al. 2002). Moreover, by generating electricity using wind energy rather than fossil fuels, operation of the project could offset production of GHGs. Any offset would constitute an indirect beneficial effect.

4.4 Assessment of Alternatives

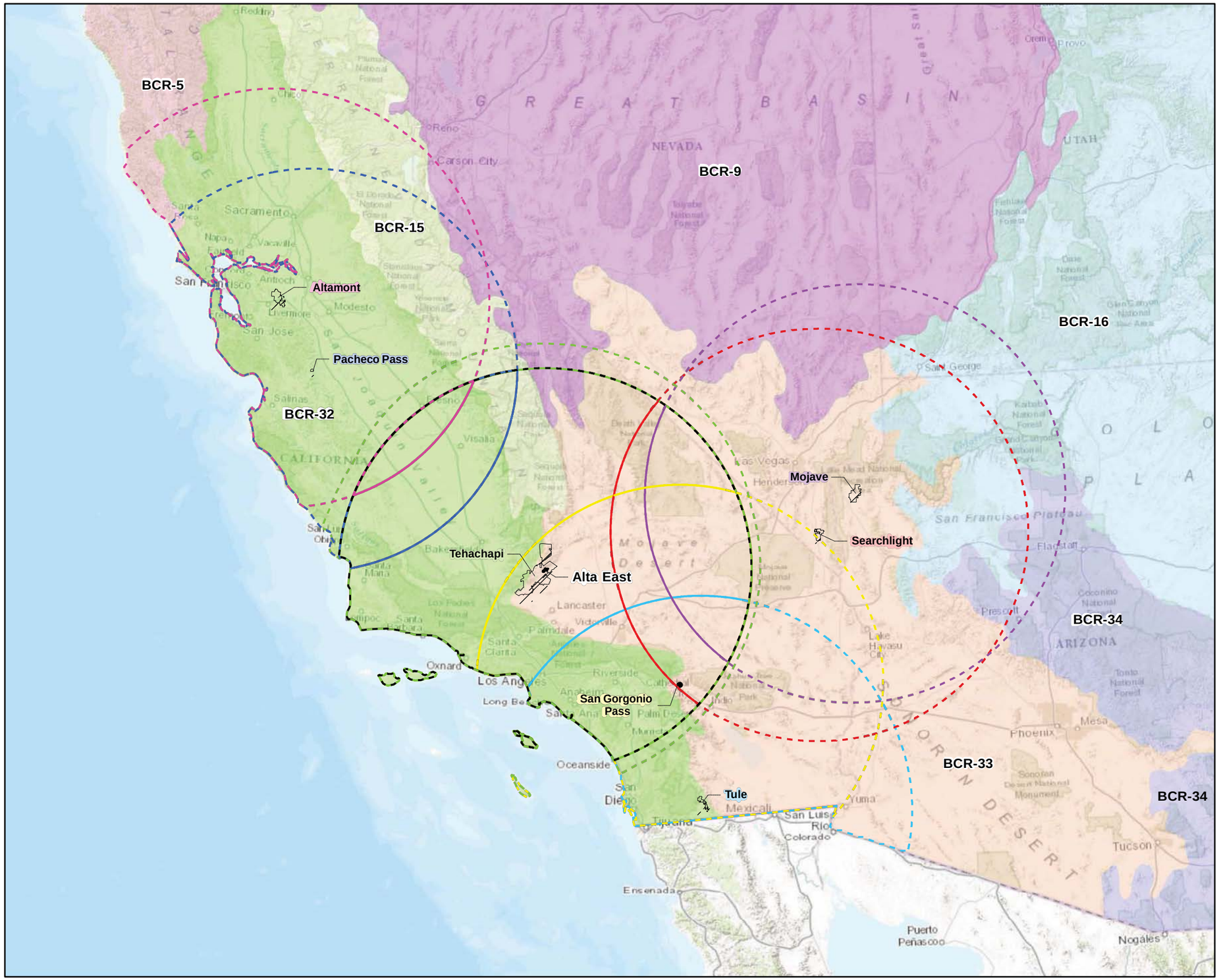
In assessing whether there is a "significant" impact, we have considered both the context and intensity of the action and its effects (40 CFR 1508.27). *Context* refers to the affected environment in which the proposed action takes place and may include the socioeconomic, legal, and political situation surrounding an action. *Intensity* refers to the severity of the proposed action's impact on the environment and may consider environmentally beneficial actions, public health, unique characteristics of the geographic area, controversy, uncertainty, precedent-setting elements, cumulative effects, cultural resource effects, effects on endangered species, and consistency with environmental laws (40 CFR 1508.27[b]). In the case of the Proposed Action—issuance of an eagle take permit—we have assumed that the context is construction and operations of an approved wind energy facility within a larger developed Tehachapi WRA, and that a certain amount of take of golden eagles already occurs. Consideration of intensity addresses the relative severity of effects on eagles, the possibility of the Federal action to establish a precedent for future eagle take permits, and the efficacy of the action in mitigating adverse cumulative effects.

4.4.1 Alternative 1: No Action – Operation of the Project Without an Eagle Take Permit

Under the No-Action Alternative, we would either take no action or deny the permit application and not issue a permit. Under the No-Action Alternative, direct impacts of Alta East on the golden eagle population would be quantified through fatality monitoring during the first 3 years of operation, which the applicant will conduct in compliance with the FEIS and FEIR. The take estimate for the 30-year life of the project is 15 eagles (0.5 eagle/year times 30 years; Table 2-2).

Under the No-Action Alternative, the project would continue to operate without a take permit. Should the project result in the take of eagles under the No-Action Alternative, the applicant would be in violation of the Eagle Act and would thereby be subject to investigation and possible prosecution by our Office of Law Enforcement and the U.S. Department of Justice.

If we decide not to issue a take permit because we assess the risk to be zero, and take occurs, then we will have been in error and law enforcement action against the applicant would be unlikely. However, following the initial take, the operator (Alta Wind X, LLC) will be directed by the Office of Law Enforcement to immediately coordinate with us and may be directed to shut down wind turbines to avoid additional eagle take until adaptive management measures are implemented. Failure to implement Service recommendations to avoid additional take and/or failure to obtain a permit would likely result in investigation and could result in prosecution under the Eagle Act. In the alternate scenario—in which we do not issue a take permit because the application and conservation commitments made by the applicant fail to meet our issuing criteria—then immediate law enforcement action is more likely.



VICINITY MAP

LEGEND

- Project Location
- 140-mile Project Buffers*
  - Alta East
  - Altamont
  - Pacheco Pass
  - Teachapi
  - San Gorgonio Pass
  - Mojave
  - Searchlight
  - Tule

BCR

- (32) Coastal California
- (9) Great Basin
- (5) Northern Pacific Rainforest
- (34) Sierra Madre Occidental
- (15) Sierra Nevada
- (33) Sonoran and Mojave Deserts
- (16) Southern Rockies/ Colorado Plateau

* Where project overlap within the 140-mile Buffer of Alta East occurs, it is represented by a solid line

0 40 80
Miles

FIGURE 4-1
Local Area Population Overlap with Other Wind Developments
Alta East Wind Project
Alta Wind Energy Center Project

4.4.2 Alternative 2: Issue Permit for Applicant's ECP

Golden Eagle Take

Under this alternative, we recognize that the project is built, and that all applicant-committed measures, compensatory mitigation, and adaptive management requirements would be fulfilled. We estimate that up to three eagles will be killed over the 5-year permit duration at the site from the operations of Alta East.

If the predicted take threshold is reached within 3 or 4 years of permit issuance, the following experimental ACPs would be considered for implementation as described in Step III of the ECP's Stepwise table

(Table 2-1) and summarized below:

- Additional years(s) of eagle mortality monitoring.
- Studies of deterrence effectiveness.
- Intensified monitoring to determine eagle use patterns.
- Biological monitors to direct curtailment actions.
- Radar systems to direct curtailment actions.
- Extended eagle movement and mortality monitoring studies.
- Broader seasonal or temporal curtailment.
- Other actions to minimize and compensate for effects.

If unintended take were to reach or exceed our predicted or authorized levels, Step IV would require curtailment, additional monitoring to inform ongoing curtailment schedules, radar deployment, and / or other measures deemed appropriate by the Service.

Subsequent implementation of the ACPs could result in decreased eagle fatalities. Consequently, the fatalities that occur during the initial 5-year period (i.e., three fatalities) cannot be extrapolated to determine a 30-year total (i.e., 15) because it is presumed that ACPs would reduce future fatalities. This anticipated decline would reduce the 30-year total from 15 eagle fatalities to 4–15 fatalities (see Table 2-2).

Ninety-two utility pole retrofits would be completed within 1 year of permit issuance under this alternative.

The applicant's proposed approach would ensure no net loss to golden eagle populations. Based on the intensity and context of these effects and consideration of the elements associated with this alternative, Alternative 2 is not expected to result in significant adverse effects to the golden eagle population.

4.4.3 Alternative 3: Issue Permit Based on Applicant's ECP with Additional Monitoring and Mitigation

Under this alternative, we estimate that up to three eagles will be killed over the 5-year permit duration. The effects would be similar to those described in Alternative 2, although possibly at a slower rate (and lower total) because the additional monitoring would diminish the possibility of a take occurring without being detected. Increased mortality monitoring associated with this alternative (i.e., evaluating all turbines during a monitoring year) would help to ensure that fatalities are detected and would support validation of the take estimate. Increased monitoring also has the benefit of accelerating the use of the intensified Stepwise table if a fatality is discovered, thereby helping reduce future fatalities. One hundred thirty-eight utility pole retrofits would be completed within 1 year of permit issuance under this alternative. Requiring additional compensatory mitigation under this alternative would reduce the cumulative impacts to the local-area golden eagle population.

Alternative 3 is not expected to result in significant adverse effects on golden eagle populations because the compensatory mitigation would result in no net loss to the breeding population.

4.4.4 Alternative 4: Issue Permit Based on ECP with Curtailment of Four Ridgeline Turbines when Eagles are Observed

Under Alternative 4, the effects would be almost identical but potentially less than those described in Alternative 2. ACPs would be implemented as described in Alternative 2, based on the number of fatalities, and 30-year total fatalities are expected to be slightly lower (the maximum is reduced from 15 to 14; Table 2-2). The primary difference under Alternative 4 is the requirement for curtailment of the four ridgeline turbines to reduce eagle take; a biological monitor would be present during daytime hours who has the authority to curtail turbines whenever an eagle flies within 1 mile of any of the four ridgeline turbines.

To evaluate risk under this Alternative, we used the Bayesian Collision Risk Model (Service 2013a) with an input variable of 47 turbines to simulate this scenario, and this resulted in an annual take estimate of 0.46 golden eagles, which is slightly less than the estimate for 51 turbines. However, this assumes that all turbines, regardless of location, present an equal collision risk to eagles and that curtailment of turbines is the same as turbines not being there. Based on a qualitative assessment of the eagle use information, the four ridgeline turbines appear to pose the greatest risk to eagles. However, the preconstruction survey data cannot be used to directly predict with certainty that a specific turbine may cause a take.

Based on the intensity and context of these effects and consideration of the elements associated with this alternative, Alternative 4 is not expected to result in significant adverse effects on golden eagle populations.

4.4.5 Alternative 5: Issue Permit Based on ECP with Radar Deployment, Curtailment when Eagles are Detected

Under Alternative 5, the effects would be identical to but potentially less than those described in Alternative 2. The adaptive management approach would be implemented as identified in the ECP and described in Alternative 2.

Under this alternative, eagle risk may be reduced by the presence of a radar system whose development would be initiated with commencement of operations. The radar system would be designed to identify eagles and curtail turbines when an eagle approaches any turbine throughout the project site. However, because the 18-month testing and calibration of the system would not occur prior to its implementation, the effectiveness of this measure is not accurately quantifiable. However, given the likelihood that a radar system would become increasingly effective at identifying golden eagles in the project vicinity, over time the risk of an eagle collision is likely to decrease.

Based on the intensity and context of these effects and consideration of the elements associated with this alternative, Alternative 5 is not expected to result in significant adverse effects on golden eagle populations.

CHAPTER 5

Summary and Conclusion

In our NEPA analysis, we considered the Applicant Proposed Action and four alternative actions:

- Alternative 1: No Action – Operation of the Project Without an Eagle Take Permit
- Alternative 2: Issue Permit for Applicant's ECP
- Alternative 3: Issue Permit for Applicant's ECP with Additional Monitoring and Mitigation
- Alternative 4: Issue Permit for ECP with Curtailment of Four Ridgeline Turbines when Eagles are Observed
- Alternative 5: Issue Permit for ECP with Radar Deployment, Curtailment when Eagles are Detected

The alternatives were narrowly defined because the project was already approved by the BLM and Kern County and is currently operational. However, the alternatives constitute a reasonable range to assess differing potential environmental effects associated with issuance of a programmatic eagle take permit. All action alternatives have similar environmental effects—namely the level of eagle take and approach to mitigation. All alternatives are based on a set of underlying assumptions. Under any of the action alternatives, we would validate those assumptions through ECP implementation and permit condition monitoring. Alternatives 3, 4, and 5 are potentially more protective of eagles, although the predicted range of eagle fatalities across all four action alternatives does not vary. Our Selected Alternative described in the Finding of No Significant Impact was selected because it provides for ongoing implementation of take avoidance measures through the curtailment program (ACP), mitigation consistent with our mortality estimate and offsets cumulative impact concerns, and ensures that eagle fatalities are detected.

In our evaluation of the risk of the project to eagles, we considered the available information on number and status of golden eagle nests and occurrences near the project, the number of known and projected fatalities, the existing land uses and land use practices near the project, and available population data in the BCRs. We evaluated the eagle use data developed by the applicant during preconstruction surveys, and corroborated the applicant's estimated golden eagle fatality rates presented in the Alta East ECP (Appendix A) with our predicted annual eagle fatalities (Appendix D). We will be able to address future possible take through implementation of ACPs that require increasing levels of effort to reduce eagle mortalities. These ACPs are the essence of our ECP Guidance and ensure that effects on eagles are avoided, minimized, and mitigated consistent with our requirements under 50 CFR 22.26, and such that all action alternatives would meet the standard of "no net loss" of eagles.

CHAPTER 6

References

Anderson, R. L., D. Strickland, J. Tom, N. Neumann, W. Erickson, J. Cleckler, G. Mayorga, G. Nuhn, A. Leuders, J. Schneider, L. Backus, P. Becker, and N. Flagg. 2000. Avian monitoring and risk assessment at Tehachapi Pass and San Gorgonio Pass wind resource areas, California: Phase 1 preliminary results. In *Proceedings of the National Avian-Wind Power Planning Meeting-III, San Diego, CA*. pp. 31-46

Anderson, R., N. Neumann, J. Tom, W. P. Erickson, M. D. Strickland, M. Bourassa, K. J. Bay, and K. J. Sernka. 2004. *Avian monitoring and risk assessment at Tehachapi Pass Wind Resource Area, California*. National Renewable Energy Laboratory.

Avian Power Line Interaction Committee (APLIC). 2006. *Suggested Practices for Avian Protection on Power Lines: The State of the Art in 2006*. The Edison Electric Institute, APLIC, and the California Energy Commission, Washington, DC and Sacramento, CA.

Blancher, P. J., K. V. Rosenberg, A. O. Panjabi, B. Altman, J. Bart, C. J. Beardmore, G. S. Butcher, D. Demarest, R. Dettmers, E. H. Dunn, W. Easton, W. C. Hunter, E. E. Iñigo-Elias, D. N. Pashley, C. J. Ralph, T. D. Rich, C. M. Rustay, J. M. Ruth, and T. C. Will. 2007. *Guide to the Partners in Flight Population Estimates Database. Version: North American Landbird Conservation Plan 2004*.

Bureau of Land Management (BLM). 2005. *Final Environmental Impact Report and Statement for the West Mojave Plan, A Habitat Conservation Plan and California Desert Conservation Area Plan Amendment*. January. http://www.blm.gov/pgdata/etc/medialib//blm/.

Bureau of Land Management (BLM). 2012. *Alta East Wind Project. Biological Assessment*. Prepared by CH2M HILL, Oakland, California. California Desert District. Moreno Valley, California. December.

Bureau of Land Management (BLM). 2013a. *Alta East Wind Project - Proposed Plan Amendment and Final Environmental Impact Statement*. United States Department of the Interior. Case File Number: CACA 052537. February.

Bureau of Land Management (BLM). 2013b. *Record of Decision Alta East Wind Project and Amendment to the California Desert Conservation Area Plan*. United States Department of the Interior. Environmental Impact Statement DES 12-18. Case File Number: CACA 052537. May.

California Public Utilities Commission (CPUC). 2005. *Transmission in the Tehachapi Wind Resource Area. A Report of the Tehachapi Collaborative Study Group*. March 16.

California Public Utilities Commission (CPUC) and U.S. Department of Agriculture, Forest Service (USDA Forest Service). 2009. *Southern California Edison's Tehachapi Renewable Transmission Project (TRTP) Final Environmental Impact Report/Environmental Impact Statement (EIR/EIS)*. October.

Cayan, D., M. Tyree, K. E. Kunkel, C. Castro, A. Gershunov, J. Barsugli, A. J. Ray, J. Overpeck, M. Anderson, J. Russell, B. Rajagopalan, I. Rangwala, and P. Duffy. 2013. "Future Climate: Projected Average." In *Assessment of Climate Change in the Southwest United States: A Report Prepared for the National Climate Assessment*, edited by G. Garfin, A. Jardine, R. Merideth, M. Black, and S. LeRoy, 101–125. A report by the Southwest Climate Alliance. Washington, DC: Island Press.

CH2M HILL. 2011. *North Sky River Wind Energy Project, Raptor Nest Inventories.* Prepared for NextEra Energy Resources, LLC. July.

CH2M HILL. 2012. *Conservation Plan for the Avoidance and Minimization of Potential Impacts to Golden Eagles Alta East Wind Project. Draft No. 2*. March.

Chatfield, A., W. P. Erickson, and K. Bay. 2010a. *Avian Baseline Studies for the Sun Creek Wind Resource Area, Kern County, California*. *Final Report: May 2009 – May 2010*. Prepared for CH2M HILL, Oakland, California. Prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming.

Chatfield, A., W.P. Erickson, and K. Bay. 2010b. *Avian and Bat Fatality Studies at the Alite Wind-Energy Facility, Kern County, California*. Final Report June 15, 2009-June 15.

Chatfield, A., W. P. Erickson, and K. Bay. 2011. *Avian Baseline Studies at the Alta East Resource Area, Kern County, California. Final Report: July 2010 – June 2011.* Prepared for CH2M HILL, Oakland, California. Prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. July 13.

Craig, T. H., J. W. Connelly, E. H. Craig, and T. L. Parker. 1990. "Lead Concentrations in Golden and Bald Eagles." *Wilson Bulletin*. Vol. 102. pp. 130-133.

Davis, H., editor. 1995. *A Pilot Golden Eagle Population Study in the Altamont Pass Wind Resource Area, California*. Contract No. DE-AC36-83CH10093, NREL/TP-441-7821. Golden, CO: National Renewable Energy Laboratory; 219 p.

Deem, S. L., S. P. Terrell, and D. J. Forrester. 1998. A retrospective study of morbidity and mortality of raptors in Florida: 1988–1994. *Journal of Zoo and Wildlife Medicine*. Vol. 29. pp. 160–164.

DRECP. 2014. *DRAFT Desert Renewable Energy Conservation Plan (DRECP) and Environmental Impact Report/ Environmental Impact Statement*. SCH No. 2011071092; BLM/CA/PL- 2014/025+1793; FWS–R8–ES–2014–N165. September.

Dwyer, J. F., R. E. Harness, B. D. Gerber, M. A. Landon, P. Petersen, D. D. Austin, B. Woodbridge, G. E. Williams, and D. Eccleston. 2016. "Power pole density informs spatial prioritization for mitigating avian electrocution." *Journal of Wildlife Management*. Vol. 80. No. 4. pp. 634-642.

Erickson, W. P., A. Chatfield, and K. Bay. 2011. *Avian Baseline Studies for the North Sky River Wind Energy Project. Kern County, California*. Final Report. May 18, 2010–May 26, 2011.

Franson, J. C., L. Sileo, and N. J. Thomas. 1995. *Causes of Eagle Deaths.* National Biological Survey, National Wildlife Health center, Madison, WI.

Gardali, T., N. E. Seavy, R. T. DiGaudio, and L. A. Comrack. 2012. "A climate change vulnerability assessment of California's at-risk birds." *PLOS ONE* 7(3): e29507. doi:10.1371/journal.pone.0029507.

Guyonne F. E., J. Ferrer and M. Ferrer. 1999. "Mitigation of Raptor Electrocution on Steel Power Poles." *Wildlife Society Bulletin*. Vol. 27, No. 2 (Summer, 1999). pp. 263-273.

Harness, R. E. and K. R. Wilson. 2001. "Electric-utility structures associated with raptor electrocutions in rural areas." *Wildlife Society Bulletin*. Vol. 29. pp. 612-623.

Harris, M. C., and J. M. Sleeman. 2007. "Morbidity and mortality of bald eagles (*Haliaeetus leucocephalus*) and peregrine falcons (*Falco peregrinus*) admitted to the Wildlife Center of Virginia." *Journal of Zoo and Wildlife Medicine*. Vol. 38. pp. 62-66

Hunt, W. G. 1998. "Raptor Floaters at Moffat's Equilibrium." *Oikos*. Vol. 82. pp. 191-197.

Hunt, G. 2002. *Golden eagles in a perilous landscape: predicting the effects of mitigation for wind turbine bladestrike mortality*. California Energy Commission Report P500-02-043F. Sacramento, California, USA.

Inkley, D. B., M. G. Anderson, A. R. Blaustein, V. R. Burkett, B. Felzer, B. Griffith, J. Price, and T. L. Root. 2004. *Global climate change and wildlife in North America*. Technical review 04–2. The Wildlife Society, Bethesda, MD.

International Panel on Climate Change (IPCC). 2007. *Climate Change 2007: Synthesis Report.* Core Writing Team: Pachauri, R.K., and A. Reisinger (eds.). Contribution of Working Groups I, II and III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. IPCC, Geneva, Switzerland.

Johnsgard, P. A., 1990. *Hawks, Eagles, & Falcons of North America*. p. 260-268. Washington and London: Smithsonian Institution Press.

Kelly, T. R., Bloom, P. H., Torres, S. G., Hernandez, Y. Z., Poppenga, R. H., Boyce, W. M., and C. K. Johnson. 2011. "Impact of the California lead ammunition ban on reducing lead exposure in golden eagles and turkey vultures." *PLOS ONE* 6: e17656.

Kern County. 2012. *Final Plan Amendment & Final Environmental Impact Statement / Final Environmental Impact Report for the Alta East Wind Project*. November

Kern County. 2013a. *Draft Environmental Impact Report. Rising Tree Wind Energy Project*. November.

Kern County. 2013b. *Draft Environmental Impact Report. Addison Energy Wind Project*. November.

King, T. F. 2006. "Animals and the United States National Register of Historic Places." *The Applied Anthropologist*. Vol. 26. pp. 129-135.

Kochert, M. N., K. Steenhof, C. L. Mcintyre and E. H. Craig. 2002. "Golden Eagle (Aquila chrysaetos). In *The Birds of North America Online* (A. Poole, Ed.). Ithaca: Cornell Lab of Ornithology. http://bna.birds.cornell.edu/bna/species/684.

Kramer, J. L. and P. T. Redig. 1997. "Sixteen years of lead poisoning in eagles, 1980-95: an epizootiologic view." *Journal of Raptor Research*. Vol. 31. pp. 327-332.

Kunkel, K. E, L. E. Stevens, S. E. Stevens, L. Sun, E. Janssen, D. Wuebbles, K. T. Redmond, and J. G. Dobson. 2013. "Regional Climate Trends and Scenarios for the U.S. National Climate Assessment. Part 5." *Climate of the Southwest U.S.* NOAA Technical Report NESDIS 142-5. 79 pp.

LaSorte, F. A. and F. R. Thompson. 2007. "Poleward shifts in winter ranges of North American birds." *Ecology*. Vol. 88. pp. 1803-1812.

Lehman, R. N. 2001. "Raptor electrocution on power lines: current issues and outlook." *Wildlife Society Bulletin*. Vol. 29. pp. 804-813.

Lehman, R. N., P. L. Kennedy, and J. A. Savidge. 2007. "The state of the art in raptor electrocution research: a global review." *Biological Conservation*. Vol. 136. pp. 159-174.

Lehman, R. N., J. A. Savidge, P. L. Kennedy, and R. E. Harness. 2010. "Raptor electrocution rates for a utility in the Intermountain Western United States." *Journal of Wildlife Management*. Vol. 74. pp. 459-470.

Leslie, D., J. Schwartz, and B. Karas. 2012. *Altamont Pass Wind Resource Area Bird Fatality Study, Bird Years 2005–2010*. Prepared for Alameda County Community Development Agency. ICF International. November.

Lopez-Lopez, P., Ferrer, M.A., Madero, A., Casado, E. & McGrady, M. 2011. "Solving man-induced large-scale conservation problems: the Spanish Imperial eagle and power lines." *PLOS ONE* 6: e17196

McCarty, J. P. 2001. "Review: Ecological consequences of recent climate change." *Conservation Biology*. Vol. 15. pp. 320-331.

Miller, M. J. R., M. E. Wayland, and G. G. Bortolotti. 2002. Lead exposure and poisoning in diurnal raptors: a global perspective. In: Yosef, R. M., M. L Miller, and D. Pepler (Editors), *Raptor in the New Millennium, Proceedings of the Joint Meeting of the Raptor Research Foundation and The World Working Group on Birds of Prey and Owls*. Eliat, Israel: 2-8 April 2000. International Birding and Research Centre, Eliat. pp. 224-2.

Millsap, B. A., G. S., Zimmerman, J. R., Sauer, R. M., Nielson, M., Otto, E., Bjerre, and R. Murphy. 2013. "Golden eagle population trends in the western United States: 1968–2010." *Journal of Wildlife Management*. Vol. 77. pp. 1436-1448.

Millsap, B. A., A. R., Harmata, D. W., Stahlecker, and D. G. Mikesic. 2014. "Natal dispersal distance of bald and golden eagles originating in the coterminous United States as inferred from band encounters." *Journal of Raptor Research*. Vol. 48. No. 1. pp. 13-23.

Mustin, K., W. J Sutherland, and J.A. Gill. 2007. "The complexity of predicting climate-induced ecological impacts." *Climate Research*. Vol. 35. pp. 165-175.

Newton, I. 1979. *Population Ecology of Raptors*. Buteo Books, Vermillion, South Dakota. 399 pp.

Nielson, R. M., T. Rintz, M. B. Stahl, R. E. Good, L. L. McDonald, and T. L. McDonald. 2010. *Results of the 2009 Survey of Golden Eagles (*Aquila Chrysaetos*) in the Western United States*. A. Contract #201818C027. Prepared for the US Fish and Wildlife Service (Service), Virginia. Prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming, ed. January 7. http://www.west-inc.com/reports/2009GoldenEagleSurvey.pdf.

North American Bird Conservation Initiative, U.S. Committee. 2010. *The State of the Birds 2010 Report on Climate Change, United States of America*. U.S. Department of the Interior: Washington, DC. http://www.stateofthebirds.org/2010/results-for-species.

North American Bird Conservation Initiative (NABCI). 2013. *Bird Conservation Regions*. http://www.nabci-us.org/map.html. Accessed February 23.

Orloff, S., and A. Flannery. 1992. *Wind turbine effects on avian activity, habitat use, and mortality in Altamont Pass and Solano County Wind Resource Areas: 1989-1991*. Report to California Energy Commission, Sacramento, California.

Liguori, S., PacifiCorp. 2016. Personal communication with Heather Beeler, USFWS. July 6, 2016.

Pagel, J. E., D. M. Whittington, and G. T. Allen. 2010. *Interim Golden Eagle Technical Guidance: Inventory and Monitoring Protocols and other Recommendations in Support of Golden Eagle Management and Permit Issuance*. Division of Migratory Bird Management, U.S. Fish and Wildlife Service.

Pagel, J. E., K. J., Kritz, B. A., Millsap, R. K., Murphy, E. L., Kershner, and S. Covington. 2013. "Bald Eagle and Golden Eagle Mortalities at Wind Energy Facilities in the Contiguous United States." *Journal of Raptor Research*. Vol. 47. pp. 311-315.

Peterson, A.T. 2003. "Subtle recent distributional shifts in Great Plains bird species." *Southwestern Naturalist*. Vol. 48. pp. 289-292.

Point Reyes Bird Observatory Conservation Science (PRBO). 2011. *Projected Effects of Climate Change in California: Ecoregional Summaries Emphasizing Consequences for Wildlife*. Version 1.0. Accessed September 20, 2013. http://data.prbo.org/apps/bssc/climatechange.

Richards, J., A. Lickey, and J. Sleeman. 2005. "Decreasing prevalence and seasonal variation of gunshot trauma in raptors admitted to the Wildlife Center of Virginia: 1993-2002." *Journal of Zoo and Wildlife Medicine*. Vol. 36. pp. 485-488.

Scheuhammer, A. M. and S. L Norris. 1996. "The ecotoxicology of lead shot and lead fishing weights." *Ecotoxicology*. Vol. 5. pp. 279-295.

Smallwood, K. S. and C. Thelander. 2005. *Bird mortality at the Altamont Pass Wind Resource Area, March 1998 – September 2001 Final Report*. National Renewable Energy Laboratory, NREL/SR-500-36973. Golden, Colorado. 410 pp.

Tetra Tech. 2013. *Pine Tree Wind Power Facility Eagle Conservation Strategy*. Draft. Prepared for Los Angeles Department of Water and Power. July.

Tinto, A., J. Real, and S. Manosa. 2010. "Predicting and correcting electrocution of birds in Mediterranean areas." *Journal of Wildlife Management*. Vol. 74. pp. 1852–1862

U.S. Department of Energy (USDOE). 2013. *Installed Wind Capacity*. Accessed May 22, 2013. http://www.windpoweringamerica.gov/wind_installed_capacity.asp.

U.S. Department of the Interior. 2009. *Adaptive Management: The U.S. Department of the Interior Technical Guide*. Washington D.C. Updated (first edition – 2007).

U.S. Fish and Wildlife Service (Service). 2003. *Migratory Bird Permit Memorandum.* Department of the Interior US Fish and Wildlife Service. Washington D.C. April.

U.S. Fish and Wildlife Service (Service). 2009. *Final Environmental Assessment Proposal to Permit Take Provided under the Bald and Golden Eagle Protection Act.* Department of the Interior US Fish and Wildlife Service. Washington D.C. April.

U.S. Fish and Wildlife Service (Service). 2012. *Eagle Conservation Plan Guidance, Module 1 – Land-based Wind Energy Technical Appendices*. Division of Migratory Bird Management. August.

U.S. Fish and Wildlife Service (Service). 2013a. *Eagle Conservation Plan Guidance, Module 1 – Land-based Wind Energy*. Version 2. April.

U.S. Fish and Wildlife Service (Service). 2013b. *Biological Opinion on the Alta East Wind Project, Kern County, California*. (3031 (P), CACA-052537, CAD000.06) (8-8-13-F-19). Memorandum to Supervisory Projects Manager, Renewable Energy Coordination Office, California Desert District, Bureau of Land Management, Moreno Valley, California. From Field Supervisor, Ventura Fish and Wildlife Office. Ventura, California. May 8.

U.S. Fish and Wildlife Service (Service). 2013c. Letter to Randy Hoyle, Terra-Gen Power, LLC. May 16.

U.S. Fish and Wildlife Service (Service). 2013d. *Draft Environmental Assessment. Shiloh IV Wind Project Eagle Conservation Plan*. Department of the Interior US Fish and Wildlife Service. Washington D.C. July.

U.S. Global Change Research Program (USGCRP). 2013. *Draft National Climate Assessment. A report of the National Climate Assessment Development Advisory Committee*. Washington, D.C. Accessed September 26, 2013. http://ncadac.globalchange.gov.

Watson, J. 1997. *The Golden Eagle*. 1st ed. T. and A. D. Poyser: London, U.K.

Watson, J. W. and R. W. Davies. 2009. *Range use and contaminants of golden eagles in Washington*. Washington Department of Fish and Wildlife, Olympia, Washington.

Wendell, M. D., J. M. Sleeman, and G. Kratz. 2002. “Retrospective study of morbidity and mortality admitted to Colorado State University Veterinary Teaching Hospital during 1995 to 1998.” *Journal of Wildlife Diseases*. Vol. 38. pp. 101-106.

Wichmann, M. C., J. Groeneveld, F. Jeltsch, and V. Grimm. 2005. “Mitigation of climate change impacts on raptors by behavioral adaptation: ecological buffering mechanisms.” *Global and Planetary Change*. Vol. 47. pp. 273- 281.

Zeiner, D. C., W. F. Laudenslayer, Jr., K. E. Mayer, and M. White, eds. 1988-1990. *California’s Wildlife*. Vol. I-III. California Department of Fish and Game, Sacramento, California.

CHAPTER 7

Preparers and Contributors

7.1 U.S. Fish and Wildlife Service

Heather Beeler, Eagle Permit Specialist/Wildlife Biologist, NEPA Lead

Jessica Rempel, Ecological Services Biologist, NEPA Preparation Assistance

7.2 CH2M HILL Engineers, Inc.

Aarty Joshi, Project Manager/Environmental Planner

Deron Lawrence, Wildlife Ecologist, NEPA Review

Rene Langis, PhD, NEPA Preparation Assistance

Bridget Canty, Wildlife Biologist, NEPA Preparation Assistance

Heather Rand, Technical Editor

Karen Mino, GIS Analyst (Critigen subcontractor)