Project-Specific Avian and Bat Protection Plan for the Tule Reduced Ridgeline Wind Project

Tule Wind LLC
Portland, Oregon

Version or Date: January 9, 2012

Revised August 17, 2012

Revised March 8, 2013

This page intentionally left blank

Contents

Tables

Figures

Acronyms and Abbreviations

ABPP	Avian and Bat Protection Policy
ACP	Advanced conservation practices
AMP	Adaptive Management Plan
APLIC	Avian Power Line Interaction Committee
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BMP	Best management practices
CDFG	California Department of Fish and Game
COD	commercial operation delivery
CSLC	California State Lands Commission
EC	Environmental Coordinator
FEIS/FEIR	Final Environmental Impact Statement/Draft Environmental Impact Report
GPS	Global Positioning System
HF	high-frequency
IRI	Iberdrola Renewables, Inc.
LF	low-frequency
Met	meteorological
MF	mid-frequency
MW	megawatt
NBMMRP	Nesting Bird Management, Monitoring, and Reporting Plan
NML	Nest Monitoring Log
PCFS	post-construction fatality surveys
PSABPP	project-specific avian and bat protection plan
SPCC	Spill Prevention Counter-measures and Control
TAC	Technical Advisory Council
USACE	US Army Corps of Engineers
USFWS	U.S. Fish and Wildlife Service
VLF	very low-frequency
WMRS	Wildlife Monitoring and Reporting System
WRI	Wildlife Research Institute

1. Introduction

This project-specific avian and bat protection plan (PSABPP) describes the process for applying the Iberdrola Renewables, Inc. (IRI) Avian and Bat Protection Policy (ABPP) (IRI 2008) to the Reduced Ridgeline Project of the Tule Wind Project. The Reduced Ridgeline Project consists of turbines on Ewiiaapaayp Tribal Land and potentially California State lands, but has been substantially reduced by the elimination of 27 turbines and does not include turbines on Bureau of Land Management (BLM) land; other infrastructure is proposed on BLM land. The PSABPP is intended to be potentially applicable to both the BIA and SLC lands to the degree that the Proposed Project is adopted by the respective agencies for the lands under their jurisdiction. The Tule Wind Project referenced in this document is the original larger project, which included turbines in the valley and on the ridgeline. Data collected early in the development process focused on the Tule Wind Project. This PSABPP uses a subset of the data collected for the Tule Wind Project and data specific to the Reduced Ridgeline Project to document the bird and bat impact, avoidance, minimization, and mitigation measures for the Reduced Ridgeline Project. The PSABPP provides a decision framework using the most up to date information to evaluate risk and make siting and operational decisions.

This PSABPP is based on the final Project-Specific Avian and Bat Protection Plan for the Tule Wind Project (Sep. 30, 2011, Tule Wind LLC 2011) covering the McCain Valley portion (Phase I) of the project, and the avoidance, minimization and mitigation measures in this document are largely replicated from that ABPP. This Reduced Ridgeline PSABPP is intended to supplement and support specific findings needed to facilitate decisions by land use agencies and the Tribe for those portions of the analyzed in the FEIR/EIS and that are located on the ridgeline. Documented in this PSABPP, Tule Wind LLC, a wholly owned subsidiary of IRI, in collaboration with the Bureau of Indian Affairs (BIA), have outlined how the Reduced Ridgeline Project will meet the current no-net loss standard for local breeding eagle populations (USFWS 2011). Tule Wind LLC will account for any remaining unavoidable impacts through avoidance and minimization measures to reduce the level of impacts to the maximum extent practicable (Section 3), coupled with a toolbox of potential mitigation measures (Section 5.3) implemented as deemed necessary, per the adaptive management protocol (Section 6).

The proposed elements of avoidance, minimization, mitigation and adaptive management for eagles can be applied to other species of concern as well (Tables 3-1, 3-2, and 5-2). Recognizing differences between eagles and other species of concern, an additional mechanism for determining appropriate measures for addressing potential risk will be accomplished with the use of the Technical Advisory Council (TAC) comprised of individuals from the USFWS, BLM, California Department of Fish and Game (CDFG), a Tribal representative who is well versed in eagle biology, and Tule Wind LLC; additional, topic-specific expertise may be enlisted by the TAC as well. Upon determination of impact levels that warrant a reaction from Tule Wind LLC, the TAC will be convened to assess data and information collected to date, determine whether additional, more focused data should be gathered, and/or develop a set of recommended corrective measures to implement. In short, the procedure for assessing data and establishing a step-wise approach to addressing unforeseeable or unreasonable impacts is in place for both eagles and other species of concern.

To assess risk to eagles, several types of data are used in this PSABPP. To characterize the Reduced Ridgeline Project and to provide comparison to other studies, point count data from 2008 and 2009 associated with the Reduced Ridgeline Project are used to calculate mean use. To calculate a fatality estimate, data from point counts and eagle counts from 2011 and 2012 are used as inputs to the U.S. Fish and Wildlife Service eagle fatality model. To understand movements by nestling eagles and to develop curtailment scenarios, satellite telemetry data from 2011-2012 are used to calculate fixed kernel home rage estimates.

The analysis is designed to provide additional Reduced Ridgeline Project-specific findings and to outline needed avoidance, minimization and mitigation measures that will assist management agencies to in their making. Those agencies include the Ewiiaapaayp Tribe which govern their trust land, the BIA which will decide on lease approval on the tribal trust land, the CSLC which will approve the use of lands under their jurisdiction and the BLM which must grant a ROW for road, transmission lines and safety areas which may be needed to implement the decisions that are made by the BIA.

In addition to the avoidance, minimization, and mitigation measures, Tule Wind LLC has also agreed to apply for a programmatic eagle take permit prior to operation of the Reduced Ridgeline Project consistent with current USFWS guidance and to abide by the terms and conditions of such take permit when issued. This PSABPP will be adopted by the applicable State and Federal agencies and the Tribe as a controlling document for the protection of avian and bat resources during the construction, operation and decommissioning of the Reduced Ridgeline Project.

1.1 Organization of This Document

The PSABPP is organized in sections that follow the five-tiered approach presented in the final guidelines from the USFWS Wind Turbine Advisory Committee (USFWS 2012a) within the phases (pre-construction, construction, post-construction) of wind energy development. The purpose of the PSABPP is to document Reduced Ridgeline Project analyses and studies conducted in accordance with the tiered decision process laid out in the draft Guidelines. The PSABPP is structured to be a robust document that governs the operation of the Reduced Ridgeline Project, including considerations for modifying operations in the event of unforeseeable impacts to wildlife or habitat.

- Section 2.0 focuses on the pre-construction evaluation phase. Tier 1: Preliminary Site Screening, Tier 2: Site Characterization and Tier 3: Field Studies and Impacts Assessment are addressed.
- Section 3.0 focuses on siting and construction measures. Best management practices (BMPs), monitoring of site constraints, compliance conditions, and training of construction personnel are addressed.
- Section 4.0 focuses on the post-construction phase. Tier 4: Post-Construction Fatality Monitoring and Tier 5: Other Post-Construction Studies quantify the actual level of impact or assess effectiveness of mitigation measures for the project. Tier 4 includes the Wildlife Monitoring and Reporting System (WMRS) with baseline and operational

monitoring (IRI 2010). The results of these monitoring efforts may act as a trigger for Tier 5 activities.

- As part of the post-construction phase, the mitigation and ongoing measures documented in Section 5.0 identify regulatory requirements and commitments for the life of the project. These measures are entered into a program for compliance management that tracks and documents Tule Wind LLC actions to comply. The actions may include operational modifications (e.g., curtailment); BMPs; offsite or onsite habitat restoration, enhancement, or protection; and further studies and monitoring.
- Section 6.0 is the Adaptive Management Plan (AMP) that incorporates elements from Sections 2.0-5.0 of the PSABPP. The AMP discusses the decision-making framework for how Tule Wind LLC and the USFWS will work in coordination to evaluate impacts by the project and determine which mitigation or conservation measures should be implemented in order to sufficiently address the noted impacts.

1.2 Project Development Overview

Planning and development for the Tule Wind Project, including the Reduced Ridgeline Project, began in 2004 with no fatal flaws identified during initial assessments and, subsequently, avian and bat risk assessment indicated that mortality rates would be below or similar to typical levels at other wind energy facilities in the region (Tier 1 and 2; summarized in Section 3.4 Biological Resources in Draft Environmental Impact Statement/Draft Environmental Impact Report (DEIS/DEIR; CPUC and BLM 2010)). Local land use permitting is required in San Diego County, California (county permitting was initiated in 2009 and is ongoing). Studies and consultation with agencies occurred from 2004 through 2011 to address potential impacts to federal and state-listed species and to migratory birds (Tier 3; see Section 2 for a summary of survey results). Tule Wind LLC prepared a Biological Assessment and submitted it to the USFWS in August 2010. A draft Biological Opinion has been prepared by the USFWS, and was released to Tule Wind LLC in July, 2011 and recommends measures to minimize impacts to the Quino Checkerspot Butterfly. Likewise, permitting for Clean Water Act Section 401 and 404 and concerns for sensitive species during construction will be addressed or avoided by careful siting and BMPs. Concurrently, field surveys focused on active eagle territories were initiated in January 2011 to evaluate eagle use of the Reduced Ridgeline Project and the potential for incidental take of eagles (Tier 5; see Sections 4.2 and 5.2) and these will continue throughout construction and operation. Subsequently, post-construction fatality surveys (PCFS) for birds and bats will begin after construction is completed (Tier 4; see Section 4) to estimate mortality rates.

1.3 Project Location

Tule Wind LLC is proposing to construct and operate the Reduced Ridgeline Project located near Boulevard, California (Figure 1-1). The Tule Wind Project will be primarily located in the In-Ko-Pah Mountains near the McCain Valley in southeastern San Diego County (Figure 1-2). Wind turbines for the project will be located on lands administered by the Ewiiaapaayp Indian Reservation and the California State Lands Commission (CSLC). Other infrastructure such as access roads and the collection system will be located on BLM land.

Access could occur via the Manzanita and Campo Indian Reservations as well as private land under the jurisdiction of San Diego County.

The proposed Reduced Ridgeline Project will consist of: (1) up to 27 wind turbines; (2) access roads between turbines, including improvements to existing roadways and new roadways; (3) a 34.5 kV overhead and underground electrical collector cable system; (4) 4 two-acre temporary laydown areas; and (5) 1 permanent meteorological tower. The proposed project footprint (impact extent) will affect approximately 170 acres within the 4,952-acre survey corridor.

The Final EIS for the Tule Wind Project has been completed by the BLM via the NEPA process (http://www.blm.gov/ca/st/ en/prog/energy/fasttrack/tule/fedstatus.html), and the USFWS determined in October 2011 that the ABPP covering Phase I was designed to avoid, minimize and monitor impacts to migratory birds, bats and eagles (http://www.cpuc.ca.gov/environment/info/dudek/ecosub/Tule%20ABPP%20signed%20Memo%2010-4-11.pdf). This PSABPP, covering the Reduced Ridgeline Project, will identify the data collected for the originally proposed Phase II – Ridge Turbines, as a required mitigation measure in the BLM DEIR/DEIS and BLM Record of Decision (ROD) as the ABPP which was adopted for the Valley (Phase I) turbines.

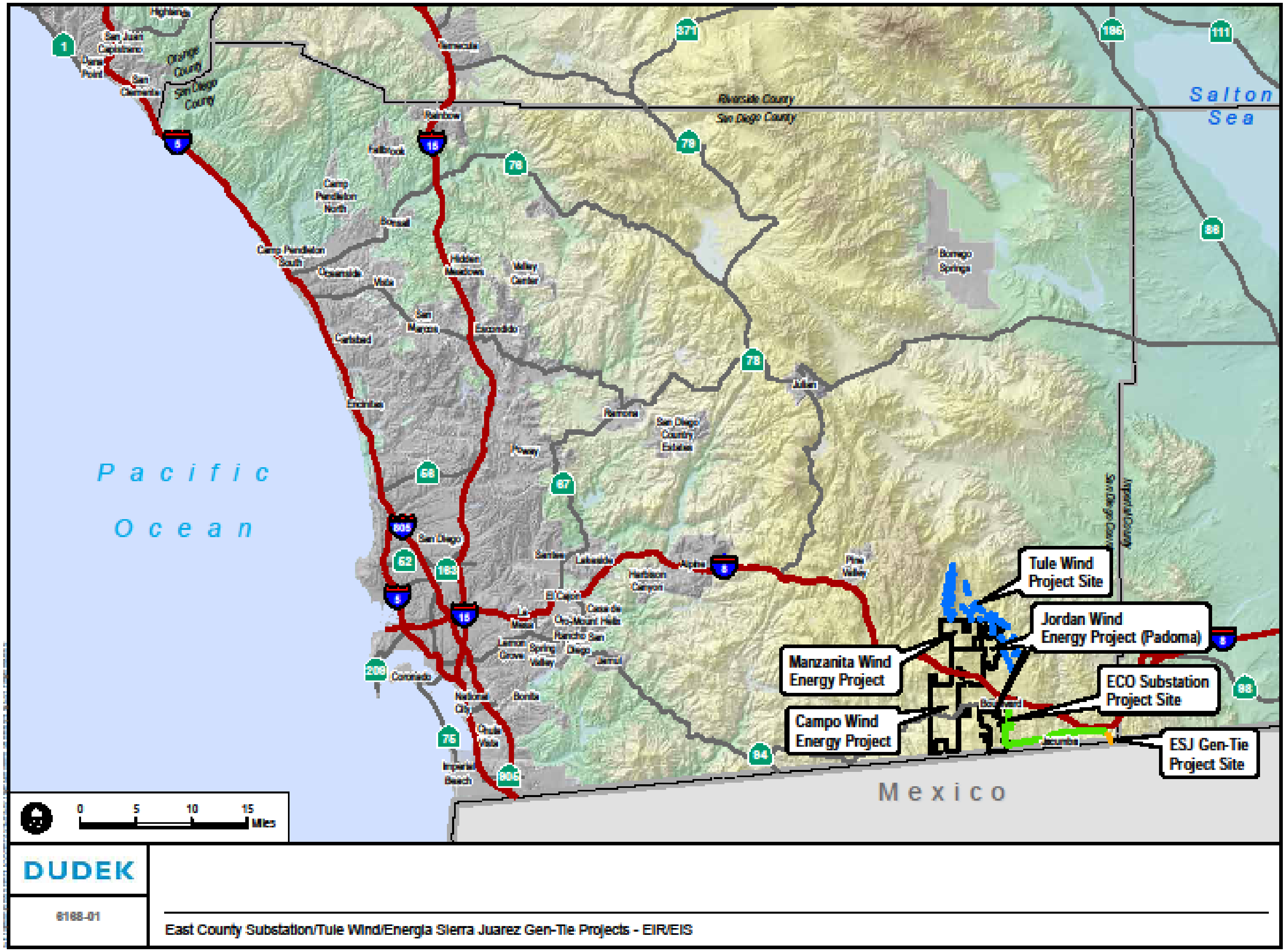


Figure 1-1. Vicinity Map of Tule Wind Project

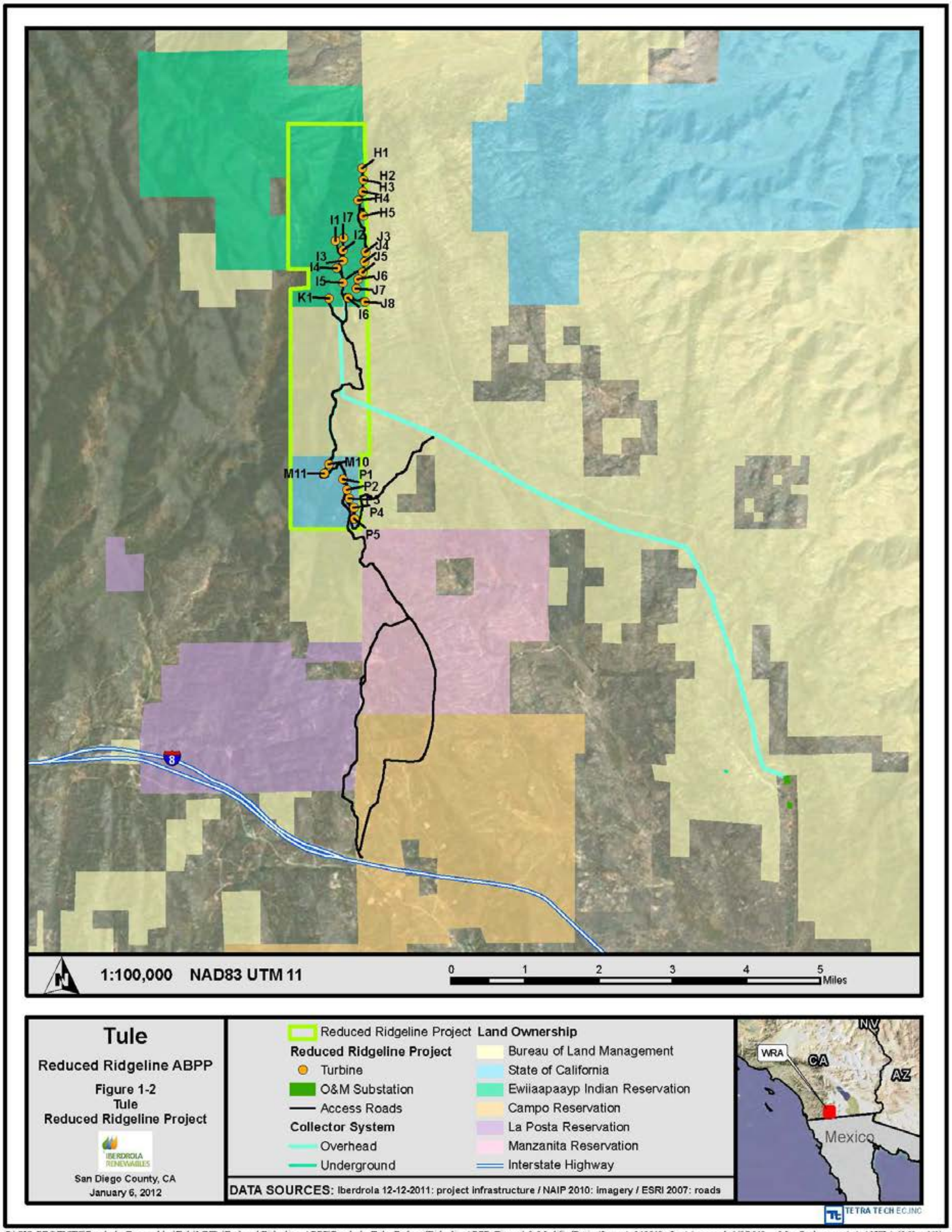


Figure 1-2. Reduced Ridgeline ProjectFacilities[1]

[1]See the Final EIS link at http://www.blm.gov/ca/st/en/fo/elcentro/nepa/tule.html

2. Pre-Construction Wildlife Assessment and Siting

2.1 Tier 1: Preliminary Site Screening

Fatal flaw analyses, biological assessments, and permitting evaluation for natural resource conditions for the Tule Wind Project were conducted as early as 2004 with no fatal flaws identified. A review of state and federal databases identified the following listed and rare species potentially present in the project vicinity (Table 2-1, 2-2). Avian surveys, conducted in 2005-06 and 2007-08, also revealed no fatal flaws. During surveys conducted in 2010 pursuant to recently released USFWS draft and interim protocols for golden eagles (USFWS 2010a), a new golden eagle nest was discovered close to the northernmost proposed turbine in the Reduced Ridgeline Project. The nesting pair (presumably from the historical Cane Brake territory) had historically nested farther north and west of the Reduced Ridgeline Project.

Table 2-1. Sensitive Avian Species Potentially Occurring within the Tule Wind Project

Common Name	Latin Name	Status	Habitat	Notes
Bell's sage sparrow	*Amphispiza belli belli*	Fed: None State: None BLM: None MSCP: None County: Group 1	Common resident in semiarid scrub and sometimes in chamise chaparral.	Not observed, but suitable habitat found on-site.
California condor	*Gymnogyps californianus*	Fed: Endangered State: Endangered, Fully Protected BLM: None MSCP: None County: None	Two resident populations; one in Central California and one in Northern Arizona/Southern Utah.	Not observed. Not expected to occur on-site. One captive-born released female was last seen west of the project area in 2007.
Cooper's hawk[1]	*Accipiter cooperii*	Fed: None State: None BLM: None MSCP: None County: Group 1	Common resident in trees, especially pines, hardwood groves and riparian cottonwoods and sycamores.	Observed on-site.
Golden eagle[1]	*Aquila chrysaetos*	Fed: BGEPA State: Fully Protected BLM: Sensitive MSCP: Proposed Covered[2] County: Group 1	Found in open coniferous forest and barren areas, especially in hilly or mountainous regions.	Observed on-site. A nest was located approximately 500 feet from the project footprint. . No nests are known to occur on or within 4,000 feet of County land parcels.
Gray vireo	*Vireo vicinior*	Fed: BCC State: SSC BLM: Sensitive MSCP: Proposed Covered[2] County: Group 1	Inhabits desert scrub, mixed juniper or pinyon pine and oak scrub, and chaparral in hot, arid mountains and high scrubland.	Not observed. Has potential to occur on-site during migration.
Least Bell's vireo	*Vireo bellii pusillus*	Fed: Endangered State: Endangered BLM: None MSCP: Proposed Covered[2] County: Group 1	Found in willow dominated riparian habitat.	Not observed. No habitat found on-site.

Table 2-1. Sensitive Avian Species Potentially Occurring within the Tule Wind Project (continued)

Common Name	Latin Name	Status	Habitat	Notes
Loggerhead shrike[1]	*Lanius ludovicianus*	Fed: None State: SSC BLM: None MSCP: Proposed Covered[2] County: Group 1	Inhabits open brushy areas, meadows, pastures, orchards, thickets along roads, and hedges.	Observed on-site.
Long-eared owl[1]	*Asio otus*	Fed: None State: SSC BLM: None MSCP: Proposed Covered[2] County: Group 1	Inhabits dense vegetation adjacent to open grassland or shrub-land, and open forests.	Incidental observation in winter 2007.
Northern harrier[1]	*Circus cyaneus*	Fed: None State: SSC BLM: None MSCP: Covered[2] County: Group 1	Found in abandoned fields, upland maritime heaths, wet hayfields, salt marshes, and cattail marshes.	Observed on-site.
Olive-sided flycatcher[1]	*Contopus cooperi*	Fed: None State: SSC BLM: None MSCP: None County: Group 2	Found on edges, openings, and natural and human-created clearings adjacent to otherwise relatively dense forests.	Observed on-site.
Prairie falcon[1]	*Falco mexicanus*	Fed: BCC State: None BLM: None MSCP: None County: Group 1	Often found where there are large patches of low vegetation and areas of open ground, vertical cliffs with a rock overhang are preferred for nesting.	Observed on-site.
Purple martin	*Progne subis*	Fed: None State: SSC (nesting) BLM: None MSCP: Proposed Covered[2] County: Group 1	Breeds near human settlements where nest houses are provided, especially near water and large open areas.	Not observed. Has the potential to occur on-site.
Rufous-crowned sparrow[1]	*Aimophila ruficeps*	Fed: None State: None BLM: None MSCP: Proposed Covered[2] County: Group 1	Found in coastal sage scrub and other low growing scrublands.	Observed on-site.
Southwestern willow flycatcher	*Empidonax traillii extimus*	Fed: Endangered State: Endangered BLM: None MSCP: Proposed Covered[2] County: Group 1	Inhabits dense trees or thickets near water.	Not observed on-site. No habitat for this species is found on-site. Observed off-site incidentally.
Tricolored blackbird	*Agelaius tricolor*	Fed: None State: SSC BLM: Sensitive MSCP: Covered[2] County: Group 1	Found in cropland, hedgerows, grassland and herbaceous areas.	Not observed. Has a low potential to occur on-site while foraging.
Turkey vulture[1]	*Cathartes aura meridionalis*	Fed: None State: None BLM: None MSCP: Proposed Covered[2] County: Group 1	Found in dry, open country, farmlands, and woodlands. Needs tall trees for roosting.	Observed on-site.

Table 2-1. Sensitive Avian Species Potentially Occurring within the Tule Wind Project (continued)

Common Name	Latin Name	Status	Habitat	Notes
Vaux's swift[1]	*Chaetura vauxi*	Fed: None State: SSC BLM: None MSCP: None County: None	Found in mature forest but will also forage and migrate over open country.	Observed on-site.
Vermilion flycatcher	*Pyrocephalus rubinus flammeus*	Fed: None State: SSC BLM: None MSCP: None County: Group 1	Arid scrub, farmlands, savanna, agricultural areas, and riparian woodland.	Not observed. Has low potential to occur on-site.
Western bluebird[1]	*Silalia mexicana*	Fed: None State: None BLM: None MSCP: None County: Group 2	Woodlands, farmlands, orchards, savanna, riparian woodlands, and burned or disturbed woodlands.	Observed on-site.
Western burrowing owl	*Athene cunicularia hypugaea*	Fed: None State: SSC BLM: Sensitive MSCP: Proposed Covered[2] County: Group 1	Nesting habitat consists of open areas with mammal burrows in arid and semi-arid environments.	Not observed. Has a low potential to occur on-site.
White-tailed kite[1]	*Elanus leucurus*	Fed: None State: Fully Protected BLM: None MSCP: Proposed Covered[2] County: Group 1	Riparian woodland, oak groves, or sycamore groves adjacent to grassland.	Incidental observation during 2005-2006 avian survey.[3]
Willow flycatcher	*Empidonax traillii*	Fed: None State: Endangered BLM: None MSCP: None County: None	Breeds in shrubby areas near running or standing water and winters in shrubby clearings with successional growth.	Not observed. No habitat is found on-site; however, two off-site observations in Thing Valley were recorded during the 2007-2008 avian survey.
Yellow warbler[1]	*Dendroica petechia*	Fed: None State: SSC (nesting) BLM: None MSCP: Proposed Covered[2] County: Group 2	Inhabits riparian areas or strips of riparian habitat in foothills.	Observed on-site.

Source: Tule Draft EIS
[1] Denotes species that have been observed on-site.
[2]Listed in County of San Diego draft (East County) MSCP Plan covered species list
[3]Potentially observed outside the survey corridor or while in transit to and from the site.
Key:
Fed = Federal listing
State = State listing
BLM = Bureau of Land Management listing
MSCP = Multiple Species Conservation Program listing
County = County of San Diego listing
SOC = Federal Species of Concern
SSC = State Species of Concern
BGEPA = Bald and Golden Eagle Act
BCC = Bird of Conservation Concern

Table 2-2. Birds of Conservation Concern within Bird Conservation Region 33 – Sonoran and Mojave Deserts

Species
Least bittern
Bald eagle (b)
Peregrine falcon (b)
Prairie falcon
Black rail
Snowy plover (c)
Mountain plover (nb)
Whimbrel (nb)
Long-billed curlew (nb)
Marbled godwit (nb)
Red knot (*roselaari* ssp.) (nb)
Gull-billed tern
Black skimmer
Yellow-billed cuckoo (w. US DPS) (a)
Elf owl
Burrowing owl
Costa's hummingbird
Gila woodpecker
Gilded flicker
Bell's vireo (c)
Gray vireo
Bendire's thrasher
LeConte's thrasher
Lucy's warbler
Yellow warbler
Rufous-winged sparrow
Black-chinned sparrow
Lawrence's goldfinch

33 (a) ESA candidate, (b) ESA delisted, (c) non-listed subspecies or population of Threatened or Endangered species, (d) MBTA protection uncertain or lacking, (nb) non-breeding in this BCR
Suggested citation:
U.S. Fish and Wildlife Service. 2008. Birds of Conservation Concern 2008. United States Department of Interior, Fish and Wildlife Service, Division of Migratory Bird Management, Arlington, Virginia. 85 pp. [Online version available at <http://www.fws.gov/migratorybirds/>]

2.2 Tier 2: Site Characterization

Tule Wind LLC and its consultants conducted numerous site visits to the project vicinity between 2004 and 2011. These visits were conducted to assist with screening and characterization of the site, to assess potential impacts to federal and state-listed species and migratory birds and bats (see Section 2.3 Tier 3), and to assist in turbine siting and in development of management actions to reduce impacts. These efforts were done concurrently with consultation and outreach to stakeholders such as the BLM, USFWS, CDFG, US Army Corps of Engineers (USACE), Tribal, State and County representatives, non-governmental organizations, and the public. These groups expressed concern for the risk to migrating birds and eagles from collisions with wind turbines.

2.3 Tier 3: Field Studies and Impacts Assessment

2.3.1 Field Studies and Results

In response to concerns about potential bird and bat impacts resulting from the development of the Tule Wind Project a variety of field studies and literature reviews were conducted (Table 2-3). The geographic coverage of each study may differ due to changes in the anticipated turbine layout at the time when the studies were initiated. Full details about methods, exact areas covered, and the locations and numbers of species detected during the surveys can be found within the original reports for the respective studies. Survey highlights are summarized below for the Tule Wind Project to provide context for the impacts assessment, which focuses solely on the Reduced Ridgeline Project.

Table 2-3. Survey Efforts to Date at the Tule Wind Project

Study	Taxa	Survey Dates
Avian Point Counts (Tetra Tech 2008)	All Birds	March 2005 – March 2006
Avian Point Counts (Tetra Tech 2009)	All Birds	September 2007-September 2008
Ground-based Raptor Nest Surveys (Tetra Tech 2009)	Raptors	April 2008
USFWS Interim Protocol Golden Eagle Nest Surveys (WRI 2010)	Golden Eagles	Spring 2010
USFWS Interim Protocol Golden Eagle Nest Surveys (WRI 2011)	Golden Eagles	Spring 2011
USFWS Interim Protocol Golden Eagle Nest Surveys (WRI 2012)	Golden Eagles	Spring 2012
Golden Eagle Surveys and Nest Cameras (WRI 2011)	Golden Eagles	January – June 2011, October 2011 – June 2012
Golden Eagle Telemetry	Golden Eagles	Summer 2011-Summer 2012 (and ongoing)
Bat Acoustic Survey (Gruver et al. 2011)	All Bats	September 2008-November 2010

Avian Point Counts

Avian point count surveys were conducted approximately every two weeks between March 25, 2005 and March 10, 2006 at 14 point count locations and between September 13, 2007 and September 12, 2008 at 16 point count locations (Figure 2-1). Thirty-minute fixed-point count surveys (800-meter [m] radius) were conducted at points distributed throughout the Tule wind project. Mean avian use was in the moderate range during both 2005-2006 and 2007-2008 surveys (11.67 and 9.35 birds/30 min, respectively). The most commonly detected birds in 2005-2006 (western scrub jay, common raven, and bushtit) were also detected regularly in 2007-2008. Species with the highest encounter rates (the number of birds flying at rotor swept height (RSH) /30 min) during both years included common raven, white-throated swift, turkey vulture, and red-tailed hawk.

Raptor mean use during 2005-2006 and 2007-2008 was 0.58 birds/30 min and 0.98 birds/30 min, respectively. Similar to 2007-2008, the red-tailed hawk and turkey vulture had the highest mean use (0.29 and 0.21 birds/30 min, respectively) of raptors detected during the 2005-2006 surveys. The encounter rates for the turkey vulture and red-tailed hawk were between 0.02 and 0.47 birds flying in the RSH/30 minutes in 2005-2006 and between 0.04 and 0.64 birds flying within the RSH/30 minutes in 2007-2008.

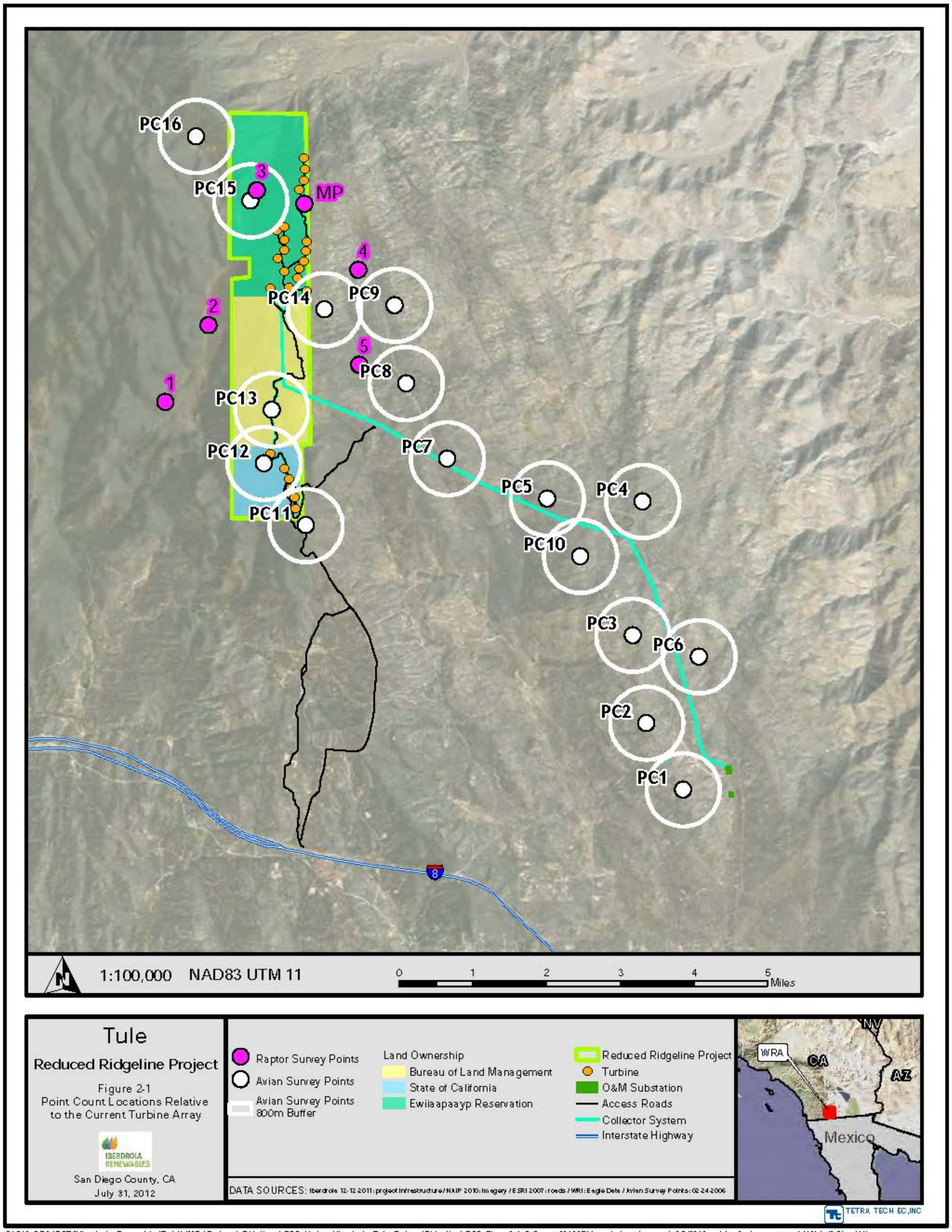


Figure 2-1. Point Count Locations Relative to the Current Turbine Array

Songbirds had the highest mean use out of all species groups observed (3.87 birds/30 min). The songbird species with the highest mean use was the house finch (0.44 birds/30 min). This species had a low encounter rate during the 2007-2008 avian surveys, indicating that the risk of turbine collision for this species is low.

The red-tailed hawk and the turkey vulture had the highest mean use among raptor species (0.49 birds/30 min and 0.40 birds/30 min, respectively). These species had low encounter rates during the 2007-2008 avian surveys (0.25 birds flying at rotor-swept height [RSH] /30 min and 0.21 birds flying at RSH /30 min, respectively); thereby indicating the likelihood of turbine collisions is low compared to other wind facilities with seasonal raptor use data in the public domain (Tetra Tech 2009). Compared to other wind facilities with published seasonal raptor use rates, 2007-2008 use rates at the Tule Wind Project ranked 13th out of 34 in the spring, ninth out of 32 in the summer, 18th out of 29 in the fall, and ninth out of 28 in the winter (Tetra Tech 2009).

The golden eagle, protected under the Bald and Golden Eagle Protection Act (BGEPA), was detected once (Fall 2007) on Ewiiaapaayp Tribal land and once (Spring 2008) on California State lands during surveys and once incidentally (Spring 2008). No species federally listed under the Endangered Species Act were detected during surveys; however, the willow flycatcher was observed off-site twice incidentally. It is unknown whether the individuals sighted were of the southwestern subspecies, which is listed as threatened under the California Endangered Species Act. Other species of special concern detected during avian surveys were loggerhead shrike, northern harrier, Vaux's swift, yellow warbler, and olive-sided flycatcher.

Raptor Nest Surveys

A ground-based raptor nest survey was conducted in April 2008, before trees began to leaf out, to increase visibility of raptor nests. A biologist conducted the survey across the Tule Wind Project and, where possible, within approximately a 1-mile radius around the Project area. A Cooper's hawk nest, red-tailed hawk nest, and 12 inactive nests were observed during the raptor nest survey. The Cooper's hawk nest was located in an oak tree and the red-tailed hawk nest was located in a cottonwood tree.

Golden Eagle Surveys

Golden Eagle Nest Surveys

In 2010, the Wildlife Research Institute (WRI) conducted golden eagle nest surveys within 10 miles of the Tule Wind Project on March 30, 2010 by helicopter. WRI surveyed ten historic golden eagle territories, of which six were occupied, and of those, three of the nests had incubating adults (Figure 2-2; Cane Brake, Glenn Cliff, Morena Butte). WRI notes that USFWS golden eagle protocol (USFWS 2010a) dated February 2010 was not disclosed to Tule Wind LLC until after the survey was conducted (WRI 2010). The closest territory (Cane Brake) had an active nest 207 m (680 feet) from turbine H1 and 1,450 m (4,757 feet) from turbine H2.

In 2011, WRI conducted USFWS protocol-level surveys for golden eagles by helicopter within 10 miles of the Tule Wind Project. Surveys were conducted on February 14, 15, 21 and 23 and March 8 and 10, 2011 for the first round of surveys and on April 12 and 14 for second round of surveys (Figure 2-3). During the second round, surveys of the Agua Caliente territory were conducted from the ground, to avoid disturbing local bighorn sheep lambing.

In 2011, eleven golden eagle territories were surveyed, six of which were observed to be occupied during the first round of surveys (Cane Brake, Coyote Mountains – West, Garnet Mountain, Glenn Cliff, Monument Peak, and Morena Butte). Three of the territories were confirmed as productive during the second round of surveys (Cane Brake, Glenn Cliff, Morena Butte; WRI 2011). The closest territory (Cane Brake) had an active nest 150 m (492 feet) from turbine H1 and 368 m (1,207 feet) from turbine H2.

In 2012, WRI conducted USFWS protocol-level surveys for golden eagles by helicopter within 10 miles of the Tule Wind Project. Surveys were conducted on December 27, 2011, and February 22 - 23, 2012 for the first round of surveys and on April 5, April 24, May 7, May 20, and July 1, 2012 for the second round of surveys (Figure 2-4). The Agua Caliente territory was not surveyed in February or April to avoid disturbing bighorn sheep lambing in 2012.

In 2012, ten golden eagle territories were surveyed, including eight that were observed to be occupied (Cane Brake, Carrizo Gorge, Coyote Mountains - West, Garnet Mountain, Glen Cliff, Monument Peak, Morena Butte, and Table Mountain), one that was unoccupied (Thing Valley), and one that was unknown based on the absence of signs of occupancy (i.e., eagles or active eagle nests) coupled with incomplete searches in 2012 (Agua Caliente). WRI determined that the Thing Valley territory was inactive because no golden eagle nests were located during the survey (WRI 2012a). WRI interpreted the status of Agua Caliente territory as possibly occupied because one nest observed in late December 2011 had some signs of potential recent repair ("possibly active"; WRI 2012a). The interpretation of territory occupancy in the standard protocols and guidance in use (Postupalsky 1974, Pagel et al. 2010, Driscoll 2010, USFWS 2012) bases occupancy status determinations on data gathered during the current year, which would lead to unoccupied status for the Agua Caliente territory. Because WRI was unable to completely survey the Agua Caliente territory during the 2012 breeding season, we conservatively interpreted the "possibly active" nest status as indicative of an unknown territory status (unable to determine occupancy).

Of the occupied territories, two were confirmed to be productive during second round surveys (Carrizo Gorge and Morena Butte), four were not productive (i.e., no eggs were laid; Cane Brake, Coyote Mountains-West, Glen Cliff, and Table Mountain), and two failed (i.e., eggs or chicks were present but did not fledge; Garnet Mountain and Monument Peak). In 2012, the closest territory (Cane Brake) had an active (though unproductive) nest 1,498 m (4,915 feet) from turbine H1 and 1,623 m (5,325 feet) from turbine H2. WRI also classified a closer nest as "possibly active" in 2012, indicating that there were signs of activity at the nest that could not be definitively assigned to 2012 (i.e. may have been from a previous breeding season); this nest was 225 m (738 feet) from turbine H1 and 472 m (1,549 feet) from turbine H2. WRI uses the "possibly active" designation in cases where they believe new nest material may have been added since the previous breeding season, but the material appears to have lost too much moisture to conclude with certainty that it was placed during the current breeding season (thus, it may be an inactive nest). Due to their work with nest cameras, WRI has observed that other animals such as ring-tailed cats can move sticks around in old nests, creating the appearance of recent activity by eagles (C. Meador, WRI, pers. comm.). Compared with 2011, activity in the Cane Brake nests in 2012 was reduced, with activity recorded at the more distant nest (inactive in 2011) and inconclusive evidence of activity ("possibly active") recorded at the nearer nest in 2012, whereas in 2011 WRI reported two active nests in the Cane Brake territory, including one productive nest that fledged one eaglet (WRI 2011, 2012a).

Based on the aerial survey data, no territory produced young in every year (Table 2-4). Both Morena Butte and Cane Brake were successful in 2010 and 2011; however, neither territory fledged young in 2012. Although an active nest or young was not documented in 2010 or 2011 in the Carrizo Gorge territory, observation of at least one juvenile in the territory in 2012 indicates that young were possibly produced in 2011.

Table 2-4. Golden Eagle Territory and Nest Status within 10 Miles of the Tule Wind Project Boundary

Territory	Year	Territory Status[1]	Nest Status[2]	Productivity (no. fledglings)
Agua Caliente	2010	Unoccupied	Inactive	0
Agua Caliente	2011	Unknown	Possibly Active[3]	0
Agua Caliente	2012	Unknown	Possibly Active[3]	0
Cane Brake	2010	Occupied	Active	2
Cane Brake	2011	Occupied	Active	1
Cane Brake	2012	Occupied	Active	0
Carrizo Gorge	2010	Unoccupied	Inactive	0
Carrizo Gorge[4]	2011	Unoccupied	Inactive	Possibly 1
Carrizo Gorge	2012	Occupied	Active	2
Coyote Mountains	2010	Unknown	Possibly Active[3]	0
Coyote Mountains	2011	Occupied	Active	0
Coyote Mountains	2012	Occupied	Active	0
Garnet Mountain	2010	Occupied	Active	0
Garnet Mountain	2011	Occupied	Active	0
Garnet Mountain	2012	Occupied	Active	0
Glen Cliff	2010	Occupied	Active	1
Glen Cliff	2011	Occupied	Active	1
Glen Cliff	2012	Occupied	Active	0
Monument Peak	2010	Occupied	Active	0
Monument Peak	2011	Occupied	Active	0
Monument Peak	2012	Occupied	Active	0
Morena Butte	2010	Occupied	Active	1
Morena Butte	2011	Occupied	Active	2
Morena Butte	2012	Occupied	Active	0
Table Mountain	2010	Occupied	Inactive	0
Table Mountain	2011	Unoccupied	Inactive	0
Table Mountain	2012	Occupied	Active	0
Thing Valley	2010	Occupied	Active	0
Thing Valley	2011	Unoccupied	Inactive	0
Thing Valley	2012	Unoccupied	Inactive	0

[1]Territory status is assigned based on observation of eagles, physical signs of eagle presence, or active nests within the territory during the survey year.
[2]Nest status is for all nests in the territory. For example, a territory may have multiple nests and if one was active, nest status is coded as active.
[3]Nest status is listed as possibly active if the original surveys noted possible nest activity, but did not confirm active status. For Agua Caliente, possibly active status was assigned because no active nests were found, but the territories were not completely surveyed.
[4]Based on the observation of a juvenile in 2012, it is possible that at least 1 young was produced in 2011, although no active nests or signs of occupancy were found during nest surveys.

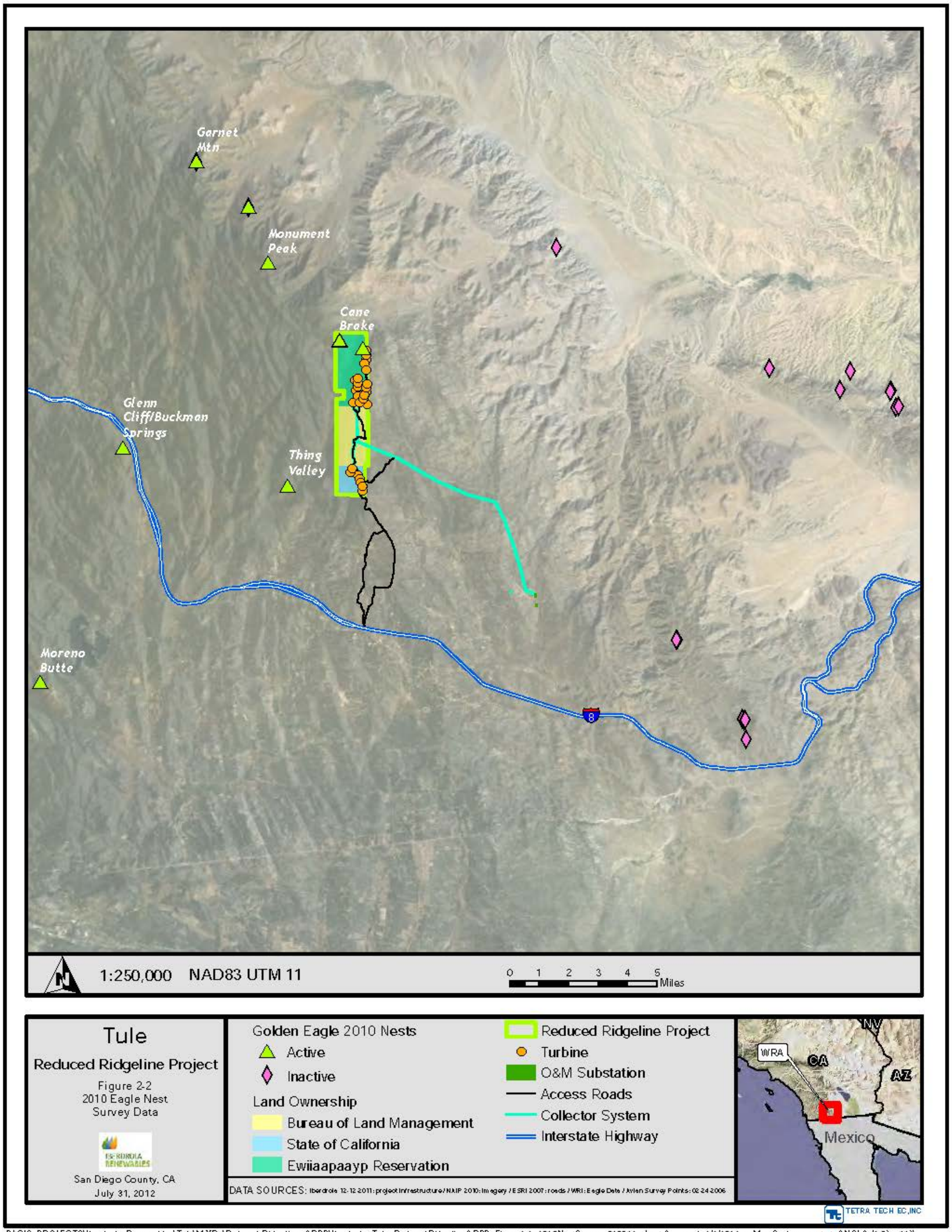
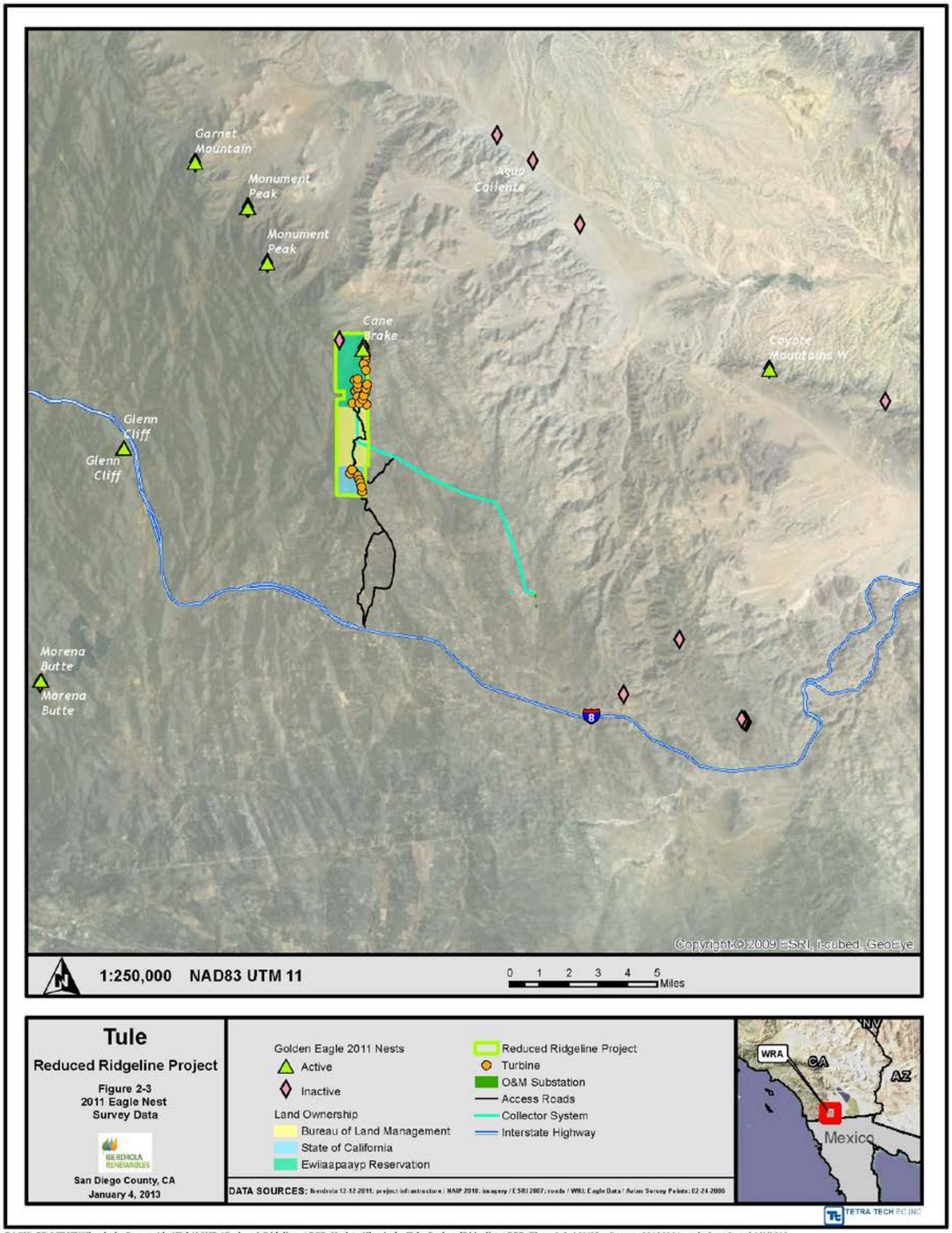


Figure 2-2. 2010 Eagle Nest Survey Data



P:\GIS_PROJECTS\Iberdrola_Renewables\Tule\MXDs\Reduced_Ridgline_ABPP_Updates\Iberdrola_Tule_ReducedRidgelineABPP_Figure2-3_2011NestSurvey_20130104.mxd - Last Saved 1/4/2013

Figure 2-3. 2011 Eagle Nest Survey Data

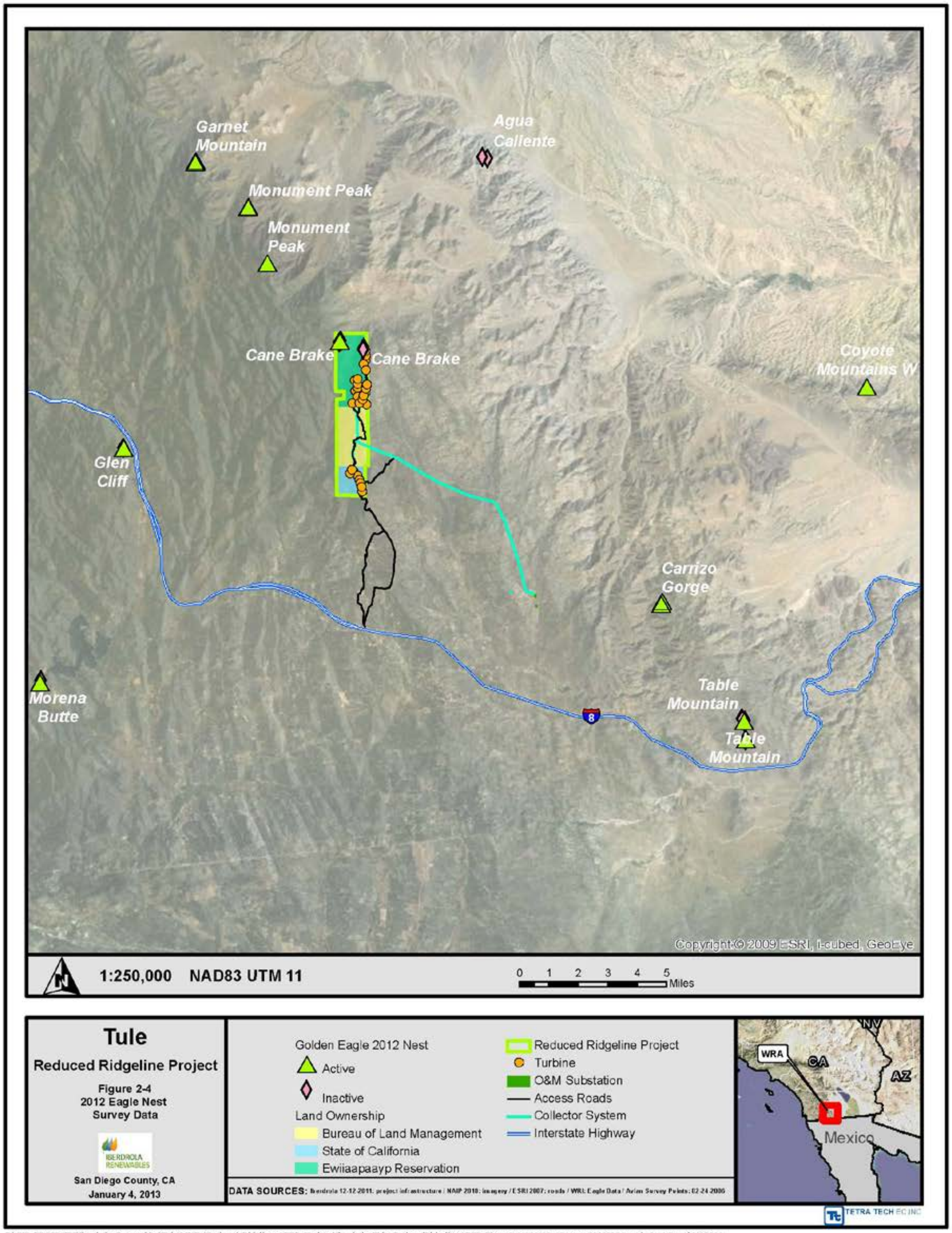


Figure 2-4. 2012 Eagle Nest Survey Data
* Thing Valley status not shown because no golden eagle nests were found in the territory in 2012

Golden Eagles Detected During Point-Count Surveys

Use of the Tule Wind Project by golden eagles was relatively low based on the avian surveys (Tetra Tech 2009), with a reported mean use of <0.01 eagles/30-minute survey. Over the two years of point-count surveys, two golden eagles were detected within the Reduced Ridgeline Project boundary. One observation in the fall of 2007 was within the rotor swept area and one observation in the spring of 2008 was outside of the rotor swept area (Tetra Tech 2008, 2009). Observations of golden eagles during focused, raptor-count surveys in 2011 and 2012 are discussed along with estimates of mean use from those surveys in the appropriate section below.

Golden Eagle Nest Cameras

In order to more fully evaluate golden eagle behavior and use of the area noted with initial survey efforts, prior to the beginning of the 2011 breeding season, WRI installed motion-sensitive cameras on three golden eagle nests in two territories (Cane Brake and Carrizo Gorge (two nests)) that are close to the Tule Wind Project and were active in 2010. These cameras recorded prey deliveries for approximately four months at each nest and were used to determine productivity. The Cane Brake cameras recorded adult eagles feeding young a variety of birds, mammals, and snakes including the following: ground squirrels (25.5%), desert cottontail and black-tailed jackrabbits (17.7%), birds (including ravens and red-tailed hawks, 13.7%), snakes (9.8%), gray fox (2%), mule deer remains (2%) and other unidentifiable species (29.3%) (WRI 2012b). In addition, the Cane Brake camera also documented a siblicide event. The predominance of ground squirrels and rabbits in the diet was interpreted by WRI as an indication that the adults primarily hunted the chaparral/sage brush/desert grassland transition zone on the slope and in the valley to the north, northwest, and east of the nest. Adult attendance at the Cane Brake nest was high through April, and then decreased sharply in early May, and the fledgling eaglet left the nest on June 3, 2011. WRI noted that adult eagles were filmed on the nest only twice after the fledging date. Nest cameras will remain in place in order to collect data in future years. In 2012, WRI kept the camera in the active Cane Brake nest from 2011, and placed a camera in another Cane Brake nest, one in a Table Mountain nest and two in Carrizo Gorge nests, but no data were available from these cameras as of August 2012.

Golden Eagle Flight Behavior Surveys

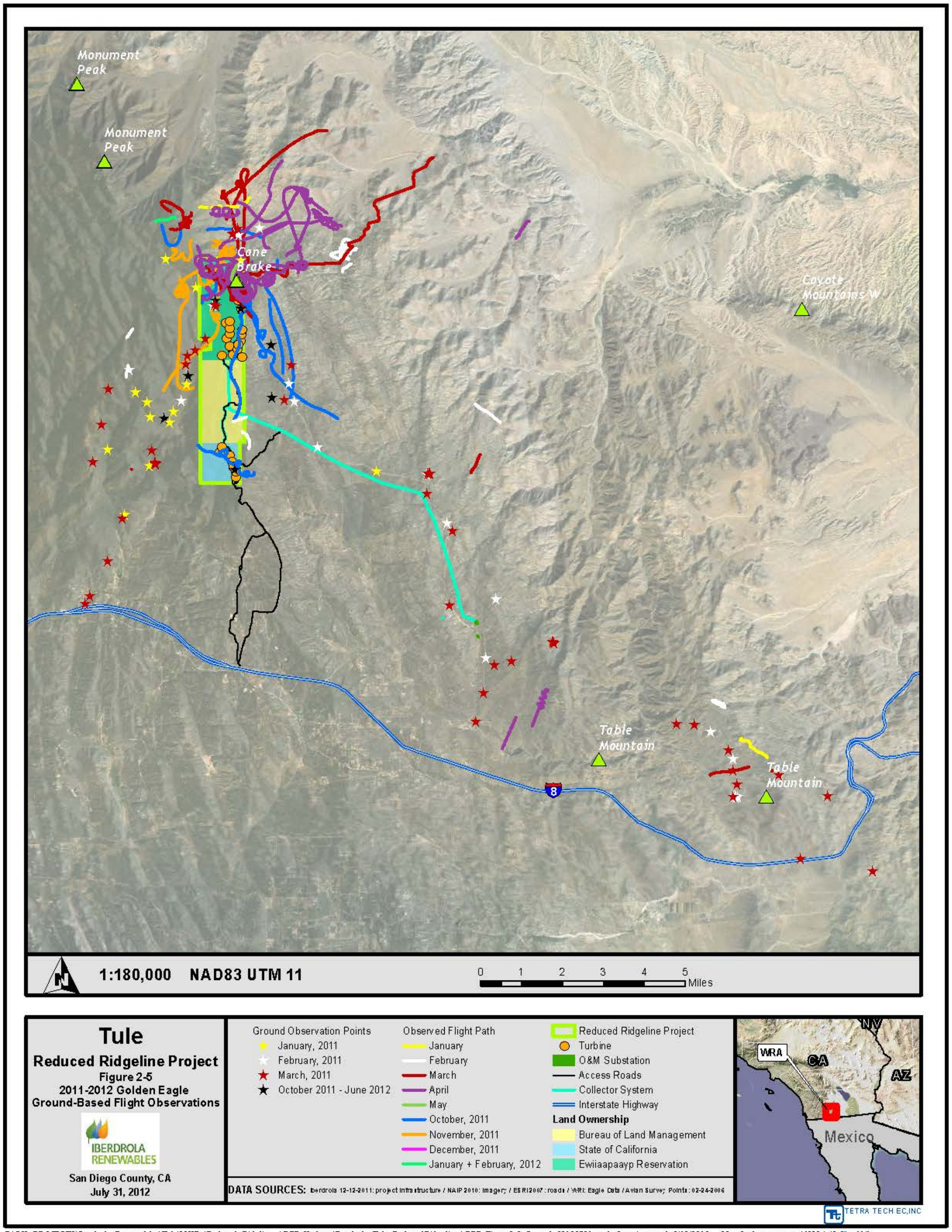
Focal Nest Observations. In order to more fully evaluate golden eagle behavior and use of the area, WRI initiated weekly ground-based flight behavior surveys in January 2011 targeting the four golden eagle territories closest to the Tule Wind Project that were active in the previous year. For each survey, teams of two to four observers recorded observations from multiple observation points within the territory (See Figure 2-5) with the goal of mapping and describing flights by golden eagles within the territory and over the Tule Wind Project. Observations were conducted for a minimum of 1-2 hours per point, for a total of approximately 8 hours per territory per survey, from points that provided good views of core nesting areas and flight paths within territories. From January to May, observers spent 182 hours (21 surveys) observing the Cane Brake territory, 73 hours (12 surveys) observing the Carrizo Gorge territory, 69 hours (11 surveys) observing the Table Mountain territory, and 129 hours (21 surveys) observing the Thing Valley territory, with an additional 60 hours spent at observation points that provided views of two territories simultaneously (e.g., Cane Brake and Carrizo Gorge, or Cane Brake and Thing Valley). A total of 106 flight paths were documented, of which 66 were within the Ewiiaapaayp Tribal land and 1 was within the California State lands boundary of the Reduced Ridgeline Project.

Raptor-Count Surveys. WRI conducted 108 4-hour raptor count surveys (433 hours) to measure use of the Reduced Ridgeline Project by flying golden eagles from September 2011 – June 2012 at five locations providing views of the Reduced Ridgeline Project. WRI documented flight paths of individual eagles (Figure 2-5); and recorded flight heights; minutes over the Reduced Ridgeline Project; minutes below the RSH, within the RSH and above the RSH; and attempted to record the age of all eagles observed. In some cases data were recorded for an eagle observation but a flight path was not mapped. Thus, the number of flight paths recorded may not match the number of eagle observations in some months.

A total of 11 golden eagles were observed in flight: 6 adults, 2 immatures, and 3 of unknown age. A total of 7 eagles made flights over the Reduced Ridgeline Project on Ewiiaapaayp Tribal land (Table 2-5). A total of 9.5 minutes of flight within the RSH were recorded during these flights over the Reduced Ridgeline Project. Flights over the Reduced Ridgeline Project occurred along the ridgeline and in the valley to the west of the ridge (Figure 2-5). Mean use of golden eagles during raptor counts in 2011 and 2012 was 0.012 golden eagles per 30 minutes.

Migration Surveys. WRI conducted 11 migration-count surveys (82 hours) to measure use of the Reduced Ridgeline Project by eagles during the fall migration period (September – December, 2011) at one survey point that provided a wide view of the Reduced Ridgeline Project on Ewiiaapaayp Tribal land. WRI collected the same data during migration counts as it did during point counts (see above). In some cases data were recorded for an eagle observation but a flight path was not mapped. Thus, the number of flight paths recorded may not match the number of eagle observations in some months.

A total of 9 golden eagles were observed in flight: 4 adults and 5 immatures. Given the timing of the observations in late fall, it is likely that some of these eagles were migrants, although it is not possible to be certain about the origin of unmarked birds. One of these eagles made a flight over the Reduced Ridgeline Project on Ewiiaapaayp Tribal land (Table 2-5). A total of 4 minutes of flight within the RSH were recorded during this flight over the Project. Flights over the Reduced Ridgeline Project occurred along the ridgeline and in the valley to the west of the ridge (Figure 2-5). Mean use of golden eagles during raptor counts was 0.055 golden eagles per 30-minutes. Because the sample frame of the migration counts differs from point-count surveys (i.e. smaller spatial extent and a single, full-day count per survey period), mean-use estimates derived from migration surveys are not directly comparable to those from point-count surveys.



P:\GIS_PROJECTS\Iberdrola_Renewables\Tule\MXDs\Reduced_Ridgline_ABPP_Updates\Iberdrola_Tule_ReducedRidgelineABPP_Figure2-5_Ground_20120731.mxd - Last Accessed: 8/13/2012 - Map Scale correct at: ANSI A (8.5" x 11")

Figure 2-5. Golden Eagle Ground-based Observations

Table 2-5. Ground-Based Flight Paths Relative to the Tule Wind Project

Month, Year	Survey Type	Total Flight Paths Recorded	Flight Paths within Ewiiaapaayp Tribal Land Boundary
January, 2011	Focal nest observations	1	0
February, 2011	Focal nest observations	13	5
March, 2011	Focal nest observations	42	28
April, 2011	Focal nest observations	49	32
May, 2011	Focal nest observations	1	1
September, 2011	Raptor surveys[1]	0	0
October, 2011	Raptor surveys	7	3
November, 2011	Raptor surveys	8	3
December, 2011	Raptor surveys	1	1
January, 2012	Raptor surveys	1	1
February, 2012	Raptor surveys	0	0
March, 2012	Raptor surveys	0	0
April, 2012	Raptor surveys	0	0
May, 2012	Raptor surveys	0	0
June, 2012	Raptor surveys	**0**	**0**
Total		**123**	**73**

[1] Results for combined raptor-count surveys and migration surveys

Golden Eagle Telemetry Study

In order to more fully evaluate golden eagle behavior and use of the area noted with initial survey efforts, WRI attempted to place telemetry transmitters on breeding adult eagles in territories near the Tule Wind Project. WRI began efforts to capture adult golden eagles for fitting with telemetry transmitters in January, 2011, by "prebaiting" (placing bait at a site prior to trapping) the Cane Brake (2 sites in Thing Valley and 1 in McCain Valley) and Table Mountain (1 site) territories and monitoring bait sites with remote trap site cameras. No attempts were made to trap adult eagles at these territories because there were no adults observed at the prebaiting sites. By April, prebaiting was suspended at all territories because of the start of the breeding season when nestlings were potentially present in active golden eagle nests. WRI successfully placed satellite telemetry transmitters on a total of five eaglets from the Cane Brake (1), Glenn Cliff (1), Morena Butte (2), and O'Neal (1) territories in June 2011. The transmitters collect Global Positioning System (GPS) locations at one hour intervals for up to three years. The telemetry data (through June 2012) are presented in Figures 2-7 and 2-8 and Table 2-6. Tule Wind LLC provided results of the 2011 telemetry in April, 2012 and will provide quarterly updates of ongoing telemetry to the Tribe and agencies thereafter. These telemetry data provide information to supplement the intensive, ground-based observational surveys conducted at the Project. The telemetry data are representative only of the movements of juveniles fledged from nests near the Project, which likely differ somewhat from the movements of subadults, breeders, and non-breeding, floater adults. However, movements of non-telemetered birds over the Project were characterized by the observational surveys (focal-nest, point-count, raptor-count, and migration surveys).

The Cane Brake juvenile was located within the Reduced Ridgeline Project boundary on Ewiiaapaayp Tribal land for twenty-one percent of the telemetry point locations. The Cane Brake juvenile was a true migrant, leaving the US in November and migrating to the southern Baja Peninsula, near Cabo San Lucas, Mexico, where it remained as of July 2012 (Figure 2-8, Table 2-6). Neither the Morena Butte male or female had telemetry locations within Ewiiaapaayp Tribal land. The Morena Butte birds wandered widely after fledging, making movements into and out of Mexico (Figure 2-7). The Morena Butte male spent more time in Mexico than in the US beginning in February, 2012, and the female showed a similar trend beginning in April, 2012. Both the Glenn Cliff juvenile and O'Neal Canyon juvenile were killed during the study. On July 17, 2011 the juvenile golden eagle from the Glenn Cliff territory was struck and killed by a car on Old Highway 80 below the 2011 Glenn Cliff nest site. The telemetry unit on the O'Neal Canyon bird transmitted a mortality signal on July 7, 2011 and the bird was located by a WRI biologist on August 29, 2011.

To understand the home range size, 50% and 95% fixed kernel utilization distributions (UD) were calculated from the telemetry data. A fixed kernel UD graphically depicts the areas having 50% and 95% probability of eagle presence, based on the frequency distribution of the observed locations over the landscape; areas of high use produce areas of high probability in the kernel estimate. The home range of the Cane Brake fledgling prior to November 2011, as estimated by the 95% fixed kernel, overlapped all turbines on the Ewiiaapaayp Tribal land, and the 50% core home range overlapped 21.7 percent of the Ewiiaapaayp Tribal land including turbines H1-H5 (Fig. 2-8). This overlap is largely due to the proximity of the Cane Brake nest to the Project in 2011. If juvenile eagles fledge from more distant nests (such as the active nest in 2012), it is likely that early post-fledging movements will remain close to the nest, and therefore have less overlap with the Project. Although no GPS locations of the Glen Cliff fledgling were in the Ewiiaapaayp Tribal land, a small discontiguous area of its 95 % fixed kernel home range overlapped the Reduced Ridgeline Project boundary. However, the Glen Cliff fledging was killed by a car in July, 2011; the short duration of telemetry data for this individual indicates that any UD should be interpreted with caution.

Table 2-6. Satellite Tracking Locations Relative to the Reduced Ridgeline Project of the Tule Wind Project, May, 2011 – June, 2012

Eagle	Number of points within Ewiiaapaayp Tribal Land	Number points within US	Number of points within Mexico	Percentage of the 50-percent kernel overlapping the Ewiiaapaayp Tribal Land
Cane Brake (fledgling)	1128	2133	3164	21.7
Morena Butte male (fledgling)	0	3509	1932	0
Morena Butte female (fledgling)	0	4365	965	0
O'Neal (fledgling)	0	759	0	0
Glen Cliff (fledgling)	0	120	9	0

Ongoing and Future Golden Eagle Surveys

Ongoing golden eagle studies consist of (1) nest surveys within 10 miles of the Tule Wind Project, (2) continued collection of nest photos in the eagle territories closest to the Reduced

Ridgeline Project, and (3) telemetry studies of eaglets fitted with telemetry units in summer 2011 in territories near the Reduced Ridgeline Project.

Bat Acoustic Surveys

Acoustic surveys for bats using Anabat™ SD-1 ultrasonic detectors at two fixed stations were conducted from September 4, 2008, to August 10, 2009, and again at nine fixed stations and nine roaming stations from March 11 to November 15, 2010. During the 2010 surveys within the Reduced Ridgeline Project boundary, one roaming station was sampled on Ewiiaapaayp Tribal land and two roaming stations were sampled on California State land. The roaming bat acoustic stations were placed at ground level near features suspected to be attractive to bats. The objective of the acoustic bat surveys was to estimate the seasonal and spatial patterns of activity in the study area by bats, and provide a qualitative estimate of potential impacts to bats from turbine operation. Bat activity was surveyed using acoustic detectors (Anabat SD1) at two fixed meteorological (met) tower stations from September 4, 2008, to August 10, 2009. Ground-based detectors were paired with detectors raised on met towers to compare bat activity at different heights (ground [≤ 1 m] versus raised [45 m]) and monitor bat activity at heights within the anticipated rotor-swept zone. Bat activity was monitored at eight met tower stations (4 met towers monitored – 2 detectors per tower) and at ten bat feature and roaming sampling locations on a total of 250 nights during the period March 11 to November 15, 2010. Bat feature stations were established to assess a probable upper bound on bat activity for the area. The number of bat passes was measured to create an index of overall bat activity (Hayes 1997), and bat calls were sorted into four approximate species groups based on the minimum call frequency (Table 2-7). To assess the potential for bat mortality, the mean number of bat passes per detector-night (averaged across ground-based monitoring stations) was compared to existing data from wind-energy facilities where both bat activity and mortality levels have been measured.

Table 2-7. Bat Species Likely to Occur in the Vicinity of Tule Wind Project, Sorted by Call Frequency

Common Name	Scientific Name	Status
High-frequency (> 40 kHz)		
western red bat	*Lasiurus blossevillii*	Fed: none, State: SSC
California leaf-nosed bat	*Macrotus californicus*	Fed: none, State: SSC
ghost-faced bat	*Mormoops megalophylla*	Fed: none, State: none
California bat	*Myotis californicus*	Fed: none, State: none
western small-footed bat	*Myotis ciliolabrum*	Fed: none, State: none
long-legged bat	*Myotis volans*	Fed: none, State: none
Yuma bat	*Myotis yumanensis*	Fed: none, State: none
canyon bat	*Parastrellus hesperus*	Fed: none, State: none
Mid-frequency (30-40 kHz)		
western yellow bat	*Lasiurus xanthinus*	Fed: none, State: SSC
western long-eared bat	*Myotis evotis*	Fed: none, State: SSC
little brown bat	*Myotis lucifugus*	Fed: none, State: none
Low-frequency (15-30 kHz)		
pallid bat	*Antrozous pallidus*	Fed: none, State: SSC
Townsend's big-eared bat	*Corynorhinus townsendii*	Fed: none, State: SSC
silver-haired bat	*Lasionycteris noctivagans*	Fed: none, State: none

Common Name	Scientific Name	Status
hoary bat	*Lasiurus cinereus*	Fed: none, State: none
fringed bat	*Myotis thysanodes*	Fed: none, State: none
pocketed free-tailed bat	*Nyctinomops femorosaccus*	Fed: none, State: SSC
Brazilian free-tailed bat	*Tadarida brasiliensis*	Fed: none, State: none
Very low-frequency (< 15 kHz)		
spotted bat	*Euderma maculatum*	Fed: none, State: SSC
western mastiff bat	*Eumops perotis californicus*	Fed: none, State: SSC
big free-tailed bat	*Nyctinomops macrotis*	Fed: none, State: SSC

Source: Gruver et al. 2011 With edits from DFG to include species of special concern.
SSC: California Species of Special Concern.

In the 2008/2009 survey, four Anabat units recorded 4,592 bat passes on 842 detector-nights. Bat passes per detector-night averaged 5.53±0.13 (-0.45, 14.11; ± standard deviation; 95% confidence interval) across all stations. The average bat activity for ground stations was 10.00±16.50 (-0.78, 17.31 CI) bat passes per detector-night, and for raised stations was 1.07±2.48 (-0.12, 2.60CI) bat passes per detector-night. At the met tower stations in 2010, eight Anabat units recorded 14,667 bat passes on 939 detector-nights. Bat passes per detector-night averaged 16.42±49.34 (-1.55, 50.95CI) across all stations. The average bat activity for ground stations was 26.16±62.55 (-2.62, 65.285CI) bat passes per detector-night, and for raised stations was 6.69±25.84 (-1.22, 27.11CI) bat passes per detector-night. For all non-met tower stations, 64,766 bat passes were recorded on 551 detector-nights, with an average of 69.09±117.13 (-4.79, 122.12 CI) bat passes per detector-night. Results varied among bat feature stations. Within the Reduced Ridgeline Project, on the Ewiiaapaayp Tribal land, station TRW1A recorded2.253 total bat passes on 44 detector-nights, averaging 51.20 bat passes per detector-night. At the bat feature stations on California State land, T5 and TR7,total bat passes were 12 and 113 on 14 and 1 detector-nights, respectively. Four roaming stations were established along Thing Valley Road adjacent to the Ewiiaapaayp Tribal land to increase spatial coverage. These detector stations recorded a total of 21,098 bat passes on 239 nights, a mean of 88.28 passes per detector-night.

In 2008/2009, bat activity increased through late June, remaining at relatively high levels until mid-August. Moderate levels of activity were recorded in September 2008, decreasing to low levels by November 2008. In 2010, overall bat activity at the met towers increased during the study period, peaking during the week of August 12-18 (67.67 bat passes per detector-night). Activity decreased steadily through September to relatively low levels by mid-October.

In 2008/2009, the majority of bat passes were from high-frequency (HF) bats (HF; 72.6% of all passes) followed by low-frequency (LF) passes (LF; 17.4%), mid-frequency (MF) passes (MF; 5.3%), and very low-frequency (VLF) passes (VLF; 4.7%), and this pattern was largely consistent among the two ground stations. The distribution of bat passes recorded by raised stations differed from the ground stations in 2008/2009, with passes by LF bats accounting for the highest percentage of passes (63.0%), follow by VLF bats (21.0%), HF bats (14.2%), and mid-frequency (MF) bats (1.8%). Within the Reduced Ridgeline Project, the bat passes detected at the bat feature station (TWR1A) on the Ewiiapaayp Tribal land were primarily LF (78%), followed by HF (10%) and MF (2%). The bat feature stations on California state land detected mostly HF bats (93%), with a small number of LF passes (7%).

Weekly patterns of activity were varied among species groups. HF bats peaked first between August 9-15, 2008, followed by VLF bats (September 22-28, 2008), LF bats (May 4-10, 2009), and MF bats June 26 – July 2, 2009. At the met towers in 2010, passes by HF bats (HF; 86.1% of all passes) greatly outnumbered passes by LF bats (LF; 9.7%), MF bats (MF; 3.4%), and VLF bats (VLF 0.8%), and this pattern was largely consistent among ground stations, suggesting that the species in the HF group are generally more abundant throughout the Tule Wind Project area. Among raised stations, HF bats comprised about 68%, LF comprised 27%, and MF and VLF bats each accounted for about 2.5% of passes. Weekly patterns of activity were similar among HF, MF, and LF species, with activity peaking in mid-August, while activity levels of VLF bats did not peak until late September/early October.

2.3.2 Impacts Assessment – Golden Eagle

Collision

The collision risk analysis follows the newly developed (although untested) model from the Service's Draft Eagle Conservation Plan Guidance (USFWS 2011) in close coordination with USFWS-Region 8 and National USFWS Eagle Strike Team. To develop a weight-of-evidence estimate of the risk of collision fatalities in Reduced Ridgeline Project, we also compared eagle activity to results from existing wind energy facilities in California, Oregon, and Washington.

USFWS Fatality Model

The USFWS model provided in the ECP Guidance assumes that risk of collision is proportional to use, and that use is distributed evenly across the study area (i.e., the model does not account for spatial structure). The model uses the data available from two years of bimonthly avian point counts, focused eagle surveys conducted in winter, spring, and fall 2011 and winter, spring and early summer 2012 to estimate potential annual golden eagle fatalities at the Reduced Ridgeline Project. The inclusion of 2011-2012 eagle survey data updates previous modeling for ridge turbines conducted as part of the Phase I ABPP (Tetra Tech 2011).

Data collection varied among survey years. Data collected September – December, 2011 and January - June 2012 included measurements of eagle flight minutes at RSH. The data from avian point counts and winter-spring 2011 eagle surveys did not contain estimates of eagle flight minutes at RSH. Our analysis of these earlier point count data assumed that each golden eagle sighting over the Tule Wind Project equated to one minute of total time within the RSH; the same assumption used by USFWS in its analyses of such data (B. Millsap, USFWS, pers. comm.). Although some flights may have had longer times spent at RSH, many probably also had lower amounts of time at RSH, and we believe the assumption of one minute at RSH per flight line accurately reflects the typical flight through the Reduced Ridgeline Project, which was usually a brief foray by the Cane Brake fledgling as it moved from perch to perch. It is also important to note that the fatality model assumes that eagle observations are unique and does not attempt to account for the potential that a fatality reduces the probability of future fatalities by removing an individual from the at-risk pool of eagles. Thus, if eagles are not replaced immediately after a fatality, the model may overestimate the risk of subsequent fatalities. Furthermore, the model results presented here use data from a year when the nearest nest to the Reduced Ridgeline Project in the Cane Brake territory was active, which is unlikely to be the case in every year (e.g., Cane

Brake was occupied but not productive in 2012). The model also assumes that turbines are operating when eagles are flying, which might not be the case. Thus, the annual fatality estimates presented herein could overestimate take based on the assumptions described above.

Data input for the analysis consisted of the total minutes of eagle sightings (t, exposure time) during each calendar year of sampling. The model adjusted this sample exposure time for the proportion of the project area (A) sampled and the proportion of the daylight hours (T) of the year sampled to estimate the total exposure minutes per year for eagles at the Reduced Ridgeline Project using the following equation:

> Exposure minutes (E) = T x (A/number of count points/point count area) x (t/number of point counts/count duration).

From exposure minutes, we calculated the estimated annual fatality rate using the proportion of the project within 100 m of a turbine (D) and the observed collision rate (0.01) of golden eagles in the RSH from Whitfield (2009) as:

> Fatalities per year = E x D x collision rate.
>
> = E * D * 0.01

To characterize the risk associated with alternative layouts and operational strategies on the Ewiiaapaayp Tribal land, we developed several fatality models. The scenarios were based on the 50% kernel estimate home ranges (core home ranges) of the Cane Brake and other juveniles (Figure 2-8). The timing of the curtailment period was based on the full breeding season up to fledging (three winter months, three spring months: January – June), the nestling period (three spring months: April – June), and the period of highest activity (three months spanning winter and spring: February – April). A scenario of full-time turbine operations was modeled for comparison with alternate scenarios. Because the scenarios are selected based upon nesting activity in the Cane Brake territory, it is assumed that curtailment would be used as a strategy when the either of the two nearest nests (active in 2010 and 2011) is active (See Section 6.1 for Adaptive Management table). The following fully operational and curtailment scenarios were considered:

1. Turbine operation on Ewiiaapaayp Tribal land, only
2. Turbines on Ewiiaapaayp Tribal land, only, with the two northernmost turbines (H1, H2) curtailed during daylight hours when eagles are active for three months in the spring (April-June) during a year when the Cane Brake territory is occupied and either of the two nearest Cane Brake nests to the Project is active
3. Turbines on Ewiiaapaayp Tribal land, only, with the two northernmost turbines (H1, H2) curtailed during daylight hours when eagles are active for three winter and three spring months (January-June during a year when the Cane Brake territory is occupied and either of the two nearest Cane Brake nests to the Project is active
4. Turbines on Ewiiaapaayp Tribal land, only, with the two northernmost turbines (H1, H2) curtailed during daylight hours when eagles are active for three months spanning winter and spring (February-April) during a year when the Cane Brake territory is occupied and either of the two nearest Cane Brake nests to the Project is active

5. Turbines on Ewiiaapaayp Tribal land, only, with the four northernmost turbines (H1-H4) curtailed during daylight hours when eagles are active for three months in the spring (April-June) during a year when the Cane Brake territory is occupied and either of the two nearest Cane Brake nests to the Project is active
6. Turbines on Ewiiaapaayp Tribal land, only, with the four northernmost turbines (H1-H4) curtailed during daylight hours when eagles are active for three winter and three spring months (January-June) during a year when the Cane Brake territory is occupied and either of the two nearest Cane Brake nests to the Project is active
7. Turbines on Ewiiaapaayp Tribal land, only, with the four northernmost turbines (H1-H4) curtailed during daylight hours when eagles are active for three months spanning winter and spring (February-April) during a year when the Cane Brake territory is occupied and either of the two nearest Cane Brake nests to the Project is active. Table 2-8 summarizes the data inputs and results of these simulations.

The model estimate of annual fatalities and the number of predicted fatalities over a 20-year period are presented for each scenario.

1. **Ewiiaapaayp Tribal land, only –** Applying the USFWS model published in the draft ECP Guidance (USFWS 2011) to the average of point count data collected at points within the Ewiiaapaayp Tribal land from 2006--2012, the data input, t, for the Reduced Ridgeline Project equaled 22.0 minutes and this produced an average annual exposure minutes estimate of 187.7 minutes (see Table 2-8 for details of surveys). The proportion of the Ewiiaapaayp Tribal land project footprint within 100m of a turbine (D) is 0.102, and the resulting estimated potential eagle fatalities were therefore 0.18 per year or 3.6 golden eagles over 20 years.
2. **Ewiiaapaayp Tribal land, only, with two northernmost turbines (H1, H2) curtailed during daylight from April 1 – June 30, during a year when the Cane Brake territory is occupied and either of the two nearest Cane Brake nests to the Project is active –** Applying the USFWS model published in the draft ECP Guidance (USFWS 2011) to the average point count data collected at points within the Ewiiaapaayp Tribal land from 2006-2012, the data input, t, for the Reduced Ridgeline Project equaled 22.0 minutes. To estimate the effects of curtailing the two northernmost turbines, we removed two turbines from the model as well as all mapped flights occurring within 100m of those turbines from April 1 to the end of June, resulting in a data input (t) of 19.0 minutes (see Table 2-8 for details of 2011 surveys). This produced an average exposure minutes estimate of 171.2 minutes. The proportion of the Project within 100 m of an active turbine (D) during curtailment resulting from this change was 0.093, and the resulting estimated potential eagle fatalities were therefore 0.16 per year or 3.2 golden eagles over 20 years.

   Assuming the pattern of space use documented in 2011-2012 is typical, daytime curtailment of turbines H1 and H2 will reduce the projected golden eagle take by 0.4 eagles over the 20-year operational life of the Reduced Ridgeline Project.
3. **Ewiiaapaayp Tribal land, only, with two northernmost turbines (H1, H2) curtailed during daylight from January 1 – June 30, during a year when the Cane Brake territory is occupied and either of the two nearest Cane Brake nests to the Project**

is active –Applying the USFWS model published in the draft ECP Guidance (USFWS 2011) to average point count data collected at points within the Ewiiaapaayp Tribal land from 2006-2012, the data input, t, for the Reduced Ridgeline Project equaled 22.0 minutes. To estimate the effects of curtailing the two northernmost turbines, we removed two turbines from the model as well as all mapped flights occurring within 100m of those turbines from January to the end of June, resulting in a data input (t) of 17.0 minutes (see Table 2-8 for details of surveys). This produced an average exposure minutes estimate of 155.3 minutes. The proportion of the Project within 100 m of an active turbine (D) during curtailment resulting from this change was 0.093, and the resulting estimated potential eagle fatalities were therefore 0.14 per year or 2.8 golden eagles over 20 years.

Assuming the pattern of space use documented in 2011 is typical, daytime curtailment of turbines H1 and H2 from January to June will reduce the projected golden eagle take by 0.8 eagles over the 20-year operational life of the Reduced Ridgeline Project.

4. **Ewiiaapaayp Tribal land, only, with two northernmost turbines (H1, H2) curtailed during daylight from February 1 – April 30, during a year when the Cane Brake territory is occupied and either of the two nearest Cane Brake nests to the Project is active** - Applying the USFWS model published in the draft ECP Guidance (USFWS 2011) to average point count data collected at points within the Ewiiaapaayp Tribal lands from 2006-2012, the data input, t, for the Reduced Ridgeline Project equaled 22.0 minutes. To estimate the effects of curtailing the two northernmost turbines, we removed two turbines from the model as well as all mapped flights occurring within 100m of those turbines from February - April, resulting in a data input (t) of 17.2 minutes (see Table 2-8 for details of 2011 surveys). This produced an average exposure minutes estimate of 159.1 minutes. The proportion of the Project within 100 m of an active turbine (D) during curtailment resulting from this change was 0.093, and the resulting estimated potential eagle fatalities were therefore 0.15 per year or 3.0 golden eagles over 20 years.

   Assuming the pattern of space use documented in 2011-2012 is typical, daytime curtailment of turbines H1 and H2 from February to April will reduce the projected golden eagle take by 0.6 eagles over the 20-year operational life of the Reduced Ridgeline Project.

5. **Ewiiaapaayp Tribal land, with 4 northernmost turbines (H1-H4) curtailed during daylight from April 1 – June 30, during a year when the Cane Brake territory is occupied and either of the two nearest Cane Brake nests to the Project is active** – Applying the USFWS model published in the draft ECP Guidance (USFWS 2011) to point count data collected at points within the Ewiiaapaayp Tribal land from 2006-2012, the data input, t, for the Reduced Ridgeline Project equaled 20.2 minutes. To estimate the effects of curtailing the four northernmost turbines, we removed four turbines from the model as well as all mapped flights occurring within 100m of those turbines from April 1 to the end of June, resulting in a data input (t) of 18.5 minutes. This produced an average exposure minutes estimate of 168.4 minutes. The proportion of the Project within 100 m of an active turbine (D) during curtailment

resulting from this change was 0.083, and the resulting estimated potential eagle fatalities were therefore 0.16 per year or 3.2 golden eagles over 20 years.

Assuming the pattern of space use documented in 2011-2012 is typical, daytime curtailment of turbines H1–H4 will reduce the projected golden eagle take by 0.4 eagles over the 20-year operational life of the Reduced Ridgeline Project.

6. **Ewiiaapaayp Tribal land, with 4 northernmost turbines (H1-H4) curtailed during daylight from January 1 – June 30, during a year when the Cane Brake territory is occupied and either of the two nearest Cane Brake nests to the Project is active** – Applying the USFWS model published in the draft ECP Guidance (USFWS 2011) to point count data collected at points within the Ewiiaapaayp Tribal land from 2006-2012, the data input, t, for the Reduced Ridgeline Project equaled 20.2 minutes. To estimate the effects of curtailing the four northernmost turbines, we removed four turbines from the model as well as all mapped flights occurring within 100 m of those turbines from January 1 to the end of June, resulting in a data input (t) of 16.0 minutes. This produced an average exposure minutes estimate of 149.4 minutes. The proportion of the Project within 100 m of an active turbine (D) during curtailment resulting from this change was 0.083, and the resulting estimated potential eagle fatalities were therefore 0.14 per year or 2.8 golden eagles over 20 years.

   Assuming the pattern of space use documented in 2011-2012 is typical, daytime curtailment of turbines H1–H4 will reduce the projected golden eagle take by 0.8 eagles over the 20-year operational life of the Reduced Ridgeline Project.

7. **Ewiiaapaayp Tribal land, only, with 4 northernmost turbines (H1-H4) curtailed during daylight from February 1 – April 30, during a year when the Cane Brake territory is occupied and either of the two nearest Cane Brake nests to the Project is active-** Applying the USFWS model published in the draft ECP Guidance (USFWS 2011) to point count data collected at points within the Ewiiaapaayp Tribal land from 2006-2012, the data input, t, for the Reduced Ridgeline Project equaled 20.2 minutes. To estimate the effects of curtailing the four northernmost turbines, we removed four turbines from the model as well as all mapped flights occurring within 100m of those turbines from February 1 to the end of April, resulting in a data input (t) of 16.2 minutes. This produced an average exposure minutes estimate of 153.2 minutes. The proportion of the Project within 100 m of an active turbine (D) during curtailment resulting from this change was 0.083, and the resulting estimated potential eagle fatalities were therefore 0.14 per year or 2.8 golden eagles over 20 years.

   Assuming the pattern of space use documented in 2011-2012 is typical, daytime curtailment of turbines H1–H4 will reduce the projected golden eagle take by 0.8 eagles over the 20-year operational life of the Reduced Ridgeline Project.

Curtailing turbines during the period of highest activity (February – April) resulted in the largest reduction in the number of predicted fatalities per curtailed turbine compared to the other seasonal curtailment options. Adding turbines H3 and H4 to the curtailment scenario resulted in a negligible reduction in fatalities. Thus, the most effective curtailment scenario, based on these data, is curtailment of turbines H1 and H2 during February – April. In the event that one of the two nearest Cane Brake nests is active, Tule Wind will curtail turbines H1 and H2 during daylight hours, the curtailment scenario that produces the greatest reduction in fatality risk with the least reduction in energy production.

Table 2-8. Fatality Model Inputs and Results Based on 2006--2012 Eagle Flight Surveys for Various Management Scenarios

Analysis area	Season	Eagle flight minutes 2006/07	Eagle flight minutes 2007/08	Eagle flight minutes 2011	Eagle flight minutes 2012	Average eagle flight minutes 2006-2012	Annual fatality estimate
Ewiiaapaayp Tribal Land, no curtailment	Winter	0	0	32	4.5	9.1	0.18
	Spring	0	0	34	0	8.5	
	Fall	0	1	12	-	4.3	
Ewiiaapaayp Tribal Land: Curtail H1, H2 April-June (fledging season)	Winter	0	0	32	4.5	9.1	0.16
	Spring	0	0	22	0	5.5	
	Fall	0	1	12	-	4.3	
Ewiiaapaayp Tribal Land: Curtail H1, H2 Jan-June (full breeding season)	Winter	0	0	25	3.5	7.1	0.14
	Spring	0	0	22	0	5.5	
	Fall	0	1	12	-	4.3	
Ewiiaapaayp Tribal Land: Curtail H1, H2 Feb-April (high activity period)	Winter	0	0	25	4.5	7.4	0.15
	Spring	0	0	22	0	5.5	
	Fall	0	1	12	-	4.3	
Ewiiaapaayp Tribal Land: Curtail H1–H4 April-June (fledging season)	Winter	0	0	32	4.5	9.1	0.16
	Spring	0	0	20	0	5.0	
	Fall	0	1	12	-	4.3	
Ewiiaapaayp Tribal Land: Curtail H1–H4 Jan-June (full breeding season)	Winter	0	0	23	3.5	6.6	0.14
	Spring	0	0	20	0	5.0	
	Fall	0	1	12	-	4.3	
Ewiiaapaayp Tribal Land: Curtail H1–H4 Feb-April (high activity period)	Winter	0	0	23	4.5	6.9	0.14
	Spring	0	0	20	0	5.0	
	Fall	0	1	12	-	4.3	

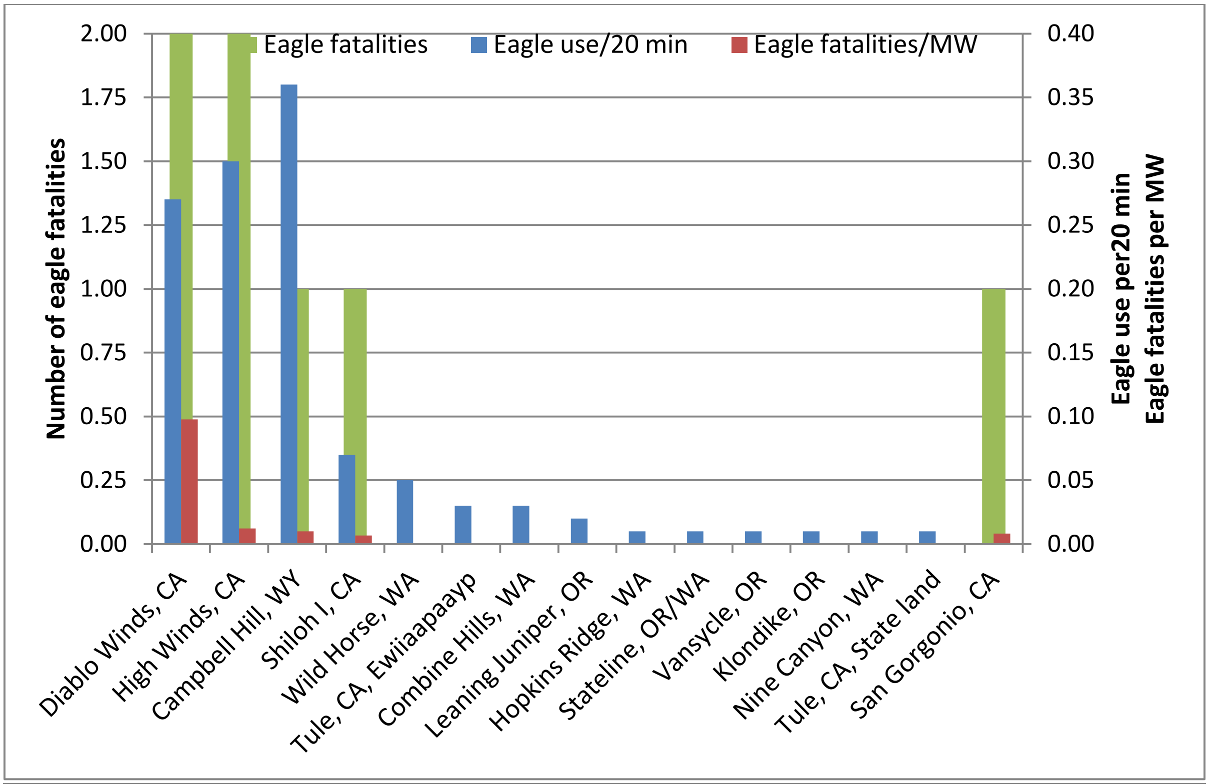
Comparison to Eagle Activity at Existing Wind Energy Projects

We augmented the calculation of projected fatality rates with a qualitative comparison to active wind energy facilities to develop a weight-of-evidence estimate of risk. For new generation wind facilities, a standard assumption is that risk is proportional to use. If this assumption is correct, eagle use of the Reduced Ridgeline Project prior to construction should be predictive of collision risk post-construction. Recent research suggests that there is no clear relationship between pre-construction measures of activity and post-construction mortality for all avian species combined or raptors as a group, but there may be predictive value of pre-construction surveys for some raptor species (Ferrer et al. 2011). In interpreting the comparison of pre-construction activity and post-construction mortality for golden eagles, it is important to bear in mind that the relationship, if any, between these variables is uncertain and likely affected by differences in methodology and site-specific environmental variables. In reality, the risk of mortality varies more among turbine location than among wind farms (Ferrer et al. 2011), and therefore micrositing decisions based on eagle behavior as modeled in the section above are probably the best means of avoiding and minimizing take. We found publicly available data on pre-construction use and post-construction fatalities for 13 active wind energy facilities in California, Oregon, and Washington, and compared them to use estimates for the Reduced Ridgeline Project.

Ewiiaapaayp Tribal land. On the Ewiiaapaayp Tribal land, only one eagle sighting was recorded during two years of point count surveys conducted between 2006 and 2008, resulting in a rate of 0.005 eagles per 30 minutes. The count surveys from 2011 – 2012 resulted in a rate of 0.012 eagles per 30 minutes during raptor surveys and 0.055 eagles per 30 minutes during migration surveys. If we assume these data to be derived from equivalent types of surveys, they may be averaged (21 eagles detected over 1,213 30-min counts) , resulting in an estimated mean use of 0.016 eagles per 30 minutes. This rate is near the low end of those for wind projects of comparable scale in California, Oregon, and Washington (Table 2-9, Figure 2-6). Wind projects with rates corresponding to the upper end of the range have caused golden eagle fatalities, whereas those at the lower end of the range generally have not (Young et al. 2003a,b, Kerlinger et al. 2006a,b, 2009, NWC & WEST 2007, Young et al. 2007, WEST 2006, 2008, Taylor et al. 2008, 2011, Gritski and Kronner 2009). Thus, if risk is proportional to use, this approach suggests there is a low probability of eagle fatalities at turbines on Ewiiaapaayp Tribal land. The input data for this analysis does not permit separate consideration of the curtailment and turbine reduction scenarios analyzed above using the USFWS model.

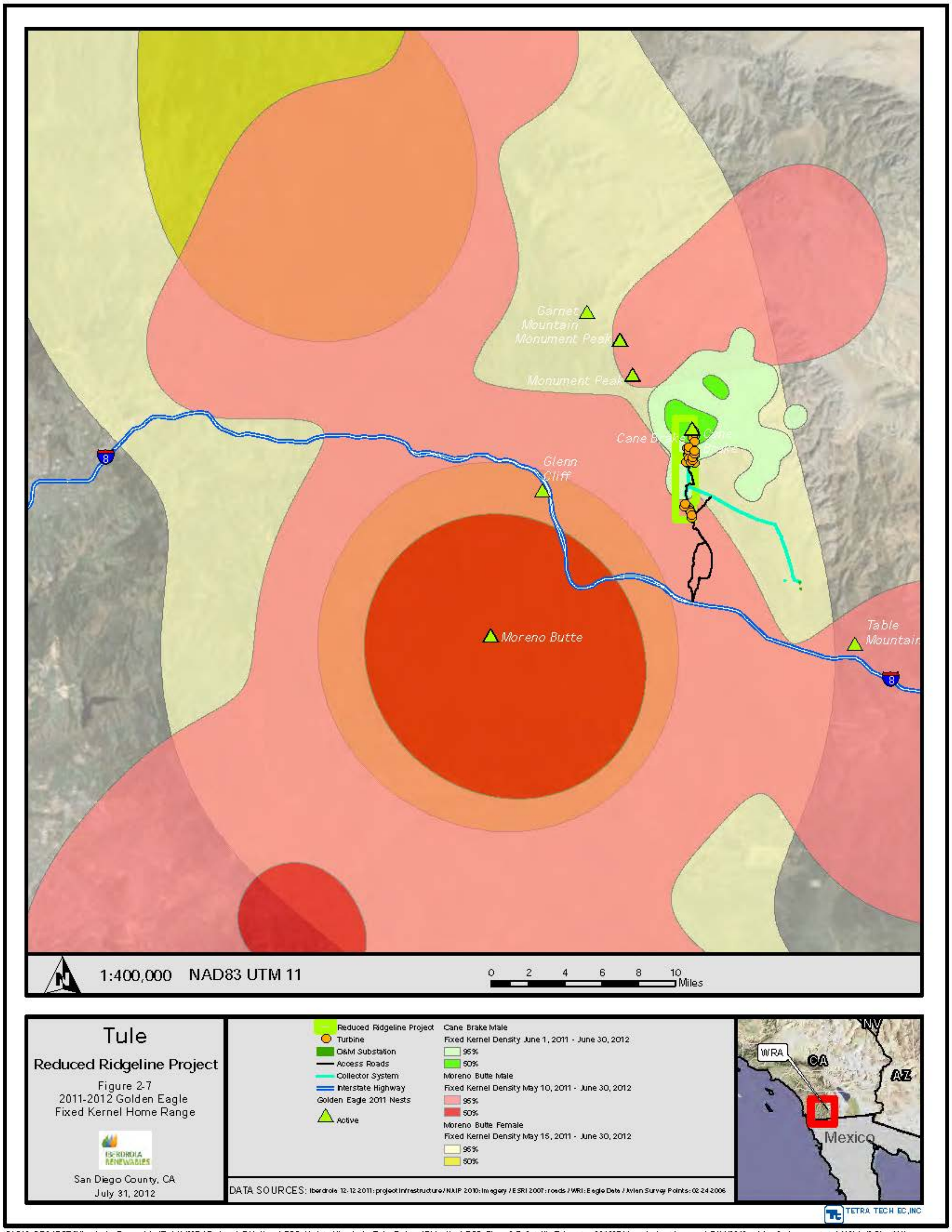
Risk Summary

For the Reduced Ridgeline Project, the weight of evidence from the combination of quantitative fatality estimation based on avian point counts, focal nest surveys, raptor count surveys, and telemetry monitoring of juvenile movements suggest that the primary period of risk occurs on Ewiiaapaayp Tribal land when the nest nearest the Reduced Ridgeline Project is active and produces young. This risk could be reduced by curtailment of turbines H1 and H2 during primary activity periods when the Cane Brake breeding territory is occupied and the nest nearest the turbines is active. Raptor survey and migration count data have not detected a golden eagle since February, 2012 indicating that data collected in 2011 represents a high-use year and that activity documented during 2011 is not representative of all years.



Project	Habitat	Survey period	Source
Diablo Winds, CA	Grassland	March 2005 - February 2006	WEST 2006
High Winds, CA	Agriculture	August 2003 - July 2005	Kerlinger et al. 2006
Campbell Hill, WY	Grassland and shrub-steppe	Unknown	Taylor et al. 2008 (cited in BLM 2011), 2011 (cited in BLM 2012)
Shiloh I, CA	Agriculture and grazed pastures	August - July, 2003-2004, 2004-2005	Kerlinger et al. 2009
Wild Horse, WA	Columbia Basin Plateau	January - December, 2007	Erickson et al. 2008
Tule, CA, Ewiiaapaayp Land	Chaparral, Sonoran Basin and Ko-Pa Mountains	September 2005 – September 2008	Tetra Tech 2008 and 2009
Combine Hills, WA	Grassland and shrub-steppe	February 2004 to February 2005	Young et al. 2006
Leaning Juniper, OR	Agriculture and shrub-steppe	2006 - 2008	Gritski et al. 2008
Hopkins Ridge, WA	Plateaus, ridges, cliffs	January - December, 2006	Young et al. 2007
Stateline, OR/WA	Agriculture, grasslands	July 2001 - December 2003	Erickson et al. 2004
Vansycle, OR	Grasslands	January - December, 1999	Erickson et al. 2000
Klondike, OR	Grasslands	October 2007 - October 2008	NWC and WEST 2007
Nine Canyon, WA	Agriculture, grazed shrub-steppe	September 2002 - August 2003	Erickson et al. 2003
Tule, CA, State Land	Chaparral, Sonoran Basin and Ko-Pa Mountains	September 2005 – September 2008	Tetra Tech 2008 and 2009
San Gorgonio, CA	Mojave and Colorado desert	March 1997 - May 1998	Anderson et al. 2005

Figure 2-6. Comparison of eagle use/ 20 minute survey, number of eagle fatalities, and eagle fatalities per megawatt (MW) at wind energy facilities in California, Oregon, and Washington, with habitat and survey period information.



P:\GIS_PROJECTS\Iberdrola_Renewables\Tule\MXDs\Reduced_Ridgline_ABPP_Updates\Iberdrola_Tule_ReducedRidgelineABPP_Figure2-7_SatelliteTelemetry_20120731.mxd - LastAccessed: 7/31/2012 - Map Scale correct at ANSI A (8.5" x 11")

Figure 2-7. 2011 Fledgling Golden Eagle Fixed-kernel Home Ranges

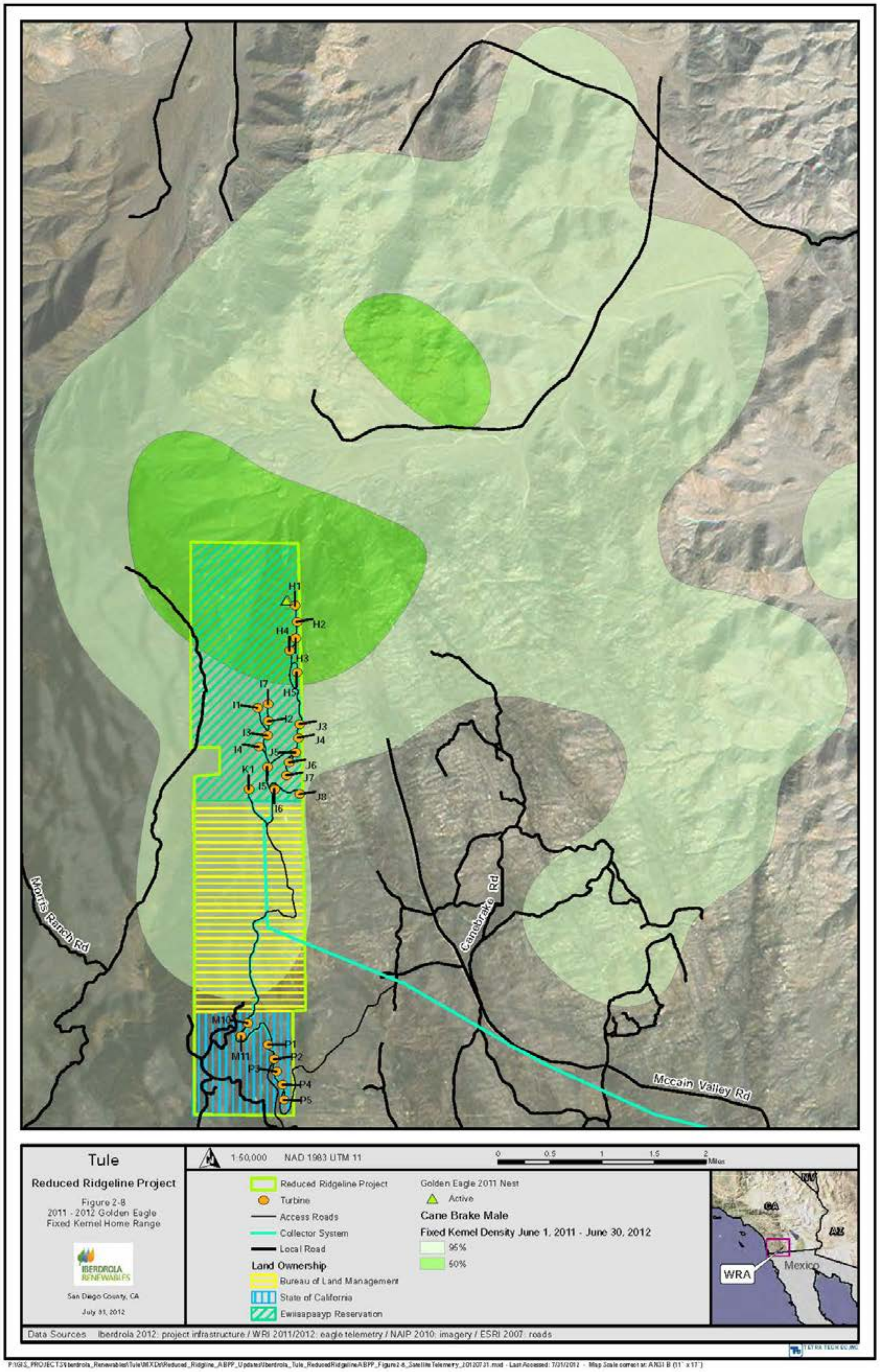


Figure 2-8. 2011 Cane Brake Fledgling Golden Eagle Fixed-kernel Home Range Prior to Migration

Table 2-9. Golden Eagle Use Estimates in a Variety of Habitats in the Western States Standardized to Number Observed per 20-minute Period (adapted from WEST 2010)

Project Name	Average[3] overall use	Bird Conservation Region	Reference
Foote Creek Rim, WY[2]	0.265	10 – Northern Rockies	Johnson et al. 2000a
Elkhorn, OR	0.263	10 – Northern Rockies	WEST 2005a
High Winds, CA[1]	0.200	32 – Coastal California	Kerlinger et al. 2005
Diablo Winds, CA[1]	0.200	32 – Coastal California	WEST 2006
Morton Pass Reference, WY[2]	0.115	10 – Northern Rockies	Johnson et al. 2000a
Antelope Ridge, OR	0.110	10 – Northern Rockies	WEST 2009
Simpson Ridge, WY[2]	0.098	10 – Northern Rockies	Johnson et al. 2000a
Bodewig, OR	0.080	9 – Great Basin	Jeffrey and Bay 2008
Wild Horse, WA[1]	0.058	9 – Great Basin	Erickson et al. 2003a
Leaning Juniper, OR	0.036	9 – Great Basin	NWC and WEST 2005b
Swauk Ridge, WA	0.027	9 – Great Basin	Erickson et al. 2003b
Windy Point, WA	0.023	9 – Great Basin	Johnson et al. 2006
Maiden, WA[1]	0.020	9 – Great Basin	Erickson et al. 2002
Windy Flats, WA	0.018	9 – Great Basin	Johnson et al. 2007a
Hopkins Ridge, WA[1]	0.017	10 – Northern Rockies	Young et al. 2003a
White Creek, WA	0.011	9 – Great Basin	Johnson et al. 2003
Broken Bow, NE	0.010	19 – Central Mixed-grass Prairie	Johnson et al. 2009a
Sunshine, AZ[1]	0.008	16 – Southern Rockies/Colorado Plateau	WEST and CPRS 2006
Tule Wind Project, CA[1]	<0.01	32 – Coastal California	Tetra Tech 2008, 2009
Klondike, OR[1]	0.006	9 – Great Basin	Johnson et al. 2002b
Burlington, CO	<0.01	18 – Shortgrass Prairie	Poulton et al. 2009

Source: Table 2 in WEST (2010)
[1]Adjusted from 30-minute surveys
[2]Adjusted from 40-minute surveys
[3]Non-weighted average of the seasonal use estimates

Golden eagle fatalities have been recorded as a result of collisions with transmission lines and towers (LaRoe et al. 1995); however, available data do not allow for the estimation of potential collisions based on the length or other characteristics of the transmission lines (e.g., Franson et al. 1995, Bevanger 1998; see below for electrocution risk). The Reduced Ridgeline Project will result in the installation of approximately 10.07miles of 34.5kV collector line with 209 towers. Publically available sources of eagle fatality information are incomplete, but suggest that the overwhelming majority of eagle fatalities associated with power lines are due to electrocution, and have attributed relatively few fatalities to collisions (e.g., Benson 1981, Phillips 1986, USFWS 2009). Golden eagle risk due to meteorological towers is likely to be extremely low due to the absence of guy lines, which further reduces the already low risk caused by met towers.

Electrocution

Golden eagle fatalities occur as a result of electrocution on power line structures (Harness and Wilson 2001, Avian Power Line Interaction Committee [APLIC] 2006). Due to their large size, golden eagles are able to bridge conductive elements (Harness and Wilson 2001, APLIC 2006). Therefore, any structures that allow for circuit completion (i.e., flesh-to-flesh contact between energized parts or an energized and grounded part) pose an electrocution risk to golden eagles. Risks to golden eagles due to electrocution from transmission lines will be minimized at the Reduced Ridgeline Project by following APLIC standards (APLIC 2006); therefore, overall risk from electrocution is low based on an assumed 40 – 80 percent reduction in risk associated with non-APLIC designed lines.

Nest Disturbance

Golden eagles are sensitive to disturbance during the nesting season (February through July in California). Recommendations for appropriate buffer distances to minimize disturbance vary by geographical location and by activity, but are not explicitly stated in current USFWS guidance (USFWS 2010a). Buffers based on research relative to nest disturbance range from 0.12 mile to 2 miles, with distances <1 mile being the most common recommendation (Table 2-10), although USFWS Region 8 recommends a buffer ≥1 mile based in part on unpublished data (H. Beeler, pers. comm.).

Table 2-10. Summary of Research or Policy-based Buffer Distances for Golden Eagles

Restrictions		Location	Activity	Notes	Reference
Spatial	Temporal				
Research-Based Literature					
1.0 miles	Unknown	CO and WY	Pipeline		Olendorff and Zeedyk 1978
0.19 miles	Winter	CO	Any	Approach distance within which 90% of birds flushed	Holmes et al. 1993
2 miles	All year	AK and Alberta	Pipeline	No construction	Jacobson 1974
2 miles	March 1 to September 1	AK and Alberta	Pipeline	No ground activity	Jacobson 1974
0.25 to 0.5 miles	Unknown	Unknown	General	Response to questionnaire provided to raptor experts	Fuller in Suter and Joness 1981
1.0 miles line-of-sight	Unknown	Unknown	General	Response to questionnaire provided to raptor experts	Howard in Suter and Joness 1981
0.12 to 0.31 miles	Unknown	Unknown	General	Response to questionnaire provided to raptor experts	Woffinden in Suter and Joness 1981
0.5 miles	February 1 to August 1	CO	Noise		Call 1979
0.31 to 0.5 miles	Any	Spain	Any	Imperial eagle, not golden eagle	Gonzalez et al. 2006
0.31 miles	Periods with eggs or young		Intermittent surveys by a few individuals		Suter and Joness 1981
0.62 miles	Periods with eggs or young		Construction and other noisy, extended activities		Suter and Joness 1981

Table 2-10. Summary of Research or Policy-based Buffer Distances for Golden Eagles (continued)

Restrictions		Location	Activity	Notes	Reference
Spatial	Temporal				
Policy-Based Literature					
0.5 mile	February 1 to July 15	CO	Unknown		Craig 1995
0.6 mile	Unknown	UT	Geothermal drilling	No drilling	ERDA 1977
0.47 to 0.68 miles	Incubating and chick rearing period	United Kingdom	Any	Derived from a poll of expert opinion (n=32)	Ruddock and Whitfield 2007
0.19 miles	Breeding and winter	Oregon	Any	Buffer expected to prevent 90% of flushing	Watson and Whalen 2004
0.5 miles	January 15- July 31	Wyoming	Wind energy	No disturbance	WGFD 2009

There are six to ten golden eagle territories within ten miles of the Tule Wind Project (Figure 2-4; WRI, 2011). Six of the territories were occupied in both 2010 and 2011, and eight were occupied in 2012 (WRI 2010, 2011). In 2010, the closest occupied eagle territory to the Project (Cane Brake) used a nest 207 m (685 ft) from turbine H1 and 440 m (1450 ft) from turbine H2. In 2011, Cane Brake had an active nest approximately 150 m (495 ft) from turbine H1 and 368 m (1214 ft) from turbine H2. In 2012, the Cane Brake territory used a distant alternate nest, which was 1498 m (4915 ft) from turbine H1 and 1623 m (5325 ft) from turbine H2. The close proximity of the Cane Brake nests, within 1 mile, suggests potential for disturbance to this nest during construction and operation of the northernmost turbines of the Reduced Ridgeline Project; however, the nearest nests are below the ridgeline with no direct line of sight to the proposed turbines, so risk of disturbance may be lower than for a line-of-sight nest. Surveys at this nest to date suggest that the adult eagles primarily forage along the south side of the Cane Brake valley, below the ridgeline (WRI, unpublished data). The Thing Valley territory, located approximately 2 miles southwest of the Reduced Ridgeline Project failed in 2007, 2008, 2009, and 2011; was occupied but unproductive in 2010; and had unknown status in 2012 (WRI 2012a). It appears that typical conditions in the Thing Valley territory do not favor successful reproduction by golden eagles.

Habitat Loss and Fragmentation

Indirect impacts of the Reduced Ridgeline Project to eagles could occur from permanent and temporary disturbance of prey habitat due to construction of facilities. This impact is estimated to be 40acres of permanent and 125acres of temporary disturbance for the Reduced Ridgeline Project. For the Ewiiaapaayp Tribal land, an estimated 16 acres of permanent impact and 59 acres of temporary impacts are expected. The density of the shrubby vegetation and the overall low to moderate eagle use during point count surveys suggest that the space occupied by the turbines is not likely to be a preferred foraging area for eagles (D. Bittner, pers. comm.); thus, the disturbance, in combination with required mitigation measures is likely to have minimal effects (CPUC and BLM 2010). Ground disturbance would be minimized to the extent practicable during the Reduced Ridgeline Project construction which would minimize impacts to jackrabbits and other prey, and hence, to golden eagles (Marzluff et al. 1997). Eagle surveys ongoing in 2011 will clarify implication of habitat loss by providing information on the movements of eagle territories near the Reduced Ridgeline Project.

2.3.3 Impacts Assessment – Birds (excluding eagles)

Collision

Birds have been identified as a group at risk because of collisions with wind turbines and power lines (Erickson et al. 2005; Drewitt and Langston 2006; Arnett et al. 2007). Specifically, migrant passerines (e.g., songbirds) are found more often in post-construction mortality monitoring compared to other groups of birds (Arnett et al. 2007). At newer generation wind energy facilities outside of California, approximately 80 percent of documented mortalities have been songbirds, of which 50 percent are often nocturnal migrants (Erickson et al. 2001a; Drewitt and Langston 2006; Johnson et al. 2007b; Strickland and Morrison 2008). It is estimated that less than 0.01 percent of migrant songbirds that pass over wind farms are killed, based on radar data and mortality monitoring (Erickson 2007) and no studies to date indicate or suggest a level of fatality that rises to a level of concern, relative to population-level impacts. Locally breeding songbirds may experience lower mortality rates than migrants because many of these species tend not to fly at turbine rotor heights during the breeding season. However, some breeding songbird species have behaviors that increase their risk of collisions with turbines.

The habitat conditions and results of the on-site avian surveys for the Tule Wind Project suggest there are no major concentrations of non-raptors during the breeding season or during migration. Songbirds, corvids, and swifts/hummingbirds are likely to use the Tule Wind Project area on occasion and were the most commonly observed species groups during the 2007-2008 avian point count surveys (Tetra Tech 2009). However, non-raptors making stopovers in the area are unlikely to concentrate within the Tule Wind Project area due to the abundance of similar habitat throughout the region. All non-raptors observed during avian surveys had relatively low encounter rates, indicating that the risk of turbine collision for these species is low. Furthermore, as recorded during the 2007-2008 avian point count surveys, few birds will be found on site from November through February (Tetra Tech 2009), resulting in minimal risk to non-raptors over the winter months.

Despite the observation that most avian fatalities at wind farms are songbirds, raptor mortality historically has received the most attention. Raptor mortality at newer wind projects has been low relative to older-generation wind farms, although there is substantial regional variation in raptor mortality rates (Erickson et al. 2002, 2004; Johnson et al. 2002a; Kerns and Kerlinger 2004; Jain et al. 2007).

The Tule Wind Project area contains broad, rolling upland areas with numerous large granite rock formations associated with the In-Ko-Pah Mountains and provides some suitable habitat for raptors; however, raptor use within the Tule Wind Project area was low (<1.0 birds/30 min) over the course of the 2005-2006 and 2007-2008 avian point count surveys. Such levels of raptor use within the Tule Wind Project suggest that raptor mortality is anticipated to be low (Young et al. 2003b). Raptor species that are likely to be found on site primarily include red-tailed hawk and turkey vulture. However, other raptor species including Cooper's hawk, American kestrel, northern harrier, sharp-shinned hawk, prairie falcon, and osprey may occur within the Project on occasion as well. Fatalities of red-tailed hawks and turkey vultures have occurred at wind farms (Kerns and Kerlinger 2004; Erickson et al. 2004). However, the low mean use and encounter rates observed for red-tailed hawks and turkey vultures indicate that their probability of negative interactions with turbines is low at the Tule Wind Project. Raptor migration surveys are ongoing for fall 2011, and should provide further quantification of use by raptors migrating in the vicinity of the Tule Wind Project.

Based on the summary above and information known on collision risk nationally (Table 2-11; mean fatality rate = 2.1 birds/MW/year), the collision risk for birds at the Tule Wind Project will be low. This risk will be further reduced through measures taken during the design, construction, and operational phases of Reduced Ridgeline Project (Tables 3-1, 3-2, and 5-1). Key avoidance and minimization measures include construction of the transmission line following APLIC guidelines, collection line burial, lighting minimization, ground disturbance restrictions, a full-time biological monitor for construction, and low-impact turbine and met tower design.

Electrocution

Utility lines (transmission and distribution) can potentially result in electrocution of bird species (e.g., large raptors) that have wing spans large enough that the bird can simultaneously contact two conductors or a conductor and grounded hardware. Therefore, any structures that allow for circuit completion (i.e., flesh-to-flesh contact between energized parts or an energized and grounded part) pose an electrocution risk. The risk of electrocution for the Reduced Ridgeline Project is likely to be low because collection lines will be buried and design of overhead lines will follow APLIC guidelines.

Disturbance/Displacement

In addition to mortality associated with wind farms, concerns have been raised that some bird species may avoid areas near turbines after the wind farm is in operation (Drewitt and Langston 2006). For example, at the Buffalo Ridge wind energy facility in Minnesota, densities of male songbirds were lower in CRP grasslands containing turbines than in CRP grasslands without turbines. It was suggested that the reduced density may be due to avoidance of turbine noise and maintenance activities, and to reduced habitat quality due to the presence of access roads and gravel pads surrounding the turbines (Leddy et al. 1999). Reduced abundance of grassland songbirds was found within 50 m of turbine pads for a wind farm in Washington and Oregon, but the investigators attributed displacement to the direct loss of habitat or reduced habitat quality resulting from construction and not the presence of the turbines (Erickson et al. 2004). Recent research at two sites in North and South Dakota (Shaffer and Johnson 2008) suggests that certain grassland songbird species (two of four studied) may avoid turbines by as much as 200 m, but these results have not been finalized nor verified at additional sites. None of these studies have addressed whether these avoidance effects are temporary (i.e., the birds may habituate to the presence of turbines over time) or permanent.

Construction activities and the presence of turbines and other Reduced Ridgeline Project features may disturb or displace birds. The impacts to birds from disturbance or displacement from the Reduced Ridgeline Project are likely to be low. Also, the Reduced Ridgeline Project is in a region of human activity consisting of the existing BLM operated Off-Highway Vehicle staging, trail riding area, and quail/bird hunting; McCain Valley Road; a new high-voltage transmission line (Sunrise) currently under construction across the Reduced Ridgeline Project; an existing high-voltage transmission line (Southwest Power Link); Interstate 8, the Golden Acorn Casino; as well as other recreational areas where existing disturbance is common and birds have likely adjusted to high levels of noise and activity. The risk of disturbance/displacement will be further reduced through avoidance and minimization measures taken during the design, construction, and operational phases of the Reduced Ridgeline Project (Tables 3-1, 3-2, and 5-1). Key measures include minimization of surface disturbance and seasonal restrictions on ground disturbance, burial of collector lines, and trash abatement programs.

Habitat Fragmentation

Habitat fragmentation can exacerbate the problem of habitat loss for birds by decreasing patch area and increasing edge habitat. Habitat fragmentation can reduce avian productivity through increased nest predation and parasitism and reduced pairing success of males. The construction of the Reduced Ridgeline Project is likely to slightly increase the degree of habitat fragmentation of the area because the ridgeline is less developed than the surrounding areas. Potential habitat fragmentation resulting from the Reduced Ridgeline Project will be reduced through avoidance and minimization measures taken during the design, construction, and operational phases of the Reduced Ridgeline Project (Tables 3-1, 3-2, and 5-1).

Table 2-11. Estimates of Mean Bird Fatalities per Turbine and per Megawatt at Wind Facilities in the United States

Wind facility and state	Habitat	Estimated mean bird fatality/ turbine/year	Estimated mean bird fatality/ MW/year	Estimated raptor fatality/ turbine/year	Estimated non-raptor fatality/ turbine/year	Estimated large bird fatality/ turbine/year	Estimated small bird fatality/ turbine/year	Estimated grassland bird fatality/ turbine/year
Klondike III, OR (Gritski et al. 2009)	Agriculture, Columbia Basin shrub-steppe	5.87	3.30	0.11	--	0.50	5.37	0.42
Judith Gap, MT (TRC Environmental 2008)*	Agriculture, short grass prairie	4.52	3.01	--	--	0.69	3.83	--
Nine Canyon, WA (Erickson et al. 2003c)	Agriculture, shrub-steppe, grassland	3.59	2.76	0.07	--	0.28	3.31	--
Stateline, OR/WA 2003 (Erickson et al. 2004)	Agriculture, Columbia Basin shrub-steppe	1.93	2.92	0.06	--	0.23	1.70	1.28
Klondike I , OR (Johnson et al. 2002b)	Agriculture, Columbia Basin shrub-steppe	1.42	0.95	0.00	--	--	--	--
Elkhorn, OR (Jeffrey et al. 2009)	Agriculture, Columbia Basin shrub-steppe	1.06	0.64	0.10	--	0.31	0.75	0.46 (songbirds)
Stateline, OR/WA (WEST and NWC 2007)	Agriculture, Columbia Basin shrub-steppe	0.81	1.23	0.07	--	0.18	0.63	0.45
Vancycle, OR (Erickson et al. 2000)	Agriculture, Columbia Basin shrub-steppe	0.63	0.95	0.00	0.63	0.13	0.50	--
Altamont WRA, CA (Smallwood and Karas 2009)	Agriculture, grassland	--	1.56	1.79	--	--	--	--
San Gorgonio, CA (Anderson et al. 2005)*	Desert shrub	0.04	--	0.003	0.04	0.02	0.02	--
High Winds, CA (Kerlinger et al. 2006)	Agriculture, grassland	0.93	0.52	0.40	--	0.50	0.42	--
Buena Vista, CA (Insignia 2009)	Agriculture, grassland	1.15	1.15	0.44	0.71 (includes bats)	--	--	--
Foote Creek Rim, Phase I, WY (Young et al. 2003b)	Mixed grass prairie, sagebrush shrubland	1.5	--	0.03	--	0.02	1.46	--
Hopkins Ridge, WA (Young et al. 2007)	Agriculture, grassland	2.21	1.23	0.25	--	0.76	1.45	--
Blue Sky Green Field, WI (Gruver et al. 2009)	Cultivated cropland	11.83	7.17	--	--	--	--	--
Ainsworth, NE (Derby et al. 2007)	Grassland, grazing	1.19	0.72	--	--	0.19	2.48	--

Table 2-11. Estimates of Mean Bird Fatalities per Turbine and per Megawatt at Wind Facilities in the United States (continued)

Wind facility and state	Habitat	Estimated mean bird fatality/ turbine/year	Estimated mean bird fatality/ MW/year	Estimated raptor fatality/ turbine/year	Estimated non-raptor fatality/ turbine/year	Estimated large bird fatality/ turbine/year	Estimated small bird fatality/ turbine/year	Estimated grassland bird fatality/ turbine/year
Wild Horse, WA (Erickson et al. 2008)	Grassland	2.79	1.55	0.17	--	0.48	2.31	0.52 (grassland songbirds)
Maple Ridge, NY (Jain et al. 2007)	Agriculture	--	1.90 (7-day sites)	--	--	--	--	--
Buffalo Ridge, MN (Johnson et al. 2000b)	Agriculture, pasture, grassland	0.5-4.45	1.43-5.93	--	--	--	--	--
Kewaunee County, WI (Poulton 2010)	Cultivated fields	1.29	1.59	--	--	--	--	--
Cedar Ridge, WI (Poulton 2010)	Cultivated agriculture	10.82 (small to medium birds)	6.53 (small to medium birds)	--	--	--	--	--
Crescent Ridge, IL (Poulton 2010)	Agriculture	0.49 (fall) 0.47 (spring)	0.33 (fall) 0.31 (spring)	--	--	--	--	--
Top of Iowa, IA (Poulton 2010)	Agriculture	0.44 (2003) 0.96 (2004)	0.49 (2003) 1.07 (2004)	--	--	--	--	--
Mars Hill, ME (Poulton 2010)	Forest, grassland	0.43 (2007 weekly) 2.04 (2008 weekly)	0.29 (2007 weekly) 1.36 (2008 weekly)	--	--	--	--	--
Mountaineer, WV (Kerns and Kerlinger 2004)	Forested ridge top	4.04	2.69	--	--	--	--	--
Klondike II, WA (NWC and WEST 2007)	Agriculture	4.71	3.14	0.17	--	0.25 (includes medium birds)	4.46	--
Average Value		**2.7**	**2.1**	**0.2**	**0.3**	**0.3**	**2.0**	**0.7**

*Post-construction monitoring occurred only during spring and fall migratory seasons. Fatality estimate is per two-season study period rather than per year

2.3.4 Impacts Assessment – Bats

Collision

Bat mortality occurs at wind farms due to collisions with turbine blades and barotrauma (Kunz et al. 2007); barotrauma is the tissue damage to the lungs that results from the rapid air-pressure reduction near moving turbine blades (Baerwald et al. 2008). Studies to date indicate that foliage- or tree-roosting migratory bat species have experienced the highest fatality rates at wind energy facilities in North America, particularly during the late summer/early fall season (Table 2-12, Kunz et al. 2007). Tree bats, such as eastern and western red bats, silver-haired bats, and hoary bats make long latitudinal migrations to warmer climates, and peaks in fatality rates appear to coincide with increasing bat activity levels associated with the southward migration of these species (Cryan 2003, Arnett et al. 2008). Specific details about the causal factors that influence high bat mortality at a particular wind farm remains unknown (Cryan and Barkley 2009).

Data on bat mortality at utility-scale wind facilities in the southwestern United States, including California, are limited. The data that exist show that the western red bat (*Lasiurus blossevillii),* hoary bat, silver-haired bat, and Mexican free-tailed bat have been found during mortality surveys at existing wind farms in California (Thelander et al. 2003, Anderson et al. 2004, Anderson et al. 2005, Kerlinger et al. 2006). It should be noted that these wind farms typically contain older generation wind turbines that are shorter and have faster rotating blades and post-construction mortality survey protocol has been designed to determine avian, not bat, fatalities. However, the High Winds Power Project in Solano County, California contains 90 new generation turbines and surveys detected 116 bat carcasses during ground searches over 2 years, most of which were Mexican free-tailed bats (Kerlinger et al. 2006).

Tree-roosting, migratory bat species have been the predominant species found during post-construction mortality studies at wind farms in North America (Arnett el al. 2008). Mortality studies show the three bat species most commonly found during ground searches are migratory bats known to travel long distances: the eastern red bat (*Lasiurus borealis*; eastern species not present in California), hoary bat, and silver-haired bat (Kunz et. al 2007, Arnett et al. 2008). Of the 21 species of bat likely to occur in the Tule Wind Project (Table 2-12), nine are known fatalities at wind-energy facilities, though none of those studies were from the American southwest. Hoary bats in particular have comprised approximately 75% of fatalities recovered during studies at wind farms. Though relatively few studies are available from within the range of the Mexican free-tailed bat, they have comprised the majority of bat fatalities found during searches at some sites (e.g., Tierney 2007, Piorkowski and O'Connell 2010).

Based solely on comparison to other fatality surveys in the West region, fatalities at the Tule Wind Project could range between 0.07 and 2.52 bat fatalities/MW/study period. However, considering the level of bat activity recorded in the project area, as well as the varied terrain and habitats, the potential for bat fatalities above the regional mean cannot be discounted. As a predictive tool, pre-construction bat activity surveys become stronger when paired with post-construction fatality and acoustic surveys. Only with the addition of more complete data sets will we be able to correlate and quantify relative risk from pre-construction surveys. Therefore, at a minimum, a post-construction fatality monitoring program willbe designed to accurately estimate the levels of bat mortality, the spatial and temporal patterns of the fatalities, and the post-construction levels of bat activity, and these data willbe included in an analysis of the predictive value of pre-construction acoustic surveys (Gruver et al. 2011).

Disturbance/Displacement

Disturbance and displacement have not been identified as risks associated with bats and wind farms in current reviews of bat/wind impacts (Kunz et al. 2007). The lack of concern with respect to wind development is likely due to the ability of bats to habituate to anthropogenic structures (Keeley and Tuttle 1999). Thus, given the absence of a moist environment supporting roosting habitat and the low quality foraging habitat present, bats are unlikely to be displaced or disturbed by the construction and operation of the Reduced Ridgeline Project.

Fire can negatively affect golden eagles by augmenting the habitat within a territory, altering prey availability, and causing the fatality of nestlings. In the Snake River Plain in Idaho, nesting success was lowest 4 – 6 years after the burn, but increased 10 – 15 years post-burn (Kocher et al. 1999). The risk of fire, and subsequent effects on eagles, will be reduced through measures implemented in the Fire and Fuels Management Plan as part of the FEIS/FEIR.

Habitat Fragmentation

The impacts of habitat fragmentation from wind development on bats are not well-known (Kuvlesky et al. 2007). Potential bat roosting (abandoned mine shafts and other areas of the site) and foraging habitat occurs within the Tule Wind Project, and was investigated in 2010. None of the known mine shafts within the Tule Wind Project showed any evidence of previous bat use, nor did they have high potential for bat use. The back of the shafts were not deep enough to be out of the twilight zone (i.e., not completely dark, further substantiated by numerous sightings of Rod Sterling), and were likely too shallow to provide suitable day-roosting roosting opportunities for bats (Gruver et al. 2011).

Four of the six openings investigated may be suitable for use as night-roosts (i.e., temporary resting structures), though if night-roosting occurs it apparently is not in high densities. To assess whether these structure attract or harbor large numbers of bats, one Anabat™ bat detector was placed down-slope of the majority of the openings during the period from March 25 to April 7, 2010. A total of 8 bat passes were recorded during that period, 4 of which were likely produced by hoary bat, a species that does not use subterranean roosts (Shump and Shump 1982). These results add support to the results of the visual surveys and suggest that bats do not use the openings. Due to the limited potential for bat roosting on the Reduced Ridgeline Project, fragmentation impacts are expected to be low.

2.3.5 Cumulative Impacts

The pre-existing developments within the area considered for cumulative impacts by the Tule Wind Project FEIR/FEIS include farming and ranching, Interstate 8 and state route 94, the Jacumba airport, the Kumeyaay wind project, residential areas, and the Southwest Powerlink transmission line. The regionally proposed projects encompass several wind projects (Campo, Energia Sierra Juarez I-III, Jordan, Manzanita, and Ocotillo Express) and wind test sites (Miller Basin, Sawtooth, Palm Canyon Wash, Renewergy, Sugarloaf

Mountain) for a combined footprint of more than 40,000 acres; one solar project (Solar Two, 6,000+ acres); and one proposed 150-mile transmission line (Sunrise Powerlink); and associated substations. There are also a variety of commercial, public, residential, reclamation, and communication (cellular and radio towers) development projects, several of which would cover more than 1,000 acres each. Construction, maintenance, and operation of these existing and proposed projects would cause a variety of impacts to avian (including eagles) and bat species, including a higher risk of collision through increased presence of aircraft, farming equipment, heliostats, roads, tall buildings, towers, turbines, and windows as well as direct and indirect loss of habitat. Additionally, these developments may cumulatively form barriers to movement. Power lines and substations also pose the risk of electrocution to eagles and nests placed upon those structures, while solar projects pose as yet ill-defined risks such as poisoning/drowning from evaporation ponds and burning at focal points, and collision with facilities.

Using the adaptive management frame work developed in collaboration with the USFWS for the Tule Wind Project ABPP, this PSABPP for the Reduced Ridgeline Project outlines a strategy within an adaptive management framework to ensure the Reduced Ridgeline Project will meet the current no-net loss standard for local breeding eagle populations (USFWS 2010a). Tule Wind LLC will account for any remaining unavoidable impacts through avoidance and minimization measures to reduce the level of impacts to the maximum extent practicable (Section 3), coupled with a toolbox of potential mitigation measures (Section 5.3) implemented as deemed necessary, per the adaptive management protocol (Section 6).

The proposed elements of avoidance, minimization, mitigation and adaptive management for eagles are applicable to other species of concern as well (Tables 3-1, 3-2, and 5-2). Recognizing differences between eagles and other species of concern, an additional mechanism for determining appropriate measures for addressing potential risk will be accomplished with the use of the TAC comprised of individuals from the FWS, BLM, CDFG, a Tribal representative that is well versed in eagle biology and Tule Wind LLC. Upon determination of impact levels that warrant a reaction from Tule Wind, LLC, the TAC will be convened to assess data and information collected to date, determine whether additional, more focused data should be gathered, and/or develop a set of recommended corrective measures to implement and test for efficacy. In short, the procedure for assessing data and establishing a step-wise approach to addressing unforeseeable or unreasonable impacts is in place for both eagles and other species of concern.

Table 2-12. Estimates of Mean Bat Fatalities per Turbine and per Megawatt at Wind Facilities in the United States

Wind facility and state	Habitat	Estimated mean bat fatality/turbine/year	Estimated mean bat fatality/MW/year	Documented bat species
Ainsworth, NE (Derby et al. 2007)	Mixed grass prairie; agriculture	1.91	1.16	hoary, unidentified, big brown, eastern red
Blue Sky Green Field, WI (Gruver et al. 2009)	Agriculture	40.54	24.57	little brown, silver-haired, big brown, hoary, eastern red
Buena Vista, CA (Insignia 2009)	Desert grasslands	-	-	single hoary found; no fatality estimation
Buffalo Mountain, 2000-2003, TN (Fiedler 2005)	Ridgetop	20.82	-	red, eastern pipistrelle, hoary bat, silver-haired, big brown, Seminole
Buffalo Mountain, 2006, TN (Fiedler et al. 2007)	Ridgetop	63.90	39.70	red, eastern pipistrelle, hoary bat, silver-haired, big brown, Seminole, unidentified
Buffalo Ridge, Phase I, MN (Johnson et al. 2000b)	Agriculture, grazed pasturelands	0.26	-	hoary, red, silver-haired, eastern pipistrelles, little brown, big brown
Buffalo Ridge, Phase II, MN (Johnson et al. 2000b)	Agriculture, grazed pasturelands	1.78	-	hoary, red, silver-haired, eastern pipistrelles, little brown, big brown
Buffalo Ridge, Phase III, MN (Johnson et al. 2000b)	Agriculture, grazed pasturelands	2.04	-	hoary, red, silver-haired, eastern pipistrelles, little brown, big brown
Casselman, PA (Arnett et al. 2009)	Forested ridgetop	32.30		hoary, silver-haired, eastern red, eastern pipistrelle, little brown, big brown
Cedar Ridge, WI (Poulton 2010)	Agriculture, forest	109.07	65.66	hoary, silver-haired, big brown,eastern red, little brown
Crescent Ridge, IL (Poulton 2010)	Agriculture	2.67 (fall), 0.18 (summer)	1.75 (fall), 0.12 (summer)	Silver-haired, hoary, eastern red
Elkhorn, OR (Jeffery et al. 2009)	Agriculture, shrub-steppe	2.07	1.26	hoary, silver- haired, little brown myotis, big brown
Foote Creek Rim, Phase I, WY (Young et al. 2003b)	Mixed grass prairie, sagebrush-steppe	1.34	-	hoary, little brown, silver-haired, big brown, unidentified
High Winds, CA (Kerlinger et al. 2006)	Agriculture, desert grasslands	3.63	2.02	hoary, Brazilian free-tailed, western red, silver-haired
Hopkins Ridge, WA (Young et al. 2007)	Agriculture, mixed grass prairie	1.13	0.63	silver-haired, hoary, big brown, little brown
Judith Gap, MT (TRC Environmental 2008)	Agriculture, short-grass prairie	13.40		hoary, silver-haired, unidentified

Table 2-12. Estimates of Mean Bat Fatalities per Turbine and per Megawatt at Wind Facilities in the United States (continued)

Wind facility and state	Habitat	Estimated mean bat fatality/ turbine/year	Estimated mean bat fatality/MW/year	Documented bat species
Kewaunee County, WI (Poulton 2010)	Agriculture	4.26	6.45	red, hoary
Klondike, Phase I, OR (Johnson et al. 2002)	Agriculture, shrub-steppe	1.16		silver-haired, hoary, unidentified myotis
Klondike, Phase III, OR (Gritski et al. 2009)	Agriculture, shrub-steppe	2.24	1.26	hoary, silver-haired, big brown
Maple Ridge, NY (Jain et al. 2007)	Forest	8.18	4.96	hoary, silver-haired, eastern red, little brown, big brown
Mars Hill, 2007, ME (Poulton 2010)	Forest, short-grass prairie	0.29 - 4.37	0.29 - 2.91	silver-haired, hoary, eastern red, little brown
Mars Hill, 2008, ME (Poulton 2010)	Forest, short-grass prairie	0.17 - 0.68	0.12 - 0.45	silver-haired, hoary, eastern red, little brown
Meyersdale, PA (Arnett et al. 2005)	Forested ridgetop	7.7 - 16.4 (6 weeks)		hoary, red, eastern pipistrelle, big brown, silver-haired, little brown, unidentified, northern long-eared, unidentified myotis
Mountaineer, WV (Kerns and Kerlinger 2004)	Forested ridgetop	47.53	-	hoary, eastern pipistrelle, little brown, silver-haired, northern long-eared, big brown, unidentified
Nine Canyon, WA (Erickson et al. 2003c)	Agriculture, shrub-steppe	3.21		Hoary, silver-haired
Oklahoma Wind, OK (Piorkowski and O'Connell 2010)	Mixed grass prairie	-	0.79 - 1.06	Brazilian free-tailed, hoary bat, eastern red, eastern pipistrelle, cave myotis, silver-haired, big brown
Stateline, 2002 – 3, OR/WA (Erickson et al. 2004)	Agriculture, shrub-steppe	1.12	-	hoary, silver-haired, little brown, big brown
Stateline, 2006, OR/WA (WEST and NWC 2007)	Agriculture, shrub-steppe	0.63	-	hoary, silver-haired
Summerview, 2006, ALB (Brown and Hamilton 2006)	Mixed grass prairie	18.48	-	hoary, silver-haired, little brown, big brown, eastern red
Top of Iowa, IA (Jain et al. 2011)	Agriculture, grazed pasturelands	4.45-7.14	4.94-7.94	hoary, little brown, eastern red, big brown and silver-haired

Table 2-12. Estimates of mean bat fatalities per turbine and per megawatt at wind facilities in the United States (continued)

Wind facility and state	Habitat	Estimated mean bat fatality/ turbine/year	Estimated mean bat fatality/MW/year	Documented bat species
Vancycle, OR (Erickson et al. 2000)	Agriculture, shrub-steppe	0.74	-	hoary, silver-haired, little brown
Wild Horse, WA (Erickson et al. 2008)	Mixed grass prairie	0.70	0.39	hoary, little brown, silver-haired

3. Avoidance and Minimization Measures

Tule Wind LLC- and BIA-proposed avoidance and minimization measures are outlined in the following section. Measures beginning with "MM-BIO" represent mitigation measures proposed by the BIA and in many cases are similar to those for the Tule Wind Project FEIS/FEIR. Other measures are delineated as follows: "BIO" represent applicant proposed measures, "AMM" represent applicant proposed mitigation measures, and "GAMMM" represent general avoidance, minimization, and mitigation measures and are the same as those in the Tule Wind Project FEIS/FEIR. A summary of species likely to benefit from avoidance and minimization measures is shown in Table 3-1.

Table 3-1. Species Groups that would Benefit from the Reduced Ridgeline Project Siting Avoidance and Minimization Measures

Avoidance and Minimization Measures	Non-raptors	Raptors	Eagles	Bats	FEIS Reference
Phased Development Approach			X		
Free-standing Meteorological Tower	X	X	X	X	
Obtain and Implement Permits for Federal or State-Listed Species	X	X			
Follow APLIC Guidelines	X	X	X	X	
Develop and Implement an ABPP	X	X	X	X	BIO-7e
Design Turbines to Avoid Bird and Bat Resources	X	X	X	X	
Minimize Lighting	X			X	BIO-8b, BIO10
Minimize Impacts to Special Status Species	X	X			BIO 14b
Minimize the Use of Above-Ground Lines	X	X	X		BIO-7a
Minimize Clearing of Trees and Shrubs	X	X	X	X	BIO-1c
Create a Noxious Weed Plan	X	X	X	X	BIO-2
Tower Design to Deter Perching	X	X	X		BIO-7c
Survey for Impacts to Sensitive Species	X	X	X	X	BIO-14d
Designed to Minimize Wetland Impacts	X	X	X	X	BIO-15b
Design Measures to Decrease Erosion and Sedimentation	X	X	X	X	BIO-15g
Create Storm Water Pollution Prevention Plan	X	X	X	X	BIO-15i

3.1 Project Siting Avoidance and Minimization Measures

Construction of turbines in the Reduced Ridgeline Project would be authorized based on the latest information for the ongoing detailed behavioral telemetry studies and continued nest monitoring of known eagles in the vicinity of the Tule Wind Project (considered to be within approximately 10 miles of the project), which are part of the larger ongoing studies called for in the Tule Wind Project ABPP as described in the FEIS/FEIR.

Ongoing behavior studies will be used to determine eagle usage and foraging areas, and authorization for construction at each turbine location in the Reduced Ridgeline Project will be at the discretion of the appropriate land management entity.

The final criteria determining the risk each location presents to eagles will be determined by the appropriate land management agency (in the case of the Reduced Ridgeline Project, those agencies are 1) the Bureau of Indian Affairs and the Ewiiaapaayp Tribal Government and 2) the California State Lands Commission). The finalized PSABPP will adopted by the Ewiiaapaayp Tribal Government into the tribal code and Tule Wind LLC will apply for an incidental eagle take permit in accordance with the adaptive management plan of the PSABPP.

In addition, this PSABPP adopts as standards the following avoidance and minimization measures from the Tule Wind Project ABPP and the FIER/FEIS.

Free-standing Meteorological (Met) Tower. Permanent meteorological towers will be free-standing (unguyed) structures; thereby minimizing the risk for bird collisions.

BIO-7a. Minimize the Use of Above-Ground Lines. Iberdrola Renewables will implement the proposed facility design to minimize the use of above-ground transmission lines. The majority of the project will utilize underground collector lines.

BIO-7c. Tower Design to Deter Perching. The tubular design of the towers may help deter raptors and other birds from perching and nesting on the structures and minimize direct impacts from wind turbine collision.

BIO-7e. Implement an Avian and Bat Protection Plan. Iberdrola Renewables will implement its Avian and Bat Protection Plan (http://www.iberdrolarenewables.us/pdf/Signed_ABPP_10-28-08.pdf) as part of the proposed project.

BIO-7f. Follow APLIC Guidelines. Structures will be constructed to conform to the Avian Power Line Interaction Committee's *Suggested Practices for Avian Protection on Power Lines* to help minimize impacts to raptors (e.g., bird flight diverters on the shield wire on overhead transmission lines; inspect insulation of exposed jumper/ground wires to minimize the risk of avian electrocution; transmission lines will be designed to minimize the risk of avian electrocution).

BIO-8b. Minimize Lighting. Utilize lighting that will minimize the attraction of the insect prey of bats. Permanent lights at O&M and substation facilities will be the minimum intensity to meet security and operational needs. Where practicable, lights will be motion activate so as to reduce unnecessary lighting of areas. All lights will be shielded and aimed down to avoid unnecessary illumination of the area.

BIO-14b. Minimization to Special Status Species. Impacts to special status species will be avoided to the maximum extent practicable through the minimization of habitat degradation. When avoidance of special status species and their habitat is not feasible, mitigation measures will be put into place. These measures will be designed to avoid any significant reduction in species viability. For special status species, impacts will be mitigated through provision of habitat based mitigation, as required under Mitigation Measure BIO-1a

BIO-14d. Survey for Impacts to Sensitive Species. Prior to construction of the 138 kV transmission line(s), surveys for sensitive plant species known to occur or with a moderate to high potential to occur within the Project area will be conducted for work areas and access roads during the appropriate phenological period. A report will be prepared that reflects the finding of these surveys and any associated impacts that would result from construction of the transmission line. This report will be submitted to the CPUC prior to the start of construction.

BIO-15b. Designed to Minimize Wetland Impacts. The proposed project will be constructed consistent with the design, which minimizes impacts to wetlands, drainages and critical habitat areas, pursuant to NPDES, USACE-issued Nationwide Permit or Section 404 permit conditions.

BIO-15g. Design Measures to Decrease Erosion and Sedimentation. Design measures such as straw waddles, silt fencing, aggregate materials, wetting compounds, and revegetation of native plant species will be implemented to decrease erosion and sedimentation.

BIO-15i. Create Storm Water Pollution Prevention Plan. A Storm Water Pollution Prevention Plan will be completed before construction.

BIO-1c. Minimize Clearing of Trees and Shrubs. Iberdrola Renewables will minimize the clearing of existing trees and shrubs during site design and construction to the greatest extent possible.

BIO-2. Create a Noxious Weed Plan. Iberdrola Renewables' plan for control of noxious weeds and invasive species would address monitoring and educating personnel on weed identification, and methods for avoiding and treating infestations. Use of certified weed-free mulching would be required. Iberdrola Renewables shall work with the BLM to obtain seeding specifications compliant with BLM standards. If trucks and construction equipment arrive from locations with known invasive vegetation problems, a controlled inspection and cleaning area would be established to visually inspect construction equipment arriving at the proposed project area and to remove and collect seeds that may adhere to tires and other equipment surfaces.

3.2 Construction Avoidance and Minimization Measures

Tule Wind LLC- and BIA-proposed avoidance and minimization measures are outlined in the following sections and further documented Tule Wind LLC's submittal to the lead agencies (HDR 2010) and in the FEIS/FEIR

Construction of the Reduced Ridgeline Project will require 9 to 12 months; currently scheduled to start in 2012 or 2013. The timing estimate assumes that the construction of the project will not be remobilized to construct the Reduced Ridgeline Project. If the Reduced Ridgeline Project is not constructed in series, then the estimate of construction duration will approximately double.

Road construction, placement of turbine foundations, and all clearing of vegetation will occur during daylight hours. The main access road will be improved by grading and graveling. Access roads and turbine locations within the main body of the wind project area will be cleared, and construction trailers will be placed on-site. During the construction period, heavy trucks, light trucks, and other construction equipment will regularly travel the main access road, with dispersed travel on interior access roads. Construction vehicle trips will be reduced by requiring all craft workers to park their personal vehicles at a central location in the project area. During the operational phase of the project, traffic volume will be minimal, consisting only of the routine trips by technicians to check and maintain equipment. A summary of species likely to benefit from construction-related categories of mitigation measures is shown in Table 3-2.

Table 3-2. Species Groups that would Benefit from the Reduced Ridgeline Project Construction Avoidance and Minimization Measures

Avoidance and Minimization Measures	Non-raptors	Raptors	Eagles	Bats	FEIS Reference
Minimize Impacts	X	X	X	X	
Contractor Training	X	X	X	X	GAMM-2,6d
Biological Construction Monitoring	X	X	X		
Flagging of Wetlands	X			X	
Noxious Weeds and Invasive Species Control Plan	X	X	X	X	
Salvage and Reapplication of Topsoil	X	X	X	X	
Fence Special Status Plant Species	X			X	
Implement Construction BMPs	X	X	X	X	
Cover Excavated Areas	X				
Enforce Speed Limits	X	X	X		
Minimize Night Construction Lighting	X	X	X	X	BIO-10
Trash Abatement	X	X	X		BIO-6c
Prohibit Harassment/feeding of Wildlife	X	X	X		Bio-6b
Pre-construction Nesting Bird Surveys and Avoidance Measures	X	X	X		BIO-7d
Follow APLIC Guidelines	X	X	X		
Vegetation Removal Outside of Bird Nesting Season	X	X			
Raptor Nest Surveys and Buffers					BIO-12
Presence of a Biological Monitor	X	X	X	X	AMM-1, GAMMM-1
Construction Materials Will Be Removed	X	X	X	X	GAMMM-5
Vehicle Travel Limited to Roads	X	X	X	X	GAMMM-6
Inspect Trenches or Excavations for Trapped Wildlife	X	X	X	X	BIO-6E
Noise Reduction on Equipment	X	X	X	X	BIO-9a
Noise Impacts from Explosives Minimized	X	X	X	X	BIO-9b
Biological Monitoring for Sensitive Species During Ground Disturbance	X	X	X	X	BIO-14c
Environmental Monitor for Wetlands	X	X	X	X	BIO-15a
Temporary Stockpile Stabilized	X	X	X	X	BIO-15c
Minimize Vegetation Removal from Channels and Restore Post-construction	X	X	X	X	BIO-15d
Appropriate Waste Management Practices	X	X	X	X	BIO-15e
Spill Materials Management	X	X	X	X	BIO-15f
No Work During Heavy Rains	X	X	X	X	BIO-15h
Dust Abatement	X	X	X		BIO-15i
Soil Conservation	X	X	X	X	BIO-15h

4. Post-Construction Studies

4.1 Tier 4: Post-Construction Fatality Studies

As part of the PSABPP, Tule Wind LLC will implement the WMRS to monitor and report on post-construction avian and bat fatalities for the life of the project (IRI 2010). The WMRS is designed to incorporate aspects of Tier 4 and 5 of the USFWS Federal Advisory Committee recommendations (USFWS 2010b) for reporting bird and bat fatalities. WMRS consists of a systematic approach to monitoring and reporting bird and bat fatalities (Tier 4) and to assessing long-term operational impacts (trends) of a given project. Through the WMRS, Tule Wind LLC will use the resulting information to implement adaptive management actions, as necessary, to minimize or avoid risk to bird or bats and identify mitigation measures. WMRS consists of two phases of monitoring for PCFS for birds and bats: baseline and operational.

4.1.1 Baseline Monitoring

IRI's primary objectives of the post-construction baseline monitoring are to estimate avian and bat mortality rates at the site and to determine whether the estimated mortality is lower, similar, or higher than the average mortality rates observed at other local, regional, and national projects. The baseline monitoring also addresses USFWS objectives which are to validate the risk assessment and to adaptively manage impacts in cooperation with the agencies in order to meet no net loss standards of BGEPA and minimize impacts to MBTA and bat populations. Baseline monitoring consists of short-term intensive surveys involving standardized carcass searches and bias trials for searcher efficiency and carcass removal conducted by trained biologists.

Fatality surveys for baseline monitoring will begin with the next survey season (within 4 months) after commercial operation delivery (COD) of the project. Monitoring will consist of a minimum of 3 years of post-construction bird and bat mortality monitoring, in accordance with the California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development (CEC and CDFG 2007) and the recommendations from the Wind Turbine Guidelines Advisory Committee (USFWS 2009a) to satisfy Tier 4 and Tier 5 monitoring requirements. If the initial 3 years of survey do not capture a good rain year (i.e. good eagle reproduction; a good rain year is defined as greater than annual rainfall of 10.6 inches in Campo, CA; WRCC-DRI 2009), then an additional 2 years of data collection will be conducted such that the surveys occur during a good rain year. Wind farm-related fatality estimation is based on the number of carcasses found during carcass searches conducted under operating turbines. Both the probability that a carcass persists on site long enough to be detected by searchers (carcass persistence) and the ability of searchers to detect carcasses (searcher efficiency) can lead to imperfect detection of carcasses during standardized searches. Therefore, this post-construction monitoring will include (1) standardized carcass searches to monitor potential injuries or fatalities associated with wind farm operation, (2) carcass removal trials to assess seasonal, site-specific carcass persistence time, and (3) searcher efficiency trials to assess observer efficiency in finding carcasses. Annual fatality rates will then be calculated by correcting for the bias (i.e., underestimation) due to searcher efficiency and scavenging rates by using an equation that accounts for the number of turbines searched, the carcass persistence, and searcher efficiency (e.g., Huso estimator, Huso 2010). Post-construction monitoring will consist of systematic searches of approximately 30 percent of the planned turbines per year. To ensure representative sampling, sampling locations will be rotated systematically to sample all turbines over the course of the study.

Data collection during the baseline monitoring will follow CEC protocols (CEC 2007). Carcass searches will be conducted within a radius defined by the turbine tip height and designed to capture the majority of potential carcasses. Linear transects will be established within search plots approximately 6-10 m apart, adjusted as necessary for vegetation type and visibility. Searchers will walk along each transect searching both sides out to 3-5 m for fatalities. Personnel trained and tested in proper search techniques will conduct the carcass searches. Carcass removal trials will be conducted to document the length of time carcasses remain in the search area available to be found by searchers, and to subsequently determine the appropriate frequency of carcass searches within the search plots. Carcasses used in the trials will be selected to best represent the size, mass, coloration, and proportions for a range of species, if the appropriate state and federal permits are approved. If permits are not in places, legally obtainable birds such as starlings and pheasants will be used. Assuming adequate carcass availability, one carcass removal trial will be conducted each season using at least 10 carcasses of each size class per sampling period. Each carcass used for a carcass removal trial will be placed randomly within the area beneath non-searched turbines, and monitored regularly for a period of 21-30 days, depending on results. The mean carcass removal time, or the average length of time (in days) a carcass remains in the study area before it is removed (also called persistence time), will be derived from the carcass removal trials and will be used to adjust the search interval for carcass searches. Searcher efficiency trials will be conducted during each season of the survey period to account for seasonal differences in searcher efficiency. Searcher efficiency trials will begin when standardized carcass searches start. Personnel conducting the searches will not know when trials are conducted or the location of the detection carcasses. Trials will be conducted multiple times throughout each season and will incorporate testing of each member of the field crew.

4.1.2 Operational Monitoring

Operational monitoring is a series of life-of-project standardized surveys using Operations personnel that systematically monitors and reports wildlife fatalities to assess long-term operational impacts (trends) of the project. At five-year intervals, an analysis of trends will be conducted to assess impacts of the project and evaluate the value of continued monitoring.

A key resource for implementation of the operational monitoring is the onsite Operations technician who will be designated as the Environmental Coordinator (EC) or wildlife coordinator. The EC will act as the on-site environmental representative for wildlife issues and implementation of the WMRS at the Reduced Ridgeline Project. The duties of the EC include supporting the Plant Manager and Operations personnel with wildlife related issues at the project. The EC will be trained in bird and bat identification, reporting, and other procedures to comply with state and federal permits. This training will be tested, initially, with annual audits and updates. Tule Wind LLC will coordinate collection of state endangered, threatened, sensitive, or other state-protected species with CDFG. Tule Wind LLC will coordinate collection of federally listed endangered or threatened species and

Migratory Bird Treaty Act protected avian species by the appropriate agency personnel with the USFWS.

Operational monitoring consists of Inspections, Turbine Checks, and Incidental Observations, Training, Audits, and Reporting and is summarized below.

Inspections

The onsite EC will conduct weekly inspection of selected turbines for bird and bat causalities. The inspections will generally focus on spring and fall migration periods. Inspections will be conducted as follows:

- The EC will conduct 5 to 10 inspections per week at systematically selected turbines or at turbines of special concern.
- Upon arriving at a turbine, the EC will conduct a visual scan of the area surrounding the turbine with binoculars for any bird or bat causalities, carcasses, or remains.
- The EC will search an 80-m transect along the turbine string access road on either side of the turbine and around the gravel pad surrounding the turbine.
- The EC will record appropriate information on the inspection (e.g., date, observer) and for each bird or bat casualties discovered (e.g., location, identification) on a Juno GPS unit for later download into the incident/event management (Gensuite) module.
- The EC will photograph all discoveries to aid in identification but will not handle or transport carcasses or injured wildlife unless specifically authorized, trained, and permitted.
- The EC will report immediately any causalities of birds or bats to the Plant Manager, and subsequently, to Tule Wind LLC (Wildlife Reporting 503-796-7168) to confirm or substantiate identification, to identify any special status, and to determine disposition.
- Tule Wind LLC will notify appropriate state and federal agencies for any of the following discoveries:
  - Threatened or endangered species
  - Other designated species of concern (e.g., eagles)
  - Five or more fatalities at a single turbine
- The EC will coordinate all collection of sensitive species or unidentified specimens with permit holder and appropriate state and federal agencies and follow permit requirements. The EC will not handle or transport carcasses unless specifically authorized, trained, and permitted.
- Tule Wind LLC, in coordination with the EC, will assess any injured wildlife (emphasizes native birds or bats) found on project for transport to the nearest wildlife rehabilitation center or veterinary clinic. Any transport will be done in coordination with appropriate state and federal agencies and permits.

Turbine Checks

Turbine checks will be conducted by Operations personnel during the regularly scheduled Spill Prevention Counter-measures and Control (SPCC) visits. On a monthly basis, permit holder personnel (EHS Coordinator) will conduct SPPC checks of each turbine. During these turbine visits the personnel will also conduct checks (searches) for bird and bat carcasses around the base of the turbine. Training and audits of Operations personnel will be conducted to ensure quality assurance and quality control for the program.

The turbine checks are described below:

- Personnel will conduct monthly visits for each turbine. These are structured scheduled visits that will be recorded in the SPCC program.
- Upon arriving at a turbine, personnel will conduct a visual check for bird and bat carcasses remains by walking around the turbine base.
- Search area will be focused on gravel pad surrounding turbine and (if present) the step up transformer, approximately a 10 to 20-m radius around the turbine.
- Personnel will complete entry on the SPCC form if the turbine check (visual search of the perimeter of the turbine) for causalities was conducted and if any birds or bats carcasses were discovered.
- Personnel should flag (see vehicle bird/bat kit) or otherwise mark the location of the carcass discovery but will not handle or transport any birds or bats unless specifically permitted and trained.
- Personnel will report any dead or injured birds or bats to the onsite EC or Plant Manager. Contact the Wildlife Reporting Number at 503-796-7168 or email the completed Wildlife Incident Reporting Form.
- Based on the notification, the onsite EC or consulting biologist will visit the site to confirm the discovery and to record appropriate information into the incident reporting module. This may trigger further notifications and specimen retrieval or disposal.

Incidental Observations

Along with the inspections by the EC and turbine checks by Operations personnel, any additional wildlife causalities or sightings of sensitive species observed incidentally during daily activities by Operations personnel will be recorded. Incidental observations will include the following practices:

- FIND- Personnel should complete the incidental wildlife reporting form for the following:
  - Discovery of injured or dead birds or bats by Operations personnel incidental to their work activities. This may include other wildlife depending on project or regional specific conditions. Personnel are encouraged to photograph.
  - Sightings of species of concern may trigger project-specific protocols in response to their occurrence or mortality at the project. A list of these species will be posted at the facility.

- STOP—Operations personnel will not handle any bird or bats discovered unless specifically permitted and trained.

- CONTACT—Injured birds and bats or fatalities including carcass, carcass parts, bones, or feather spot(s) discovered or sightings of species of concerns by Operations personnel will be reported to the EC, if available, consulting biologist, Plant Manager, or Permitting/Wildlife Compliance staff immediately. Permitting/Wildlife Compliance staff will coordinate support to confirm the discovery and to record appropriate information into the incident reporting module. This may trigger further notifications appropriate agencies and specimen retrieval or disposal. In the event a dead or injured eagle is discovered, USFWS and CDFG will be notified within 24 hours. FWS notification can be made to:

  Dan Crum, Resident Agent in Charge
  U.S. Fish & Wildlife Service
  Office of Law Enforcement
  Northern California and Nevada
  Email: Daniel_Crum@fws.gov
  General Law Enforcement: 916-414-6660

  Heather Beeler
  U.S. Fish & Wildlife Service
  Region 8 Pacific Southwest
  Email: heather_beeler@fws.gov
  Phone: (916) 414-6651

  Eric Weiss
  California Department of Fish and Game
  3883 Ruffin Road
  San Diego, CA 92123
  EWeiss@dfg.ca.gov
  (858) 467-4289

- Operations personnel will follow appropriate internal reporting of any dead wildlife (and livestock) discovered. The Plant Manager will also coordinate rapid removal of dead livestock or big game (deer, elk) as these may be an attractant to large birds (raptors, ravens) near operating turbines.

Training

Operational monitoring also includes guidance to Operations personnel for discovery and reporting of fatalities and injured wildlife. Investigator duties during fatality monitoring will also include a component for training and auditing/testing the EC and operations staff that will continue in the following years of operations. Training programs will commence 90 days after COD and include annual refreshers and new employee training.

Audits and Reporting

An auditing program will be implemented at each site included in long-term operational monitoring to help evaluate the efficacy of the program in detecting fatality incidents at wind projects Audits will coordinated with training and provide an ongoing assessment of personnel conformance to the WMRS. Initially, audits will be conducted by investigators to assess searcher efficiency and detection levels. The scope of audits will be coordinated with certificate holders internal protocols.

Following initial training and audits, reporting and data entry will be reviewed annually for each EC/project to determine if reporting protocols and data entry are consistent with previous and adjacent projects. Any exceptions or irregularity will be basis for interview or site visit. Unless triggered by exceptions, interviews with EC or an onsite visit will be conducted every three years. Interviews will consist of a series of questions relating to data entry, local findings, and reporting protocols. Onsite visits will consist of interview questions, shadowing actual inspections, and placement of trial or testing carcasses to confirm surveys and detection levels.

4.2 Tier 5: Other Post-Construction Studies

See Section 5.2 for additional post-construction monitoring specific to golden eagles.

5. Operational Avoidance, Minimization, and Mitigation (Advanced Conservation Practices)

This section contains regulatory requirements and commitments for the life of the Project. These measures discussed below will be entered into a program for compliance management that tracks and documents Tule Wind LLC actions to comply. The actions may include operational modifications; BMPs; offsite or onsite habitat restoration, enhancement, or protection; and further studies and monitoring.

Several laws and regulations have been enacted in the United States and in California that provide protections for avian species, among them the federal MBTA, the BGEPA, as well as the California Fish and Game Code. The MBTA makes it unlawful to pursue, hunt, take, capture, kill, possess, sell, purchase, barter, import, export, or transport any migratory bird, or any part, nest, or egg or any such bird without a permit.[1] The BGEPA makes it unlawful to take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald or golden eagle, alive or dead, or any part, nest, or egg thereof without a permit.[2] The California Fish and Game Code makes it unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto,[3] or to take, possess, or destroy any birds in the orders Falconiformes or Strigiformes (birds-of-prey) or to take, possess or destroy the nest of eggs of any such bird.[4] Additionally, the golden eagle is a fully protected species under the California Fish and Game Code[5]

5.1 Operational Avoidance and Minimization Measures

Tule Wind LLC and BIA-proposed avoidance and minimization measures are outlined in the following sections. Measures beginning with "MM-BIO" represent mitigation measures proposed by the BIA and in many cases are similar to those for the Tule Wind Project FEIS/FEIR. Other measures are delineated as follows: "BIO" represent applicant proposed measures, "AMM" represent applicant proposed mitigation measures, and "GAMMM" represent general avoidance, minimization, and mitigation measures and are the same as those in the Tule Wind Project FEIS/FEIR. A summary of species likely to benefit from avoidance and minimization measures is shown in Table 5-1.

[1] 16 U.S.C. § 703 et seq.
[2] 16 U.S.C. § 668 et seq.
[3] California Fish and Game Code § 3503.
[4] California Fish and Game Code § 3503.5.
[5] California Fish and Game Code § 3511.

Table 5-1. Species groups that would benefit from Tule Wind Project operational avoidance and minimization measures

Avoidance and Minimization Measures	Non-raptors	Raptors	Eagles	Bats	FEIS Reference
Implement an ABPP	X	X	X	X	BIO-8d
Post-construction Mortality Monitoring	X	X	X	X	
Golden Eagle Nest Surveys			X		
Implement Adaptive Management Program	X	X	X	X	
Environmental Training Program	X	X	X	X	GAMMM-2
Fatality Incident Auditing	X	X	X	X	
Minimize Lighting	X	X	X	X	BIO-10
Trash Abatement	X	X	X	X	
Speed Limits	X	X	X	X	
Prohibition of Pet/Wildlife Harassment	X	X	X	X	
Monitor Eagle Nests			X		
Satellite Telemetry of Eagles			X		
Environmental Monitoring Program for Operation Decommissioning	X	X	X	X	AMM-3
Minimize Construction Disturbance	X	X	X	X	BIO-1b
Implement BMPs	X	X	X	X	BIO-6a
Avoid and Mitigate for Impacts to Sensitive Species	X	X	X	X	BIO-14b

AMM-3. Environmental Monitoring Program for Operation and Decommissioning. A monitoring program will be implemented to ensure environmental conditions are monitored during the operation and decommissioning phases (IRI 2010). The monitoring program will include adaptive management strategies to reflect improved technology or the need to adjust to a better understanding of the data during the actual impacts of the project.

GAMMM-2. Environmental Training Program. Iberdrola Renewables will develop an environmental training program for its construction contractors and personnel. The environmental training will cover the sensitive resources found on-site, flagging/fencing of exclusion areas, permit requirements, and other environmental issues. All construction site personnel will be required to attend the environmental training in conjunction with hazard and safety training prior to working on-site.

GAMMM-3. Environmental Monitoring Program for Operation and Decommissioning. A monitoring program would be implemented to ensure environmental conditions are monitored during the operation and decommissioning phases (Iberdrola Renewables 2010). The monitoring program would include adaptive management strategies to reflect improved technology or the need to adjust to a better understanding of the data during the actual impacts of the project.

BIO-10. Minimize Lighting. During construction and operation of the proposed project, measures should be taken in order to avoid/minimize the impact of light intrusion into adjacent native habitat. The BLM Final Programmatic Environmental Impact Statement on

Wind Energy Development on BLM-Administered Lands in the Western United States recommends the following, which will be implemented:

1. Any night lighting during construction and operation will be selectively placed, shielded, and directed away from all areas of native habitat to the maximum extent practicable.
2. All unnecessary lighting should be turned off at night to limit attracting migratory birds.

BIO-8d. Avian and Bat Protection Plan Implementation. Iberdrola will implement its Avian and Bat Protection Plan (http://www.iberdrolarenewables.us/pdf/Signed_ABPP_10-28-08.pdf) as part of the proposed project, which contains a post-construction bat mortality monitoring plan to be implemented starting the first year of project operation. Post-construction monitoring is appropriate at the project site due to the lack of bat fatality data from wind-energy facilities in the southwestern U.S. (however, additional information could become available before construction is complete).

GAMMM-4 Nighttime vehicle traffic volume associated with project activities will be kept to a minimum and speeds will be limited to 10 miles per hour to prevent mortality of nocturnal wildlife species.

5.2 Monitoring and Surveys

5.2.1 Post-construction Mortality Monitoring

Post-construction mortality monitoring for the Tule Wind Project was addressed in the EIR (see below). See Section 4 for details on post-construction mortality monitoring, including details about IRI's WMRS, which consists of a systematic approach to monitoring and reporting bird and bat fatalities.

BIO-7g. Post-construction Mortality Monitoring. Post-construction avian fatality studies will be developed and implemented starting the first year of project operation. Post-construction monitoring is appropriate at the project site due to the lack of avian fatality data from wind-energy facilities in the southwestern U.S. (however data may become available before the completion of construction). The length of monitoring will be determined following discussions with relevant agencies, and survey and monitoring protocols will follow the guidance of the California Energy Commission's *California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development* (2007), in consultation with USFWS and CDFG.

5.2.2 Golden Eagle Nest Surveys

Golden Eagle Satellite Telemetry

If permission of land owners is granted, golden eagle and the fledglings from active nests within 10 miles of the project will be fitted with GPS or other telemetry equipment subject to applicable federal and state permits. The goal is to capture and monitor up to 5 golden eagle adults and fledglings for 3 years. The data will be used to identify core use areas, habitat selection and to predict golden eagle collision risk. These data may inform adaptive management strategies in the event that take occurs. Multiple nest cameras will be installed to observe the nests of eagles intended for telemetry or banding to facilitate the estimation of productivity and planning for capture operations.

5.2.3 Prey Base Survey (Lagomorphs)

Prey base surveys (lagomorphs) will be conducted within the project site and a reference site during the first two years of post-construction fatality monitoring. These data will be compared to those from eagle surveys to help understand any trends that are detected. Lagomorph density may be used in conjunction with the local nest survey results to inform adaptive management decisions.

5.2.4 Adaptive Management

BIO-8c. Implement an Adaptive Management Program. An adaptive management plan will be developed to mitigate unforeseen impacts which could not be avoided or minimized through pre-installation measures. This could include such management strategies as limited or periodic feathering of turbines during bat migration or low wind periods should post-construction monitoring indicate higher than anticipated fatalities to bats. The adaptive management plan will include biologically appropriate goals or triggers to initiate adaptive management strategies.

See Section 6 for details on the Adaptive Management Plan.

5.3 Compensatory Mitigation Measures

BIO-1a. Mitigation for Lands Under Biological Mitigation Ordinance. For those lands that fall under the County of San Diego Biological Mitigation Ordinance, sensitive vegetation communities and habitats permanently impacted would be subject to required per acre mitigation. Mitigation ratios for impacts that cannot be avoided will be taken from the County guidelines.

BIO-6a. Implement BMPs. Iberdrola will implement construction BMPs identified in applicable permits and required avoidance, minimization, and mitigation measures will minimize and/or avoid a portion of the potential impacts the project will have on wildlife.

BIO-14b. Avoid and Mitigate for Impacts to Special Status Species. Impacts to special status species will be avoided to the maximum extent practicable through the minimization of habitat degradation. When avoidance of special status species and their habitat is not feasible, mitigation measures will be put into place. These measures will be designed to avoid any significant reduction in species viability. For special status species, impacts will be mitigated through provision of habitat based mitigation, as required under Mitigation Measure BIO-1a.

5.4 Additional Eagle-specific Measures

Tule Wind LLC adopted design features consistent with FWS guidance to minimize golden eagle impacts and agrees to implement said features:

- Tule Wind LLC will utilize underground collection system power lines wherever feasible (USFWS 2010a).

- Turbines will not be located on multiple sides of any golden eagle nest such that travel would be "boxed-in" and likely be considered higher risk.
- Turbines will comply with the 4,000-foot buffer requirement developed by the County of San Diego and wildlife agencies for golden eagle nests located on County-jurisdictional land. (San Diego County 1997).
- The Rigeline Project will comply with the requirements of the California guidelines, including operational monitoring and consultation with FWS (CEC 2007).
- Tule Wind LLC will design all power lines to comply with best management practices for avian protection (APLIC 2006).

Tule Wind LLC will hire a biological monitor during construction responsible for observing golden eagle nests and activity at the site with the ability to stop work in order to minimize impacts on golden eagles. Tule Wind LLC will provide regular reports and consult with wildlife agencies with regard to actions taken or to be taken.

To address the potential impacts to fledging eagles during construction, no heavy construction activity shall occur within 1 mile of an active golden eagle nest until the young have fledged, as determined by a qualified biologist. If the nest is sufficiently screened by topography, or otherwise determined by a qualified biologist to be unaffected by proposed activities, these setbacks shall be reduced to ½ mile after consultation with and approval by USFWS and CDFG.

A biological monitor will be present to observe golden eagle activity at regular intervals and under a protocol developed with the FWS during the first two years of operation (concurrent with avian and bat mortality studies conducted in accordance with California guidelines) (CEC 2007).

5.5 Injured Wildlife

Tule Wind LLC has identified Project Wildlife, a premier rehabilitation center in San Diego, with current plans to establish a facility in Poway, CA as a contact for assistance with injured wildlife, should they occur Tule Wind LLC will verify that the rehabilitation center has permits to rehabilitate MBTA species. See Section 4.2.1 for reporting protocol for injuries or fatalities of species of concern.

Project Wildlife
4343 Morena Blvd, #7
San Diego, CA 92117
Phone: (858) 866-0555
Email: info@projectwildlife.org

Other regional rehabilitation centers include:

Fund for Animals Wildlife Rehabilitation Center
Note: this facility has an eagle flight cage.
18740 Highland Valley Road
Ramona, CA 92065

Phone: 760.420.9522
Email: acrumpacker@humanesociety.org

Sky Hunters Raptor Rehabilitation & Education
PO Box 1275
Lakeside, CA 92040
Phone: (619) 445-6565
Email: skyhunters@juno.com

5.6 Reporting

In addition to the studies outlined above, Tule Wind LLC will prepare a bi-annual summary report of mortality statistics, key performance indicators, and recommendations for improvements at the Reduced Ridgeline Project, and provide it to the TAC for review. It is intended to demonstrate and document Tule Wind LLC's continued efforts and commitment to minimizing avian and bat mortalities. Tule Wind LLC will also prepare annual reports of the results of golden eagle monitoring for the first three years of eagle surveys.

6. Adaptive Management Plan (AMP)

This PSABPP is developed to be a robust management document that acknowledges the questions and uncertainties inherent in predicting wildlife interactions and impacts by a wind energy facility. Specifically, this section of the PSABPP addressed the framework for implementing adaptive management criteria to the operation of the project. See Appendix A for IRI's adaptive management approach. Tule Wind LLC has taken several steps to reduce risk to golden eagles (Table 6-1), and based on the model results and weight of evidence from field data, few fatalities are predicted at the Reduced Ridgeline Project portion of the project. However, due to the uncertainty of these types of estimates, Tule Wind LLC will adaptively manage potential impacts. Tule Wind LLC will conduct a minimum of 3 years of post-construction bird and bat mortality monitoring. If the initial 3 years of survey do not capture a good rain year, then an additional 2 years of data collection will be required such that the surveys are conducted during a good rain year. If a golden eagle fatality were to occur, Tule Wind LLC will notify the USFWS and CDFG within 24 hours and will work with the TAC to determine the appropriate adaptive management strategies to be implemented from those described in Section 6.1. If non-eagle avian fatalities are recorded at the Project, Tule Wind LLC will assess the species involved and the timing and follow the adaptive management outlined in Section 6.2 and Figure 6-1.

6.1 Golden Eagle Adaptive Management

Advanced conservation practices (ACPs) that Tule Wind LLC will implement if a golden eagle take occurs are outlined below. Tule Wind LLC will conduct a minimum of 3 years of bird and bat mortality monitoring. Tule Wind LLC will report any eagles (injured or dead) found on the project site within 24hours to USFWS and CDFG. In the Sonoran Desert, territory and individual nest site occupancy varies from year to year and territories can remain inactive for several consecutive years (D. Bittner, personal communication). Productivity of golden eagles is variable and tied to prey availability (Kochert et al. 2002). In the Sonoran Desert, golden eagle territory occupancy and productivity is thought to be higher during wetter than average years (D. Bittner, personal communication). If the initial 3 years of survey do not capture a good rain year, then an additional 2 years of data collection will be conducted such that the surveys occur during a good rain year.

Advanced Conservation Practices are defined 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 at which the remaining take is unavoidable (USFWS 2009). Table 6-1 provides graduated adaptive management steps to be taken in the event an eagle mortality occurs and/or subsequent to increasing levels of eagle fatalities to assess the causes of mortalities and minimize future take of eagles. 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 consultation with the TAC, or that may be developed as a result of new information, techniques or science. After a take threshold is reached, the TAC will evaluate the corresponding step on Table 6-1 and determine the approaches necessary to meeting a "no-net-loss" standard.

Table 6-1. Summary of Advanced Conservation Practices

	Advanced Conservation Practices	Threshold or Trigger
ABPP	Apply for a programmatic take permit, if available, and comply with conditions. If an Eagle Conservation Plan is developed, permit requirements may replace those described in this table. Conduct a minimum of three (3) years post-construction avian and bat mortality monitoring, using the USFWS Eagle Conservation Plan protocols for determining searcher efficiency and scavenging adjustments to the monitoring effort. If the initial 3 years of survey do not capture a good rain year (i.e. good eagle reproduction; a good rain year is defined as greater than annual rainfall of 10.6 inches in Campo, CA; WRCC-DRI 2009), then an additional 2 years of data collection for raptors will be conducted such that the surveys are conducted during a good rain year. Submit an annual report of mortality data and, in consultation with the TAC, devise and implement advanced conservation practices derived from analysis of the monitoring data.	Agreement.
Step I	Initiate consultation with the TAC to identify appropriate advanced conservation measures to minimize likelihood of future take. Conduct three (3) additional years of compatible raptor mortality monitoring. If the fatality can be attributed to the Cane Brake breeding territory, curtail turbines H1 and H2 during daylight hours when eagles are active between February 1 and April 30 in years when either of the two nearest Cane Brake nests is active.	One eagle taken.
Step II	Intensify eagle monitoring studies, including flight path monitoring or telemetry, to define seasonal and diurnal flight patterns to inform development and/or implementation of the ACPs. Initiate advanced conservation measures involving visual and/or auditory deterrence procedures, or latest technology and methodologies, to minimize the likelihood of future take. Consult with TAC on design of advanced conservation practices and how effectiveness will be evaluated. Conduct three (3) years of compatible raptor mortality monitoring. Evaluate whether additional curtailment is warranted.	Two eagles taken within any 12 month period or three eagles taken within a 5 year period.
Step III	Biological monitors or approved advanced technology and methodologies will be employed on site during daylight hours and to a limited period of time defined as high risk for eagle fatalities (if such a period can be defined based on TAC review of fatality data to date). The method selected will test the ability to curtail turbine(s) when an eagle or large raptor approaches the rotor-swept area (RSA). A sufficient number of qualified monitors or advanced technology devices will be stationed throughout the site, so as to provide unimpeded views of eagles/large raptors that may approach within one mile of any turbine. Additionally, monitors will report and remove carrion as it is encountered. TAC will refine and evaluate the curtailment protocol utilizing data from monitoring efforts initiated in Step II. Extend or reinitiate eagle movement studies and mortality monitoring by three (3) years to of survey to evaluate raptor fatalities in the presence of ACPs.	Three eagles taken within any 12 month period or four eagles taken within any 5 years period.
Step IV	Deploy radar system(s) or approved advanced technology designed to curtail turbine blade rotation as eagle(s)/large raptors approach RSA. In consultation with the TAC, design and implement a protocol for determining the effectiveness of a radar system(s). Conduct a minimum of three (3) years mortality monitoring to evaluate raptor fatalities in the presence of ACPS.	Four eagles taken within any 12 month period or five eagles taken within any 5 years period.
Step V	Initiate consultation with TAC to determine curtailment schedules based upon evaluation of data collected in previous steps. Options may include curtailment in 1) appropriate season or 2) at identified problem turbines/strings; or 3) during certain portions of the day. Extend or reinitiate eagle movement studies and compatible raptor mortality monitoring by three (3) years.	Five eagles taken within any 24 month period or six eagles taken within the first 5 years of operations.

Table 6-1. Summary of Advanced Conservation Practices (continued)

	Advanced Conservation Practices	Threshold or Trigger
Step VI	In consultation with the USFWS and BLM, determine other appropriate actions necessary to minimize and compensate for additional impacts to eagle populations.	Seven eagles taken within a five year period.

Non-eagle Avian and Bat Species

Pre-construction studies

- Pre-construction avian point count surveys
- Pre-construction bat acoustic monitoring

Avoidance and Minimization

- Minimize the use of above-ground power lines
- Above ground power lines will follow APLIC guidelines
- Buffer for ground disturbing activities near avian nests
- Minimized lighting
- Minimized habitat disturbance

Monitoring

- A minimum of 3 years of formal post-construction mortality monitoring. If the initial 3 years of survey do not capture a good rain year (i.e. good eagle reproduction; a good rain year is defined as greater than annual rainfall of 10.6 inches in Campo, CA; WRCC-DRI 2009), then an additional 2 years of data collection will be conducted such that the surveys occur during a good rain year.
- A Wildlife Monitoring and Reporting System (WMRS) will be executed by site personnel for the life of the project.

Assessment

- Evaluate fatality results with TAC. TAC to provide guidance on whether additional years of post-construction mortality monitoring surveys or species-specific mitigation are recommended based on the observed fatality rates

Figure 6-1. Tule Wind LLC approach to avoidance, minimization, and monitoring for potential non-eagle avian and bat impacts

6.2 Avian Adaptive Management

Trigger: After the completion of post-construction mortality monitoring, a report summarizing the number and species found as fatalities; the estimates of total fatalities for the Project adjusted for carcasses removal rates and searcher efficiency; and any incidental fatality observations will be provided to the TAC. The TAC will review this report and provide guidance to Tule Wind LLC on whether additional years of post-construction mortality monitoring surveys or species-specific mitigation are recommended based on the observed fatality rates.

Monitoring Method: A minimum of 3 years of formal post-construction mortality monitoring. If the initial 3 years of survey do not capture a good rain year (i.e. good eagle reproduction), then an additional 2 years of data collection will be conducted such that the surveys occur during a good rain year.

6.3 Bat Adaptive Management

Trigger: After the completion of post-construction mortality monitoring, a report summarizing the number and species found as fatalities; the estimates of total fatalities for the Project adjusted for carcass removal rates and searcher efficiency; and any incidental fatality observations will be provided to the TAC. The TAC will review this report and provide guidance to Tule Wind LLC on whether additional years of post-construction mortality monitoring surveys or species-specific mitigation are recommended based on the observed fatality rates.

Monitoring Method: A minimum of 3 years of formal post-construction mortality monitoring. If the initial 3 years of survey do not capture a good rain year (i.e. good eagle reproduction), then an additional 2 years of data collection will be conducted such that the surveys occur during a good rain year.

7. References

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 the Tehachapi Pass Wind Resource Area. Prepared for National Renewable Energy Laboratory, Golden, CO. September 2004.

Anderson, R., J. Tom, N. Neumann, W.P. Erickson, M.D. Strickland, M. Bourassa, K.J. Bay, and K.J. Sernka. 2005. Avian Monitoring and Risk Assessment at the San Gorgonio Wind Resource Area. Phase I Field Work: March 3, 1997 – May 29, 1998, Phase II Field Work: August 18, 1999 – August 11, 2000.

Arnett, E.B., W.P. Erickson, J. Kerns, and J. Horn. 2005. Relationships between Bats and Wind Turbines in Pennsylvania and West Virginia: An Assessment of Fatality Search Protocols, Patterns of Fatality and Behavioral Interactions with Turbines. Prepared for Bats and Wind Cooperative.

Arnett, E.B., M.R. Schirmacher, M.P. Huso, and J.P. Hayes. 2009. Patterns of Fatality at the Casselman Wind Project in south-central Pennsylvania, 2008 Annual Report. Prepared for the Bats and Wind Energy Cooperative and the Pennsylvania Game Commission.

Arnett, E.B., W.K. Brown, W.P. Erickson, K.K. Fiedler, B.L. Hamilton, T.H. Henry, A. Jain, G.D. Johnson, J. Kerns, R.R. Koford, C.P. Nicholson, T.J. O'Connel, M.D. Piorkowski, and R.D. Tankersley, Jr. 2008. Patterns of Bat Fatalities at Wind Energy Facilities in North America. Journal of Wildlife Management 72:61-78.

Arnett, E.B., D.B. Inkley, D.H. Johnson, R.P. Larkin, S. Manes, A.M. Manville, J.R. Mason, M.L. Morrison, M.D. Strickland, and R. Thresher. 2007. Impacts of Wind Energy Facilities on Wildlife and Wildlife Habitat. Wildlife Society Technical Review 07-2. The Wildlife Society, Bethesda, Maryland, USA.

Avian Power Line Interaction Committee (APLIC). 2006. Suggested Practices for Avian Protection on Power Lines, the State of the Art in 2006. Edison Electric Institute, Washington, D.C.

Baerwald, E.F, G.H. D'Amours, B.J. Klug, and R.M.R Barclay. 2008. Barotrauma is a Significant Cause of Bat Fatalities at Wind Turbines. Current Biology 18:695-696.

Benson, P.C. 1981. Large raptor electrocution and powerpole utilization: A study in six western states. Ph.D. dissertation, Department of Zoology, Brigham Young University.

Bevanger, K. 1998. Biological and conservation aspects of bird mortality caused by electricity power lines; a review. Biological Conservation 86:67-76.

Brown, W.K. and B.L. Hamilton. 2006. Monitoring of Bird and Bat Collisions with Wind turbines at the Summerview Wind Power Project, Alberta, 2005-2006. Prepared for Vision Quest Windelectric, Calgary, Alberta.

Bureau of Land Management (BLM). 2011. Draft plan amendment & draft environmental impact statement/final environmental impact report for the Ocotillo wind energy facility,, eagle conservation plan for the Ocotillo wind energy facility. Ocotillo Express, LLC, Houston, TX. available online at http://icpds.com/CMS/ Media/DRAFT_Ocotillo_ECP_4_3_2011.pdf (last accessed August 16, 2012).

Bureau of Land Management (BLM). 2012. Proposed plan amendment & final environmental impact statement/final environmental impact report for the Ocotillo wind energy facility, appendix L9, eagle conservation plan. Ocotillo Express, LLC, Houston, TX.

California Energy Commission (CEC) and California Department of Fish and Game (CDFG). 2007. California guidelines for reducing impacts to birds and bats from wind energy development. Report No. CEC-700-2007-008-CMF.

California Public Utilities Commission (CPUC) and Bureau of Land Management (BLM). 2010. Draft Environmental Impact Report/Environmental Impact Statement. SDG&E East County Substation Project, Pacific Wind Development Tule Wind Project, and Energia Sierra Juarez U.S. Transmission, LLC, Energia Sierra Juarez Gen-Tie Project. Prepared by Dudek.

Call, M. 1979. Habitat management guides for birds of prey. Bureau of Land Management. Technical Note 338. Denver, Colorado.

Craig, J. 1995. Recommended buffer zones and seasonal restrictions for Colorado raptor nests. Colorado Division of Wildlife. Research Center, Fort Collins, Colorado.

Cryan, P.M. 2003. Seasonal Distribution of Migratory Tree Bats (*Lasiurus* and *Lasionycteris*) in North America. Journal of Mammology 84:579-593.

Cryan, P.M. and R.M.R. Barclay. 2009. Causes of Bat Fatalities at Wind Turbines: Hypotheses and Predictions. Journal of Mammalogy 90: 1330-1340.

Derby, C., A. Dahl, W.P. Erickson, K. Bay, and J. Hoban. 2007. Post-Construction Monitoring Report for Avian and Bat Mortality at the NPPD Ainsworth Wind Farm. Prepared for Nebraska Public Power District.

Drewitt, A.L., and R.H.W. Langston. 2006. Assessing the impacts of wind farms on birds. Ibis 148:29-42.

Driscoll, D.E. 2010. Protocol for golden eagle occupancy, reproduction, and prey population assessment. American Eagle Research Institute, Apache Junction, AZ.

Energy Research and Development Administration (ERDA). 1977. EIA for CUI Venture application for geothermal loan guarantee Beryl and Lund, Utah). EIA/GE/77-8. Washington, D.C. 109pp.

Erickson, W.P. 2007. Summary of Methods and Results for Prediction and Estimation of Impacts and Risk. Presented at NWCC Probability of Impact Workshop, 13 November 2007, Golden, CO.

Erickson, W.P. and L. Sharp. 2005. Phase 1 and Phase 1a Avian Mortality Monitoring Report for 2004-2005 for the SMUD Solano Wind Project. Prepared for Sacramento Municipal Utility District(SMUD), Sacramento, California. Prepared by URS Sacramento, California and WesternEcoSystems Technology, Inc. (WEST). August 2005.

Erickson, W.P., J.D. Jeffrey, and V.K. Poulton. 2008. Puget Sound Energy Wild Horse Wind Facility Post-Construction Avian and Bat Monitoring First Annual Report: January-December 2007. Prepared for Puget Sound Energy.

Erickson, W. P., G. D. Johnson, and D. P. Young, Jr. 2005. A summary and comparison of bird mortality from anthropogenic causes with an emphasis on collisions. USDA Forest Service Gen. Tech. Rep. PSW-GTR-191.

Erickson, W.P., J.D. Jeffrey, K. Kronner, and K. Bay. 2004. Stateline Wind Project Wildlife Monitoring Final Report, July 2001—December 2003. Technical report peer-reviewed by and submitted to FPL Energy, the Oregon Energy Facility Siting Council, and the Stateline Technical Advisory Committee.

Erickson, W.P., D.P. Young, Jr., G. Johnson, J. Jeffrey, K. Bay, R. Good, and H. Sawyer. 2003a. Wildlife Baseline Study for the Wild Horse Wind Project. Summary of Results from 2002-2003 Wildlife Surveys May 10, 2002- May 22, 2003. Draft report prepared for Zilkha Renewable Energy, Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. November 2003.

Erickson, W.P., J.D. Jeffrey, D.P. Young, Jr., K. Bay, R. Good, K. Sernka, and K. Kronner. 2003b. Wildlife Baseline Study for the Kittitas Valley Wind Project: Summary of Results from 2002 Wildlife Surveys. Final Report February 2002– November 2002. Prepared for Zilkha Renewable Energy, Portland, Oregon, by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming, and Northwest Wildlife Consultants, Inc. (NWC), Pendleton, Oregon. January 2003.

Erickson, W.P., K. Kronner, and B. Gritski. 2003c. Nine Canyon Wind Power Project Avian and Bat Monitoring Report: September 2002-August 2003. Prepared for Nine Canyon Technical Advisory Committee, Energy Northwest.

Erickson, W.P., G.D. Johnson, D.P. Young, Jr., D. Strickland, R. Good, M. Bourassa, K. Bay, and K.Sernka. 2002. Synthesis and Comparison of Baseline Avian and Bat Use, Raptor Nesting and Mortality Information from Proposed and Existing Wind Developments. Technical reportprepared for Bonneville Power Administration, Portland, Oregon by WEST, Inc., Cheyenne,Wyoming. December 2002. http://www.bpa.gov/Power/pgc/wind/Avian_and_Bat_Study_12-2002.pdf.

Erickson, W.P., G.D. Johnson, M.D. Strickland, D.P. Young Jr., K.J. Sernka, and R.E. Good. 2001a. Avian Collisions with Wind Turbines: A Summary of Existing Studies and Comparisons to Other Sources of Avian Collision Mortality in the United States. National Wind Coordinating Committee, Washington, DC.

Erickson, W.P., E. Lack, M. Bourassa, K. Sernka, and K. Kronner. 2001b. Wildlife Baseline Study for the Nine Canyon Wind Project, Final Report May 2000-October 2001 Technical report prepared forEnergy Northwest, Richland, Washington.

Erickson, W.P., G.D. Johnson, M.D. Strickland, and K. Kronner. 2000. Final Report: Avian and Bat Mortality Associated with the Vansycle Wind Project, Umatilla County, Oregon: 1999 Study Year. Prepared for Umatilla County Department of Resource Services and Development, Pendleton, Oregon.

Ferrer, M., M. de Lucas, G.F.E. Janss, E. Casado, A. R. Munoz, M.J. Bechard, and C.P. Calabuig. 2011. Weak relationship between risk assessment studies and recorded mortality in wind farms. Journal of Applied Ecology. doi: 10.1111/j.1365-2664.2011.02054.x. Available online at http://onlinelibrary.wiley.com/doi /10.1111/j.1365-2664.2011.02054.x/abstract.

Fiedler, J.K. 2005. Assessment of Bat Mortality and Activity at Buffalo Mountain Wind Farm, Eastern Tennessee. Thesis prepared for the University of Tennessee - Knoxville.

Fiedler, J.K., T.H. Henry,R.D. Tankersley, and C.P. Nicholson. 2007. Results of Bat and Bird Mortality Monitoring at the Expanded Buffalo Mountain WindFarm, 2005. Prepared for the Tennessee Valley Authority.

Franson, J.C., L. Sileo, and N.J. Thomas. 1995. Causes of eagle deaths. Pp 68-69 In LaRoe, E.T., G.S. Garris, C.E. Puckett, P.D. Doran, and M.J. Mac. Eds. 2995. Our living resources: a report to the nation on the distruction, abundance, and health of U.S. plants, animals, and ecosystems. U.S Department of the Interior, National Biological Service, Washington, DC.

Gonzalez, L. M., B. E. Arroyo, A. Margalida, R. Sanchez, and J. Oria. 2006. Effect of Human Activities on the Behaviour of Breeding Spanish Imperial Eagles (*Aquila adalberti*): Management Implications for the Conservation of a Threatened Species. Animal Conservation 9:85–93.

Gritski, B., S. Downes, and K. Kronner. 2009. Klondike III (Phase 1) Wind Power Project Wildlife Monitoring Year One Summary. Prepared for Iberdrola Renewables.

Gritski, B., K. Kronner, and S. Downes. 2008. Leaning Juniper Wind Power Project, 2006 − 2008.Wildlife Monitoring Final Report. Prepared for PacifiCorp Energy, Portland, Oregon. Prepared by Northwest Wildlife Consultants, Inc. (NWC), Pendleton, Oregon. December 30, 2008.

Gruver, J., K. Bay, M. Sonnenberg, and E. Baumgartner. 2011. Bat Acoustic Studies for the Tule Wind Resource Area. San Diego, California. Final Report: September 2008 – November 2010. Technical report prepared for Tule Wind LLC, Portland, Oregon. Prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming.

Gruver, J., M. Sonnenburg, K. Bay, and W. Erickson. 2009. Post-Construction Bat and Bird Fatality Study at the Blue Sky Green Field Wind Energy Center, Fond-du-lac County, Wisconsin, July 2008-May 2009. Final report prepared for We Energies, Milwaukee, WI. Prepared by WEST, Cheyenne, WY.

Harness, R. and K. Wilson. 2001. Electric-utility Structures Associated with Raptor Electrocutions in Rural Areas. Wildlife Society Bulletin 29: 612-623.

Hayes, J.P. 1997. Temporal Variation in Activity of Bats and the Design of Echolocation-Monitoring Studies. Journal of Mammalogy 78: 514-524.

HDR, Inc. 2010. AED.Applicant Environmental Document. HDR Engineering, Inc. 2010. Draft Tule Wind Project Applicant's Environmental Document. September, 2010.

Holmes, T.L., R.L. Knight, L. Stegall, and G.R. Craig. 1993. Responses of Wintering Grassland Raptors to Human Disturbance. Wildlife Society Bulletin 21:461-468.

Huso. M.M.P. 2010. An Estimator of Wildlife Fatality from Observed Carcasses. Environmetrics DOI: 10.1002/env.1052.

IRI (Iberdrola Renewables, Inc.). 2010 (In Press). Wildlife Monitoring and Reporting System (WMRS) Handbook. Permitting/Wildlife Compliance, Portland, Oregon.

IRI. 2008. Avian and Bat Protection Plan (ABPP). Version 1 dated October 10, 2008. Final Approved Document, Portland, Oregon. <http://www.iberdrolarenewables.us/pdf/Signed_ABPP_10-28-08.pdf>.

Insignia Environmental. 2009. 2008/2009 Annual Report for the Buena Vista Avian and Bat Monitoring Project. Prepared for Contra Costa County, CA.

Jacobson, J.O. 1974. Potential impact of the Mackenzie gas pipeline on bird populations in the Yukon and Northwest Territories. Pages 121-176 in Research Reports, vol. IV. Environmental Impact Assessment of the Portion of the Mackenzie Gas Pipeline from Alaska to Alberta. Environmental Protection Board, Winnipeg, Manitoba, Canada.

Jain, A.A., R.R. Koford, A.W. Hancock,and G.G. Zenner. 2011. Bat Mortality and Activity at a Northern Iowa Wind Resource Area. American Midland Naturalist 165: 185-200.

Jain, A., P. Kerlinger, R. Curry, and L. Slobodnik. 2007. Annual Report for the Maple Ridge Wind Power Project Post-construction Bird and Bat Fatality Study—2006. Prepared by Curry and Kerlinger, LLC for PPM Energy, Horizon Energy, and Technical Advisory Committee for the Maple Ridge Project.

Jeffrey, J.D., K. Bay, W.P. Erickson, M. Sonnenberg, J. Baker, J.R. Boehrs, A. Palochak. 2009. Horizon Wind Energy Elkhorn Valley Wind Project, Union County, Oregon Post-Construction Avian and Bat Monitoring First Annual report. Prepared by WEST, Cheyenne, WY.

Jeffrey, J. and K. Bay. 2008. Wildlife Baseline Studies for the Bodewig Wind Resource Area, Umatilla County, Oregon. March 1, 2007 - February 29, 2008. Draft Final Report Prepared for Bodewig's Renewable Energy, LLC, Pilot Rock, Oregon. Prepared by Western Ecosystems Technology, Inc. (West), Cheyenne, Wyoming.

Johnson, G.D., K. Bay, and J. Eddy. 2009a. Wildlife Baseline Studies for the Broken Bow Wind Resource Area, Custer County, Nebraska. Final Report: March 27, 2007-April 27, 2008 and March 16 - May 14, 2009. Draft prepared for BP Wind Energy North America, Houston, Texas. Prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. November 13, 2009.

Johnson, G.D., J. Jeffrey, J. Baker, and K. Bay. 2007a. Baseline Avian Studies for the Windy Flats Wind Energy Project, Klickitat County, Washington. Prepared for Windy Point Partners, LLC., by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. May 29, 2007.

Johnson, G.D., M.D. Strickland, W.P. Erickson, and D.P. Young, Jr. 2007b. Use of Data to Develop Mitigation Measure for Wind Power Development Impacts to Birds. In: Birds and Windfarms: Risk Assessment and Mitigation. M. J. de Lucas, G. F. E. Janss, and M. Ferrer, eds. Madrid, Spain. Pp. 241-257.

Johnson, G.D., W.P. Erickson, and J.D. Jeffrey. 2006. Analysis of Potential Wildlife Impacts from the Windy Point Wind Energy Project, Klickitat County, Washington. Unpublished report prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. February 3, 2006.

Johnson, G.D., W.P. Erickson, R. Good, E. Lack, K. Kronner, and B. Gritski. 2003. Ecological Baseline Studies for the White Creek Wind Project, Klickitat County, Washington. Final Report prepared for Northwestern Wind Power, Goldendale, Washington. Prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming, and Northwest Wildlife Consultants, Inc. (NWC), Pendleton, Oregon. July 2003.

Johnson, G.D., W.P. Erickson, K. Bay, and K. Kronner. 2002b. Baseline Ecological Studies for the Klondike Wind Project, Sherman County, Oregon. Final report prepared for Northwestern Wind Power, Goldendale, Washington, by Western EcoSystems Technology, Inc. (WEST) Cheyenne, Wyoming, and Northwest Wildlife Consultants, Inc. (NWC), Pendleton, Oregon. May 29, 2002.

Johnson, G.D., W.P. Erickson, M.D. Strickland, M.F. Shepherd, D.A. Shepherd, and S.A. Sarappo. 2002a. Collision Mortality of Local and Migrant Birds at a Large-scale Wind Power Development on Buffalo Ridge, Minnesota. Wildlife Society Bulletin 30:879-887.

Johnson, G.D., D.P. Young, Jr., W.P. Erickson, C.E. Derby, M.D. Strickland, and R.E. Good. 2000a. Wildlife Monitoring Studies, SeaWest Windpower Plant, Carbon County, Wyoming, 1995-1999. Final report prepared for SeaWest Energy Corporation, San Diego, California, and the Bureau of Land Management, Rawlins, Wyoming, by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. August 9, 2000. http://www.west-inc.com and http://www.westinc.com/reports/fcr_final_baseline.pdf

Johnson, G.D., W.P. Erickson, M.D. Strickland, M.F. Shepherd, and D.A. Shepherd. 2000b. Avian Monitoring Studies at the Buffalo Ridge Wind Resource Area, Minnesota: Results of a 4-Year Study. Final report prepared for Northern States Power Company, Minneapolis, Minnesota, by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. September 22, 2000.

Keeley, B.W., and M.D Tuttle. 1999. Bats in American Bridges. Bat Conservation International. Resource Publication No. 4. 40pp. Available online at: http://www.batcon.org/pdfs/bridges/ BatsBridges2.pdf

Kerlinger, P., R.Curry, L. Culp, A. Hasch and A. Jain. 2009. Post-construction avian monitoring study for the Shiloh I wind power project, Solano County, California. Prepared for Iberdrola Renewables.

Kerlinger, P., R. Curry, L. Culp, A. Jain, C. Wilkerson, B. Fischer, and A. Hasch. 2006a. Post-Construction Avian and Bat Fatality Monitoring for the High Winds Wind Power Project, Solano County, California: Two Year Report. Prepared for High Winds LLC, FPL Energy by Curry and Kerlinger, LLC. April 2006.

Kerlinger, P., R.Curry, L. Culp, A. Hasch and A. Jain. 2006b. Avian monitoring study and risk assessment for the Shiloh Wind Power Project, Solano County, California. Prepared for EnXco.

Kerlinger, P., L. Culp, and R. Curry. 2005. Post Construction Avian Monitoring Study for the High Winds Wind Power Project. Solano County, California. Year one report. Prepared for High Winds, LLC and FPL Energy.

Kerns, J., and P. Kerlinger. 2004. A Study of Bird and Bat Collision Fatalities at the Mountaineer Wind Energy Center, Tucker County, West Virginia: Annual report for 2003. Technical report prepared by Curry and Kerlinger, LLC for FPL Energy and Mountaineer Wind Energy Center Technical Review Committee.

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

Kunz, T.H., E.B. Arnett, W.P. Erickson, A.R. Hoar, G.D. Johnson, R. P. Larkin, M.D. Strickland, R.W. Thresher, and M.D. Tuttle. 2007. Ecological Impacts of Wind Energy Development on Bats: Questions, Research Needs, and Hypotheses. Frontiers in Ecological Environments 5: 315-324.

Kuvelsky, Jr., W., Brennan, L., Morrison, M., Boydston, K., Ballard, B., and Bryant, F. 2007. Wind Energy Development and Wildlife Conservation: Challenges and Opportunities. Journal of Wildlife Management 71:2487-2498.

LaRoe, E.T., G.S. Farris, C.E. Puckett, P.D. Doran, and M.J. Mac, eds. 1995. Our Living Resources: A Report to the Nation on the Distribution, Abundance and Health of U.S. Plants, Animals, and Ecosystems. U.S. Department of the Interior, National Biological Service, Washington, DC.

Leddy, K.L., K.F. Higgins, and D.E. Naugle. 1999. Effects of Wind Turbines on Upland Nesting Birds in CRP Grasslands. Wilson Bulletin 111:100-104.

Marzluff, J.M., S.T. Knick, M.S. Vekasy, L.S. Schuek, and T.J. Zarriello. 1997. Spatial Use and Habitat Selection of Golden Eagles in Southwestern Idaho. Auk 114:673-687.

Northwest Wildlife Consultants, Inc (NWC) and Western EcoSystems Technology, Inc. (WEST). 2007. Avian and Bat Monitoring Report for the Klondike II Wind Power Project, Sherman Conty, Oregon. Prepared for PPM Energy.

Northwest Wildlife Consultants, Inc. (NWC) and Western EcoSystems Technology, Inc. (WEST). 2005b. Wildlife Baseline Study for the Leaning Juniper Wind Power Project, Gilliam County, Oregon. Prepared for PPM Energy, Portland, Oregon and CH2MHILL, Portland, Oregon by NWC, Pendleton, Oregon, and WEST, Inc., Cheyenne, Wyoming. November 3, 2005.

Olendorff, R . R., and W. D. Zeedyk. 1978. Land Management for the Conservation of Endangered Birds. Pages 419-428 in S. A. Temple Editor. Endangered birds. University of Wisconsin Press, Madison, Wisconsin.

Phillips R.L. 1986. Current Issues Concerning the Management of Golden Eagles in the Western U.S.A. Birds of Prey Bulletin 3:149-156.

Piorkowski, M., and T. O'Connell. 2010. Spatial Pattern of Summer Bat Mortality from Collisions with Wind Turbines in Mixed-grass Prairie. American Midland Naturalist 164:260-269.

Postupalsky, S. 1974. Raptor reproductive success: some problems with methods, criteria and terminology. Raptor Research Report No. 2:21-31.

Poulton, V. 2010. Summary of Post-Construction Monitoring at Wind Projects Relevant to Minnesota, Identification of Data Gaps, and Recommendations for Further Research Regarding Wind-Energy Development in Minnesota. December 10, 2010. Prepared for State of Minnesota Department of Commerce.

Poulton, V., K. Bay, and D. Solick. 2009. Wildlife Baseline Studies for the Burlington Wind Resource Area, Kit Carson County, Colorado. Final Report: March 19, 2008 - November 10, 2008. Prepared for Airstream Energy, LLC, Scottsdale, Arizona. Prepared by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. January 14, 2009.

Ruddock, M. and D.P. Whitfield. 2007. A Review of Disturbance Distances in Selected Bird Species. Report from Natural Research (Projects) Ltd. to Scottish Natural Heritage. Natural Research, Banchory, United Kingdom.

San Diego County. 1997. MSCP. Multiple Species Conservation Program, County of San Diego Subarea Plan. Prepared in conjunction with the U.S. Fish and Wildlife Service and California Department of Fish and Game. San Diego, California. Adopted October 22, 1997.

Shaffer, J. and D. Johnson. 2008. Displacement Effects of Wind Developments on Grassland Birds in the Northern Great Plains. NWCC Wind Wildlife Conference, October 2008. Milwaukee, WI.

Shump, K.A. and A.U. Shump. 1982. *Lasiurus cinereus*. Mammalian Species, 185:1-5.

Smallwood, K. S., and B. Karas. 2009. Avian and Bat Fatality Rates at Old Generation and Repowered Wind Turbines in California. Journal of Wildlife Management 73:1062-1071.

Strickland, D., and M.L. Morrison. 2008. A Summary of Avian/Wind Facility Interactions in the U.S. Federal Guidelines Committee for Wind Siting Guidelines, February 26, 2008, Washington, DC.

Suter, G.W. and J.L. Joness. 1981. Criteria for Golden Eagle, Ferruginous Hawk, and Prairie Falcon Nest Site Protection. Journal of Raptor Research 15:12-18.

Taylor, K., J. Gruver, and K. Bay. 2008. Wildlife Studies for the Campbell Hill Wind Resource Area,Converse County, Wyoming. Fall Summary Report: September 9 - November 5, 2008. Preparedfor Three Buttes Windpower, LLC/Duke Energy. Prepared by Western EcoSystems Technology,Inc.(WEST), Cheyenne, Wyoming. December 30, 2008.

Tetra Tech. 2009. 2007-2008 Avian Study; Tule Wind Resource Area San Diego County, California.

Tetra Tech. 2008. 2005-2006 Avian Study; Tule Wind Resource Area San Diego County, California.

Tierney, R. 2007. Buffalo Gap I Wind Farm Avian Mortality Study: February 2006-January 2007. Final Survey Report. Prepared for AES SeaWest, Inc. TRC, Albuquerque, New Mexico. TRC Report No. 110766-C-01. May 2007.

Thelander, C.G., K.S. Smallwood, and L. Rugge. 2003. Bird Risk Behaviors and Fatalities at the Altamont Pass Wind Resource Area, Period of Performance: March 1998 - December 2000. Prepared for the National Renewable Energy Laboratory, Golden, CO. December 2003.

TRC Environmental Corporation. 2008. Post-Construction Avian and Bat Fatality Monitoring and Grassland Bird Displacement Surveys at the Judith Gap Wind Energy Project, Wheatland County, Montana. Prepared for Judith Gap Energy, LLC.

Tule Wind LLC. 2011. Project Specific Avian and Bat Protection Plan for the Tule Wind Project. Prepared for the Bureau of Land Management, California Desert District.

USFWS (U.S. Fish and Wildlife Service). 2012a. Land-based wind energy guidelines. March 2012.

USFWS (U.S. Fish and Wildlife Service). 2012b. Eagle conservation plan guidance: Module 1- land-based wind energy, technical appendices. August 2012.

USFWS (U.S. Fish and Wildlife Service). 2011. Draft Eagle Conservation Plan Guidance. February, 2011.

USFWS. 2010a. Interim Golden Eagle Inventory and Monitoring Protocols; and Other Recommendations. February, 2010.

USFWS. 2010b. *Recommendation on Policy and Guidelines*. Wind Turbine Guideline Advisory Committee. U.S. Fish and Wildlife Federal Advisory Committee, Washington, D.C. Submitted to Secretary of Interior on March 4, 2010.

USFWS. 2009. 50 CFR Parts 13 and 22 Eagle Permits; Take Necessary To Protect Interests in Particular Localities; Final Rules. Federal Register, Vol. 74, No. 175. September 11, 2009.

Watson, J. and M. Whalen. 2004. Golden Eagle (*Aquila chrysaetos*). In: Management Recommendations for Washington's Priority Species, Volume IV: Birds. Washington Department of Fish and Wildlife (WDFW). Larsen, E.M., J.M. Azerrad, and N. Nordstrom, eds. Last updated 2003. Available online at: http://wdfw.wa.gov/hab/phs/vol4/goldeagl.pdf.

WEST (Western EcoSystems Technology, Inc.). 2009. Wildlife Baseline Studies for the Antelope Ridge Wind Resource Area, Union County, Oregon. August 28, 2008 - August 12, 2009. Draft final report prepared for Horizon Wind Energy, Houston, Texas. Prepared by WEST, Cheyenne, Wyoming.

WEST. 2008. Diablo Winds Wildlife Monitoring Progress Report: March 2005 – February 2007. Prepared by WEST, Cheyenne, Wyoming. August 2008.

WEST. 2006b. Diablo Winds Wildlife Monitoring Progress Report, March 2005 - February 2006. Technical report submitted to FPL Energy and Alameda County California. WEST. Cheyenne, Wyoming.

WEST. 2005a. Ecological Baseline Study at the Elkhorn Wind Power Project. Exhibit A. Final report prepared for Zilkha Renewable Energy, LLC., Portland, Oregon, by WEST, Cheyenne,Wyoming. June 2005.

WEST. 2010. Golden Eagle Information: Tule Wind Project. Report prepared for Iberdrola Renewables, June 2010.

WEST and Colorado Plateau Research Station (CPRS). 2006a. Avian Studies for the Proposed Sunshine Wind Park, Coconino County, Arizona. Prepared for Sunshine Arizona Wind Energy, LLC., Flagstaff, Arizona, by WEST, Cheyenne, Wyoming, and the CPRS, Northern Arizona University, Flagstaff, Arizona. May 2006.

WEST and Northwest Wildlife Consultants (NWC) 2007. Stateline Wind Project Wildlife Monitoring Annual Report: January-December 2006. Prepared for FPL Energy, Oregon Department of Energy, Stateline Technical Advisory Committee.

Western Regional Climate Center – Desert Research Institute (WRCC-DRI). 2009. Climatalogical Summary: Campo, California, 1998-2008. Available online at http://www.wrcc.dri.edu/summary/czz.ca.html.

WRI (Wildlife Research Institute). 2012a. Draft golden eagle surveys surrounding the Tule Wind Energy Project in San Diego County, CA. Submitted to Iberdrola Renewables, Inc. Portland, OR. Submitted August 15, 2012.

WRI (Wildlife Research Institute). 2012b. Golden eagle nest camera findings in the Tule Wind Energy Project in San Diego County, California. Submitted to Iberdrola Renewables, Inc. Portland, OR. Submitted March 15, 2012.

WRI (Wildlife Research Institute). 2011. Golden eagle aerial surveys surrounding Tule Wind Energy Developments in San Diego County, California. Submitted to Iberdrola Renewables, Inc. Portland OR.

WRI. 2010. Golden eagle aerial surveys surrounding Tule Wind Energy Developments in San Diego County, California. Submitted to Iberdrola Renewables, Inc. Portland OR.

Wyoming Game and Fish Department (WGFD). 2009. Recommendations for Wind Energy Development in Crucial and Important Wildlife Habitat. Draft report prepared by the WGFD, Cheyenne,Wyoming. October 2009.

Young, D. P. Jr., W. Erickson, J. Jeffrey, and V. Poulton. 2007. Puget Sound Energy Hopkins Ridge Wind Project Phase I Post-Construction Avian and Bat Monitoring First Annual Report; January-December 2006. Prepared for Puget Sound Energy.

Young, D.P. Jr., W.P. Erickson, K. Bay, J. Jeffrey, E.G. Lack, R.E. Good, and H.H. Sawyer. 2003a. Baseline Avian Studies for the Proposed Hopkins Ridge Wind Project, Columbia County, Washington. Final Report, March 2002 - March 2003. Prepared for RES North America, LLC., Portland, Oregon, by Western EcoSystems Technology, Inc. (WEST), Cheyenne, Wyoming. April 30, 2003.

Young, D.P., Jr., W.P. Erickson, R.E. Good, M.D. Strickland, and G.D. Johnson. 2003b. Avian and Bat Mortality Associated with the Initial Phase of the Foote Creek Rim Wind Power Project, Carbon County, Wyoming: November 1998 - June 2002. Technical Report prepared by WEST, Inc. for Pacificorp, Inc., SeaWest Windpower, Inc. and Bureau of Land Management.

APPENDIX A
Adaptive Management

1. Adaptive Management Overview

This PSABPP is developed to be a robust management document that acknowledges the questions and uncertainties inherent in predicting wildlife interactions and impacts by a wind energy facility. The Department of the Interior adopted the National Research Council's definition of adaptive management, which states:

> *Adaptive management [is a decision process that] promotes flexible decision making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood. Careful monitoring of these outcomes both advances scientific understanding and helps adjust policies or operations as part of an iterative learning process. Adaptive management also recognizes the importance of natural variability in contributing to ecological resilience and productivity. It is not a 'trial and error' process, but rather emphasizes learning while doing. Adaptive management does not represent an end in itself, but rather a means to more effective decisions and enhanced benefits. Its true measure is in how well it helps meet environmental, social, and economic goals, increases scientific knowledge, and reduces tensions among stakeholders.*

Specifically, this section of the PSABPP intends to detail the framework for implementing adaptive management criteria to the operation of the project.

2. Management Decision

Adaptive management involves selection among various management alternatives (Section 5.2.7) that address effects to golden eagles from operation of the project. Effects are determined by undertaking the monitoring effort described in Section 4.0. The variability among alternatives are meant to be ecologically, economically, and legally feasible. Such decisions will be based on comparing baseline conditions (Section 2.0) with the goal of stabilizing local breeding populations of golden eagles.

3. Stakeholder Engagement

Evaluations of post-construction monitoring efforts and incidents of unforeseen impacts will be conducted by Tule Wind LLC and FWS. Additional input and expertise can be accessed through creation of a Technical Advisory Committee (TAC). Evaluations will facilitate understanding outcomes of management decisions and possibly modify them in order to more effectively address impacts or ameliorate impacts incurred from prior management decisions.

4. Stated Management Objectives

Adaptive management requires explicit and measurable objectives. The FWS has clearly and consistently documented that balancing renewable energy development with impacts to golden eagles is the metric of "stable or increasing local breeding populations." There is currently no conclusive guidance to avoiding take of an individual by a 30 year operating wind farm therefore it is intended that adaptive management and advance conservation measures result in avoiding, minimizing and mitigating for golden eagle impacts by the project such that the goal of stable or increasing local breeding populations is maintained for the life of the project.

5. Uncertainties Surrounding Management Decisions

For lack of understanding the dynamic nature of eagle behavior and populations as they relate to wind energy facilities, use of adaptive management to maintain a flexible and predictable set of possible operational modifications is optimal for addressing uncertainties. The desired outcome of the adaptive management model is to not only meet the objectives under Section 6.3 but also increase the level of understanding about golden eagles behavior and populations to better inform subsequent decisions related to wind energy development.

6. Resource Management and Relationships Modeled

Adaptive management is a learning-based process and thus some level of qualification about pre-construction and post-construction conditions needs to occur in order to better inform decision-making efforts. Collision risk models (e.g., Smalls, 2005; Whitfield, 2009) in conjunction with project specific pre-construction assessments can be used to develop a baseline assumption of take. Management decisions can be implemented to address any predicted take such that the goal of stable or increasing local breeding populations is maintained. As post-construction and incident reports are generated and a disparity between predictions and outcomes is realized, adaptive management measures are selected upon to ameliorate the condition, thus maintaining the overall goal of local populations.

7. Monitoring to Inform Decisions

Pre-construction monitoring has thus far determined that Phase I of the Tule project is a relatively low use area (WEST 2010, HDR 2010). Additional pre-construction monitoring (Section 3.0) will be implemented (as detailed in Section 5.2.6) towards further understanding pre-construction conditions of use of site. From these assessments, a baseline set of conditions can be assumed as well as a prediction of impacts that management decisions will be implemented to fully address. Post-construction monitoring (Section 4.1.1) will be developed and implemented such that golden eagle populations can be monitored for use of the project site. Based on monitoring data, management decisions can be implemented to maintain the goal of stable or increasing local breeding populations. Additionally, Tule Wind LLC will employ a system of environmental monitoring (as is done on the entire Iberdrola Renewables, Inc. fleet) that facilitates additional monitoring effort above and beyond specific monitoring methods (4.1.2).

8. Measuring Progress to Attainment of Objectives

Regional monitoring and research efforts that Tule Wind LLC is committed to undertake in concert with golden eagle experts and FWS are intended to verify that the goal of stable or increasing local breeding populations is being maintained. A balanced combination of on-site and off-site avian protection measures and advanced conservation measures are intended to be measurable such that all parties are assured that management objectives are being met.

9. Robust Management Actions that Adjust with Learned Knowledge

As monitoring and research efforts are undertaken, implemented management decisions are evaluated, and evaluations of combined information is made among stakeholders, Tule Wind LLC (a wholly owned subsidiary of Iberdrola Renewables, Inc.), as the developer, owner, and operator of the Tule Wind Project has exclusive rights to implement changes to management of the facility to address impacts such that the objectives of avoiding, minimizing and mitigating golden eagle impacts is maintained. Management decisions such as curtailment implicate other entities (e.g., energy off taker) that need to be accommodated. However, Iberdrola Renewables' experience with such operational mechanisms indicates that objectives can be met while accommodating otherwise competing needs. Field surveys focused on active eagle territories were initiated in January 2011 to evaluate use of the project by eagles and the potential for an eagle take. (Tier 5; see Sections 4.2 and 5.2).

10. Legal Framework

The development of programmatic permits under the Bald and Golden Eagle Protection Act (BGEPA) intended to accommodate the legal taking of golden and bald eagles may occur in the future, and may be implemented to legally promote renewable energy development. However, questions and uncertainties surrounding golden eagle populations imply an inability to issue such permits. To address this, the FWS has advanced the goal of stable or increasing local breeding populations as a metric for determining whether a given action is meeting the intended objectives of BGEPA (promotion of eagle populations among a variety of competing uses of natural resources and landscapes, of which wind energy development is a small contributing factor).