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

Tule Wind LLC
Portland, Oregon

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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 Tule Wind Project (Tule). This PSABPP documents the bird and bat impact avoidance, minimization, and mitigation measures for Tule. The PSABPP provides a decision framework for collecting information to evaluate risk and make siting and operational decisions.

Documented in this PSABPP, Tule Wind LLC, in collaboration with the U.S. Fish and Wildlife Service (USFWS), have outlined how Tule will meet the current no-net loss standard for local breeding eagle populations (USFWS 2011). 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) will account for any remaining unavoidable impacts.

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, Bureau of Land Management (BLM), California Department of Fish and Game (CDFG), a Tribal representative who is a biologist, 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, 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.

1.1 Organization of This Document

The PSABPP is organized in sections that follow the five-tiered approach presented in the draft guidelines from the USFWS Wind Turbine Advisory Committee (Guidelines, USFWS in press) within the phases (pre-construction, construction, post-construction) of wind energy development. The purpose of the PSABPP is to document Tule 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 Tule , 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 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 Tule began in 2004 with no fatal flaws identified during initial assessments and, subsequent, avian and bat risk assessment indicated that mortality rates would be below or similar to typical levels (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 2010 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 Project and the potential for incidental take of eagles (Tier 5; see Sections 4.2 and 5.2) and these will continue throughout the construction and operation of phases I and II of Tule, if permitted. Subsequently, post-construction fatality surveys (PCFS) for birds and bats will begin after construction is complete in 2012 (Tier 4; see Section 4) to estimate mortality rates.

1.3 Project Location – Phased Approach

Tule Wind LLC, a wholly-owned subsidiary of Iberdrola Renewables, Inc. (IRI), is proposing to construct and operate Tule located near Boulevard, California (Figure 1.3-1). Tule will be primarily located in the In-Ko-Pah Mountains near the McCain Valley in southeastern San Diego County (Figure 1.3-2). The project will be located on lands administered by the BLM, Ewiiaapaayp Indian Reservation, Manzanita and Campo Indian Reservations (access only), and the California State Lands Commission (CSLC), as well as private land under the jurisdiction of San Diego County.

The proposed wind energy project (Phase I – Valley Turbines and Phase II – Ridge Turbines) will consist of: (1) up to 128 wind turbines; (2) access roads between turbines, including improvements to existing roadways and new roadways; (3) a 138 kilovolt (kV) overhead power line[T-line]; (4) a 34.5 kV overhead and underground electrical collector cable system; (5) 5-acre collector substation site; (6) 5-acre operation and maintenance site; (7) a temporary 5-acre concrete batch plant site; (8) a temporary 10-acre parking area; (9) 19 two-acre temporary laydown areas; (10) three permanent meteorological towers; and (11) a sonic detection and ranging system unit for additional wind measurements; (12) a 138 kV overhead transmission line running south from the collector substation to be interconnected with the rebuilt SDG&E Boulevard Substation; and (13) 36.76 miles of newly constructed access roads and 23.44 miles of temporarily widened and improved existing access roads. The proposed project footprint (impact extent) will affect approximately 725 acres within the 4,952-acre survey corridor.

This ABPP will identify the data collected for both Phase I – Valley Turbines and Phase II – Ridge Turbines, as contemplated as a mitigation measure in the DEIR/DEIS:

MM-BIO-10f Phased Approach. *Authorize construction of portions of the project based on the results of behavioral and population studies of local golden eagles. Construction of the Tule Wind project would be authorized in two portions:*

1. *Construction of the first portion of the project would occur at those turbine locations deemed to present less risk to the eagle populations and would not include turbines on the northwest ridgeline.*
2. *Construction of the second portion of the project would occur at those turbine locations that show reduced risk to the eagle population following analysis of detailed behavior studies of known eagles in the vicinity of the Tule Wind project. Pending the outcome of*

> *eagle behavior studies, all, none or part of the second portion of the project would be authorized and will include the following turbine strings: J1 through J15; K1 through K12; L1 through L11; M1and M2; N1 through N8; P1 through P5; Q1and Q2.*

Construction of turbines in the second portion of the project will only be authorized following 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). Behavior studies will be used to determine eagle usage and forage areas, and authorization for construction at each turbine location in the second portion will be at the discretion of the BLM or the appropriate land management entity.

The final criteria determining the risk each location presents to eagles will be determined by the BLM or the appropriate land management agency, in consultation with the required resource agencies, tribes and other relevant permitting entities and will be detailed in the Avian Protection Plan. Tule Wind LLC will work with the FWS to develop criteria related to the proportion of the observed golden eagle use areas (based on the telemetry data) within proposed turbine strings to determine the risk of these turbines on individual eagles in the vicinity. Criteria will also be developed related to past and current nest occupancy and productivity (based on past and continued nest monitoring data) for the monitored nests in the project vicinity to determine the risk of the construction of turbines on the eagle population. Turbine locations exceeding the acceptable risk levels to golden eagles based on these final criteria will not be authorized for construction.

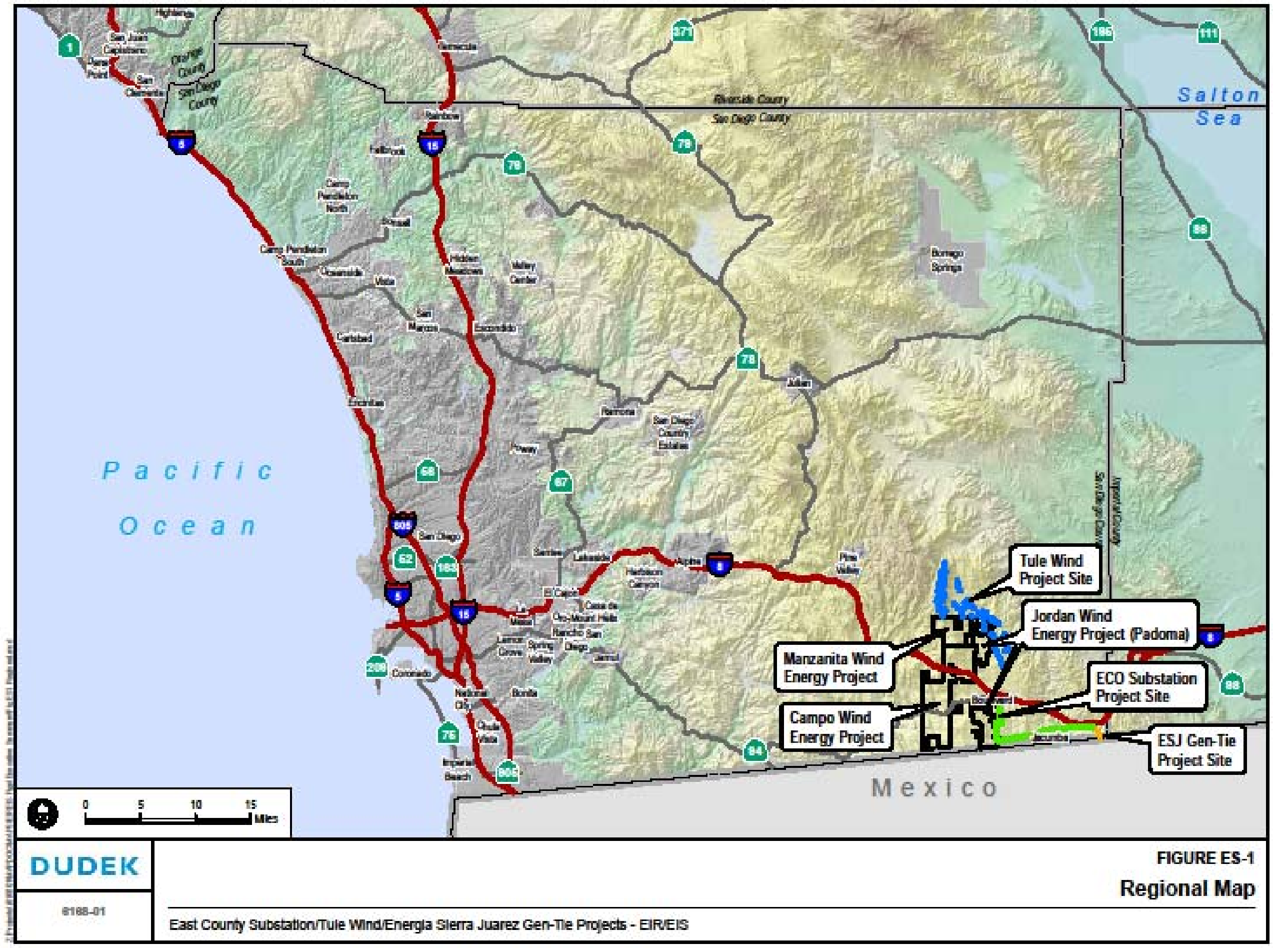


FIGURE 1.3-1
Vicinity map of Tule Wind Project

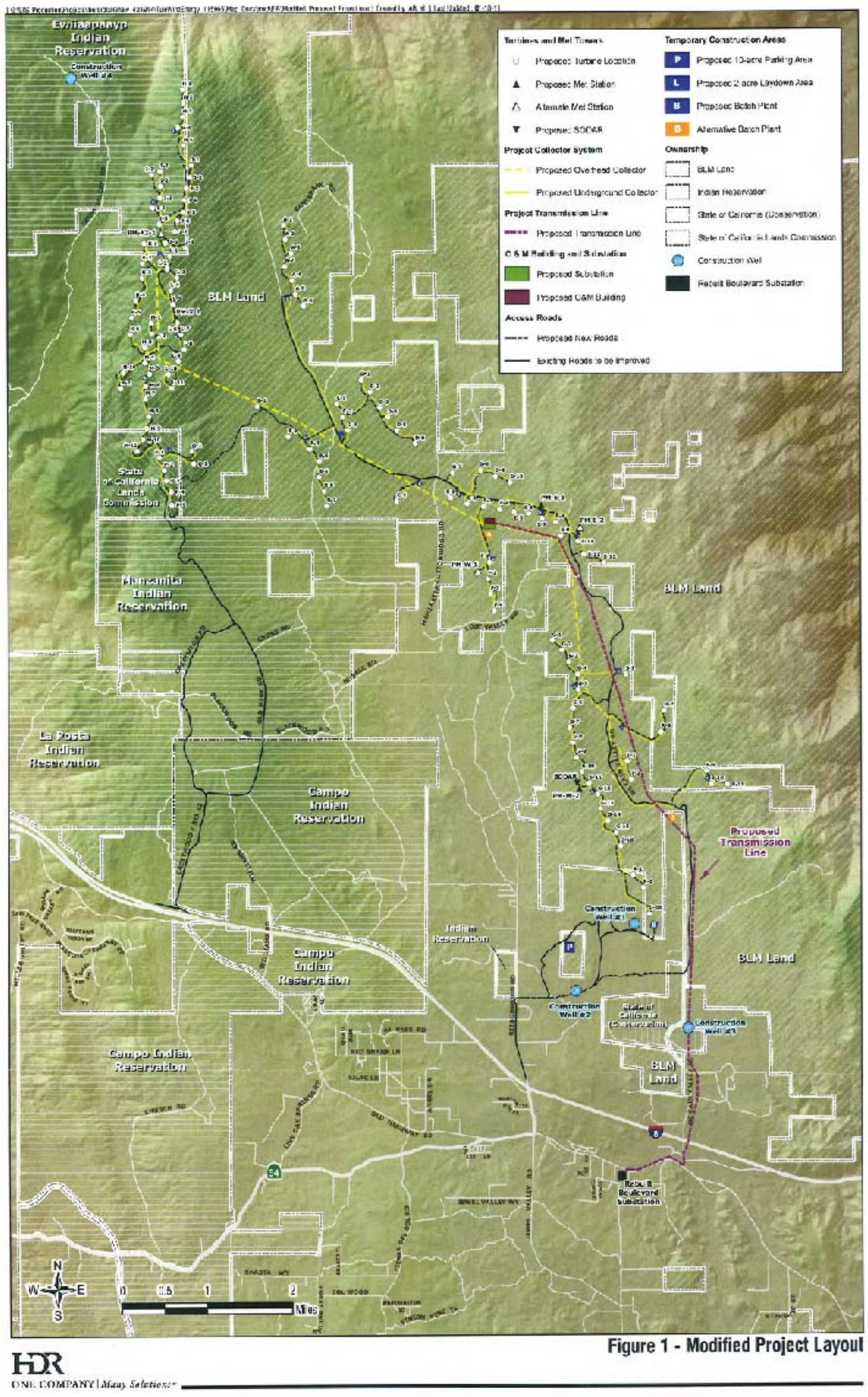


FIGURE 1.3-2
Tule Wind Project facilities[1]
[1]for final turbine layout, see the Final EIS link at http://www.blm.gov/ca/st/en/fo/elcentro/nepa/tule.html

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 Tule were conducted as early as 2004 with no fatal flaws identified to date (Curry and Kerlinger 2004). A review of state and federal databases identified the following listed and rare species potentially present in the project vicinity (Table 2.1-1, 2.1-2). Avian surveys, conducted in 2005-06 and 2007-08, also revealed no fatal flaws. During surveys conducted in 2010 pursuant to recently released USFWS protocols for golden eagles (USFWS 2010a), a new golden eagle nest was discovered close to the northernmost proposed turbine in Phase II. The nesting pair (presumably from the historical Cane Brake territory) had historically nested farther north and west of the project site.

Table 2.1-1 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* 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* 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.

Common Name	Latin Name	Status	Habitat	Notes
Least Bell's vireo	*Vireo bellii pusillus*	Fed: Endangered State: Endangered BLM: None MSCP: Proposed Covered* County: Group 1	Found in willow dominated riparian habitat.	Not observed. No habitat found on-site.
Loggerhead shrike[1]	*Lanius ludovicianus*	Fed: None State: SSC BLM: None MSCP: Proposed Covered* 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* 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* 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* 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* 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* 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* County: Group 1	Found in cropland, hedgerows, grassland and herbaceous areas.	Not observed. Has a low potential to occur on-site while foraging.

Common Name	Latin Name	Status	Habitat	Notes
Turkey vulture[1]	*Cathartes aura meridionalis*	Fed: None State: None BLM: None MSCP: Proposed Covered* County: Group 1	Found in dry, open country, farmlands, and woodlands. Needs tall trees for roosting.	Observed on-site.
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* 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* County: Group 1	Riparian woodland, oak groves, or sycamore groves adjacent to grassland.	Incidental observation** during 2005-2006 avian survey.
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* 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.
*Listed in County of San Diego draft (East County) MSCP Plan covered species list
**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 2.1-2 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 (NGOs), and the public. These groups expressed concern for the risk to migrating birds and eagles from wind turbine collisions.

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 Tule, a variety of field studies and literature reviews were conducted (Table 2.3-1). 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.

Table 2.3-1 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 Protocol Golden Eagle Nest Surveys (WRI 2010)	Golden Eagles	Spring 2010
USFWS Protocol Golden Eagle Nest Surveys (WRI 2011)	Golden Eagles	Spring 2011
Golden Eagle Surveys and Nest Cameras (WRI 2011)	Golden Eagles	January – June 2011 (and ongoing)
Golden Eagle Telemetry	Golden Eagles	Summer 2011 (and ongoing)
Bat Acoustic Survey (Gruver et al. 2011)	All Bats	September 2008-November 2010

Avian Point Counts

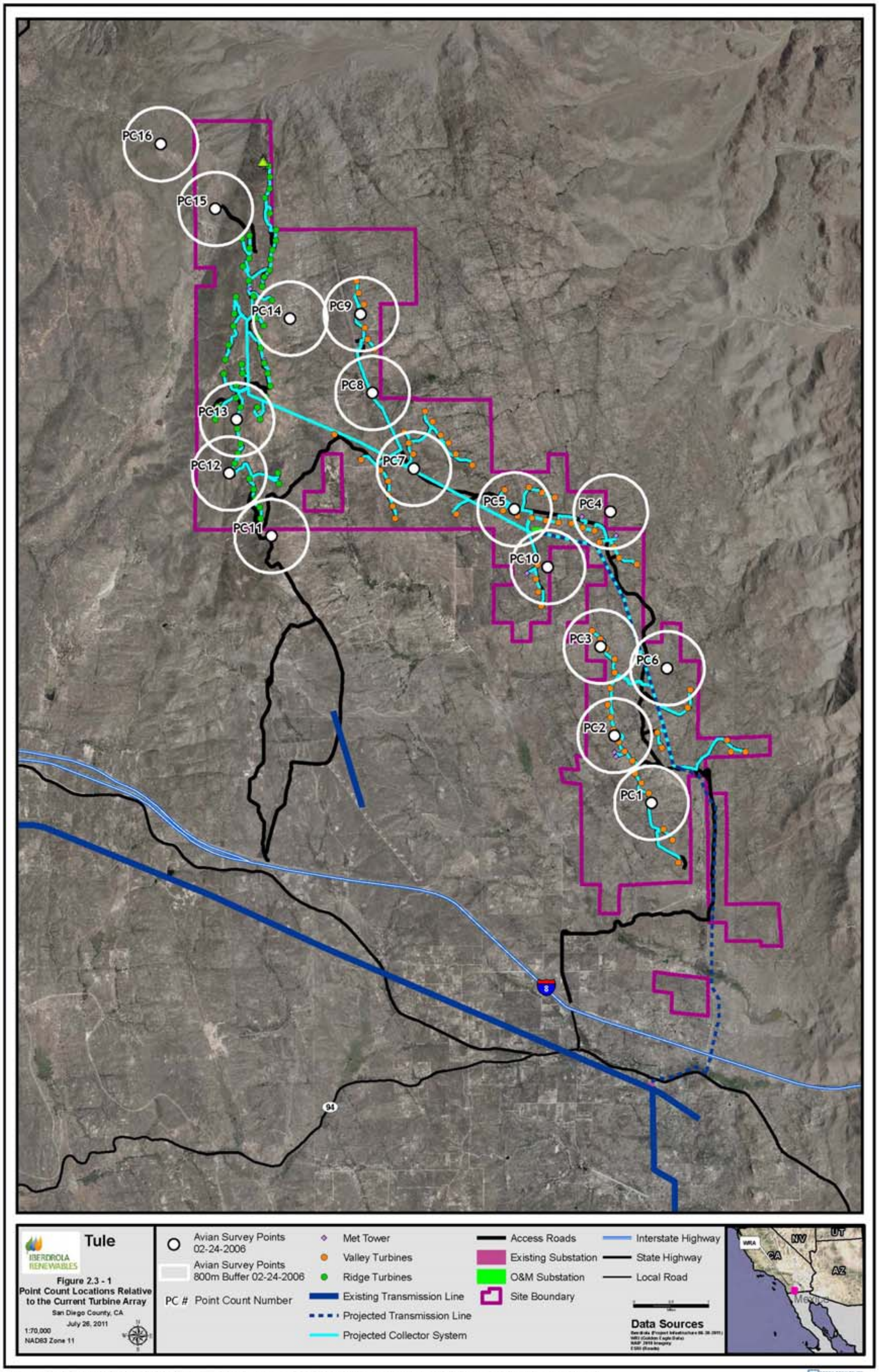
Avian point count surveys were conducted approximately every two weeks between March 25, 2005 and March 10, 2006 at 14 point count locations and between September 13, 2007 and September 12, 2008 at 16 point count locations (Figure 2.3-1). Thirty-minute fixed-point count surveys (800-meter [m] radius) were conducted at points distributed throughout Tule. 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 area (RSA) height/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 RSA/30 minutes in 2005-2006 and between 0.04 and 0.64 birds flying within the RSA/30 minutes in 2007-2008.

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 area [RSA] height/30 min and 0.21 birds flying at RSA height/30 min, respectively); thereby indicating the likelihood of turbine collisions is low compared to other facilities with seasonal raptor use (Tetra Tech 2009). Compared to other facilities with seasonal raptor use rates, 2007-2008 use rates at the 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 twice during surveys and once incidentally. 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.


PC16
PC15
PC14
PC9
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PC12
PC7
PC11
PC5
PC4
PC10
PC3
PC6
PC2
PC1
8
94
Tule
IBERDROLA RENEWABLES
Figure 2.3 - 1
Point Count Locations Relative to the Current Turbine Array
San Diego County, CA
July 26, 2011
1:70,000
NAD83 Zone 11
Avian Survey Points 02-24-2006
Avian Survey Points 800m Buffer 02-24-2006
PC # Point Count Number
Met Tower
Valley Turbines
Ridge Turbines
Existing Transmission Line
Projected Transmission Line
Projected Collector System
Access Roads
Existing Substation
O&M Substation
Site Boundary
Interstate Highway
State Highway
Local Road
Data Sources
NV
UT
CA
AZ
Mexico

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 Tule 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.

<u>Golden Eagle Surveys</u>

Golden Eagle Nest Surveys

In 2010, WRI conducted golden eagle nest surveys within 10 miles of the Project on March 30, 2010 by helicopter. WRI surveyed ten historic golden eagle territories, of which six were active, and of those, three of the nests had incubating adults (Figure 2.3-2; Cane Brake, Glenn Cliff, Moreno 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 within 500 m (1,640 feet) of a proposed string of turbines in the northern portion of Tule in 2010.

In 2011, WRI conducted USFWS protocol level surveys for golden eagles by helicopter within 10 miles of the 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 2.3-3). During the second round, surveys of the Agua Caliente territory were conducted from the ground, to avoid disturbing local bighorn sheep lambing. Eleven golden eagle territories were surveyed, six were observed to be occupied during the first round of surveys (Cane Brake, Coyote Mountains – West, Garnet Mountain, Glenn Cliff, Monument Peak, and Moreno Butte). Three of the territories were confirmed as productive during the second round of surveys (Cane Brake, Glenn Cliff, Moreno Butte) (WRI 2011).

Golden Eagles Detected During Point Count Surveys

Use of the 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. No eagles were detected in the Phase I portion of the Tule Wind Project. 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).

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 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: squirrels, chipmunks, ravens, red-tailed hawks, gopher snakes, and other unidentifiable species. In addition, the

Cane Brake camera also documented a siblicide event. Nest cameras will remain in place in order to collect data in future years.

FIGURE 2.3-2. 2010 Eagle Nest Survey Data

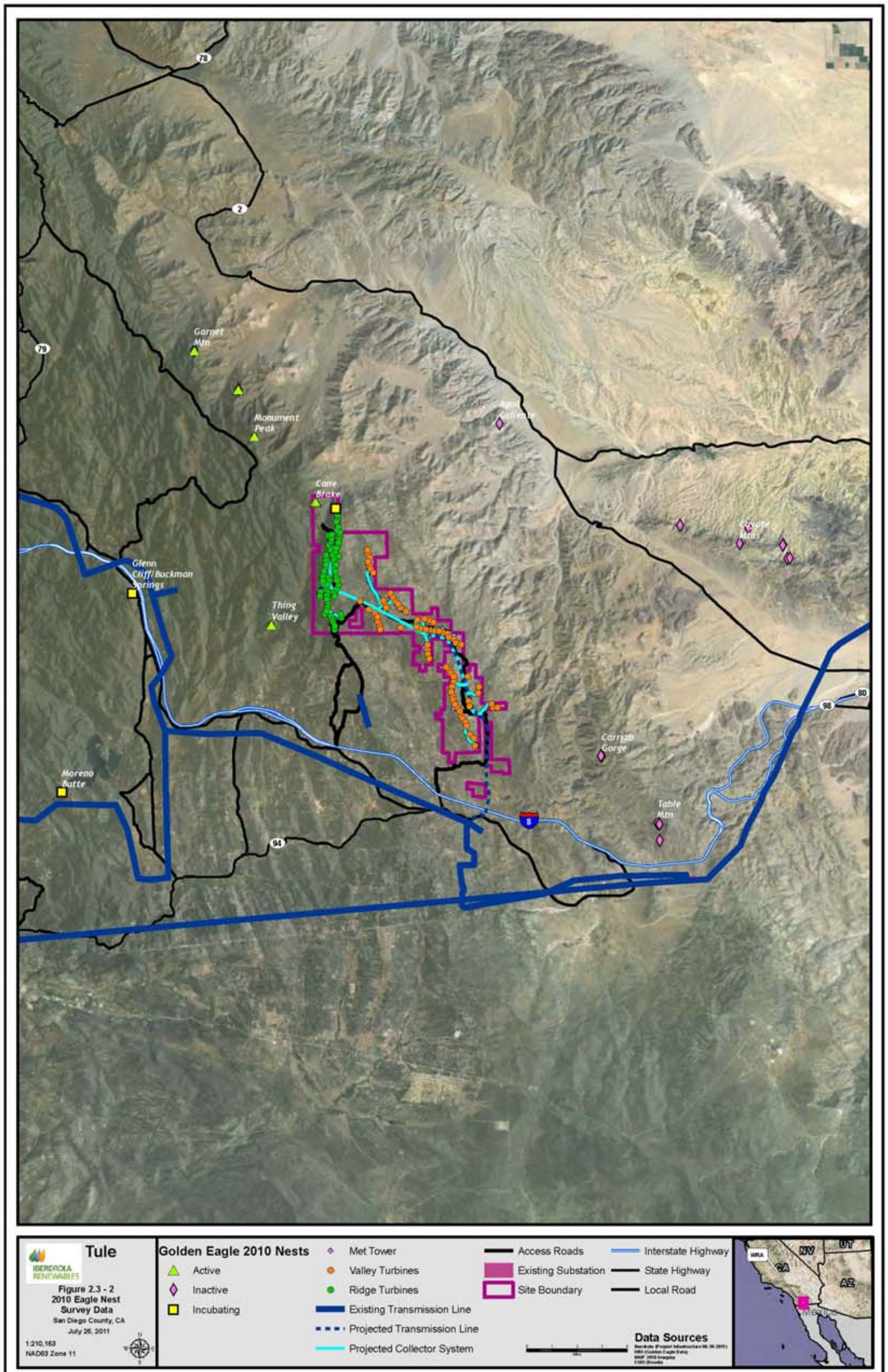
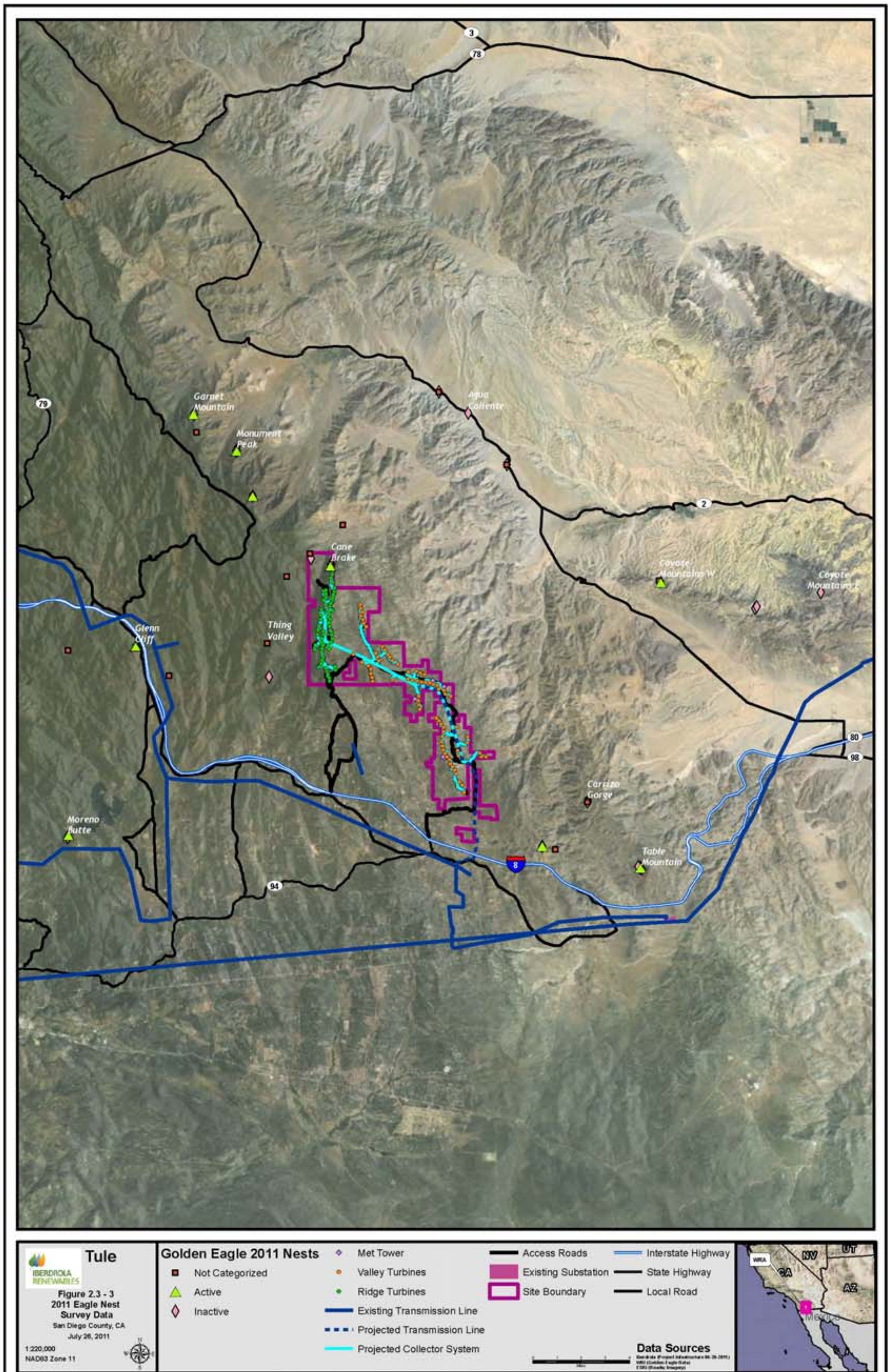


FIGURE 2.3-3. 2011 Eagle Nest Survey Data



Golden Eagle Flight Behavior Surveys

In order to more fully evaluate GOEA behavior and use of the area noted with initial survey efforts, WRI initiated weekly ground-based flight behavior surveys in January 2011 targeting the four golden eagle territories closest to the 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 Figures 2.3-4a-d) with the goal of mapping and describing flights by golden eagles within the territory and over the 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 105 flight paths were documented, of which two were within the Phase I – Valley project boundary and 65 were within the Phase II – Ridge project boundary.

WRI characterized general patterns of flight within each territory (Table 2.3-2). In the Thing Valley territory, eagles were observed on five occasions, including two flying above the ridgeline, over the Project along the southwest side of the In-Ko-Pah Mountain. In the Cane Brake territory, flights were generally oriented north to east from the core nest area on the northwest corner of the project area. The eagles were observed heading south less than 10 percent of the time and generally foraged north of the Project. In the Carizzo Gorge territory, no flights were observed over the Project, but two adults were observed making an undulating flight display near the southeast corner of the Project. In the Table Mountain territory, two adult golden eagles were seen soaring near the nest cliffs and ridge, but not over the Project.

Table 2.3-2 Ground-Based Flight Paths Relative to the Tule Wind Project

Month	Total Flight Paths Observed	Flight Paths within Phase I – Valley Project Boundary	Flight Paths within Phase II – Ridge Project Boundary
January	1	0	0
February	13	2	5
March	42	0	28
April	49	0	32
Total	**105**	**2**	**65**

Golden Eagle Telemetry Study

In order to more fully evaluate GOEA 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 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 trapsite 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 golden eagle nestling season. WRI successfully placed satellite telemetry transmitters on a total of five eaglets from the Cane Brake (1), Glenn Cliff (1), Moreno Butte (2), and O'Neal (1) territories in June 2011. The transmitters collect GPS locations at one hour intervals for up to three years. The telemetry data for 2011 movements (as of July 2011) is presented in Figures 2.3-3 and 2.3-4 and Table 2.3-3. The results for the first full year will be reported to FWS and CDFG and BLM and quarterly updates will be provided thereafter. If an agency does not provide a written assessment of the quarterly report within 30 calendar days, the quarterly reports to that agency will terminate. No monitored eagles had point locations within the Phase I Project boundary (WRI 2011). The Cane Brake fledging was located within the Phase II Project boundary for the majority of the point locations; whereas no other monitored eagles had point locations within the Project area. Similarly, a single flight path for both the O'Neal fledgling and the Glen Cliff adult suggest that these eagles may have crossed the Phase I project boundary. The O'Neal fledgling also had a flight path that may have crossed the Phase II Project boundary. The Cane Brake fledgling had multiple point locations that were suggestive that the fledgling regularly was flying through the northwestern-most portion of the Phase II project boundary. 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.

FIGURE 2.3-4. 2011 Golden Eagle Ground-based Nest Observations

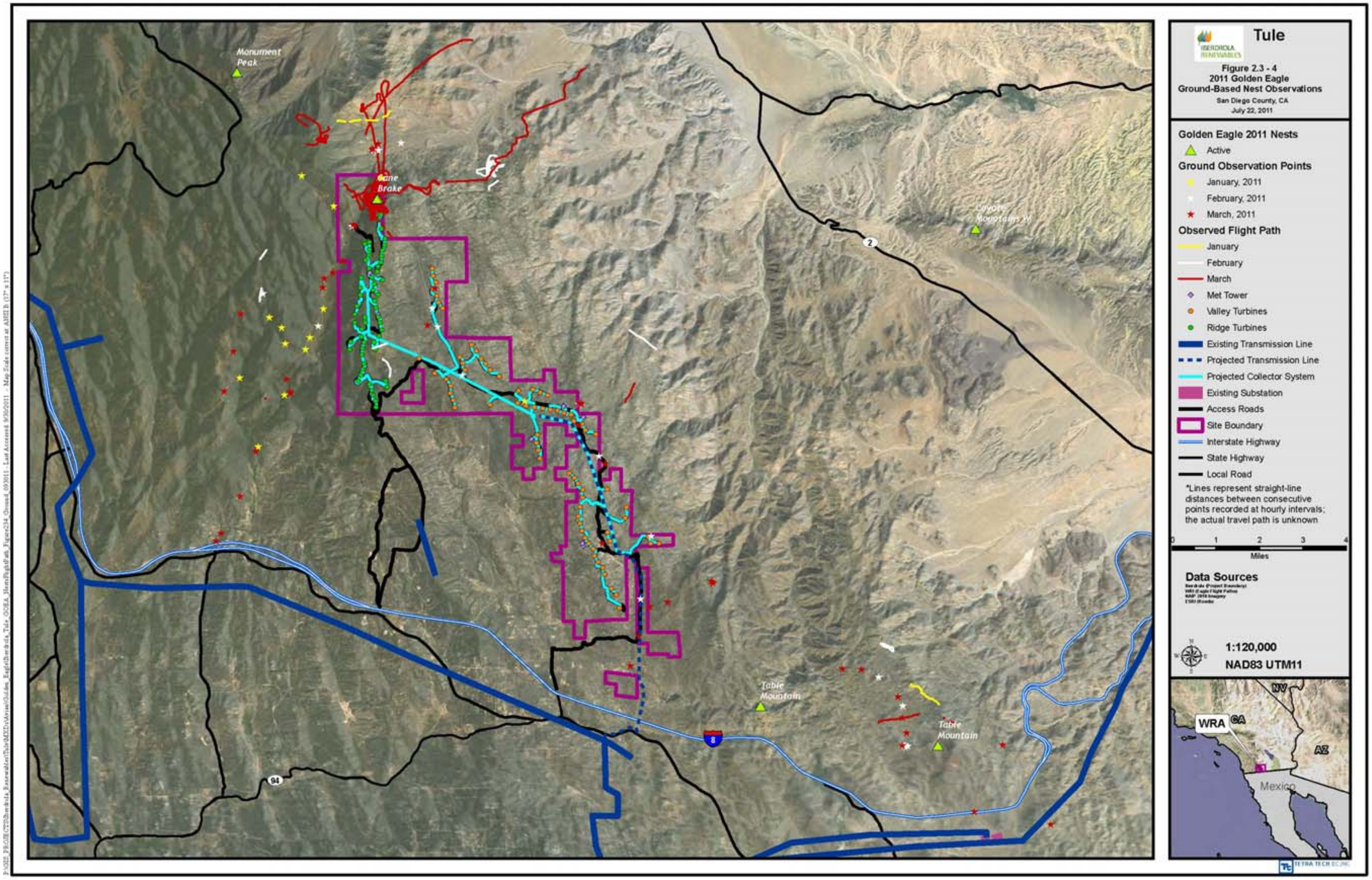


Table 2.3-3 Satellite tracking locations relative to Phase I and Phase II of the Tule Wind Project, June and July 2011

Eagle	Point Locations within Phase I – Valley Project Boundary	Point Locations within Phase II – Ridge Project Boundary	Point Locations Off of Project Boundaries	Number of Flight Connectors that May Have Crossed the Phase I – Valley Project Boundary	Number of Flight Connectors that May Have Crossed the Phase II – Ridge Project Boundary	Number of Flight Connectors that Do Not Intersect the Project Boundary
Cane Brake (fledgling)	0	485	96	0	510	70
Moreno Butte 1 (fledgling)	0	0	459	0	0	458
Moreno Butte 2 (fledgling)	0	0	550	0	0	549
O'Neal (fledgling)	0	0	758	1	1	756
Glen Cliff (adult)	0	0	120	1	0	117

Ongoing and Future Golden Eagle Surveys

Ongoing golden eagle studies in 2011 consist of (1) continued collection of nest photos in the eagle territories closest to the project and (2) telemetry studies of eaglets telemetered in summer 2011 in territories near the Project. Future avian use surveys for Phase II of the project will likely include additional point count surveys.

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. 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 versus raised) 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) 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 this project 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 2.3-4). 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 2.3-4 Bat species likely to occur in the vicinity of Tule Wind Project, sorted by call frequency (source: Gruver et al. 2011). With edits from DFG to include species of special concern.

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
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

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±0.13.64 (-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, 2.60 CI) 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, 50.95 CI) across all stations. The average bat activity for ground stations was 26.16± 62.55 (-2.62, 65.285 CI) bat passes per detector-night, and for raised stations was 6.69±25.84 (-1.22, 27.11 CI) 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. At station TR1, 41,472 bat passes were recorded on 208 detector-nights, averaging 199.38 bat passes per detector-night. At the five roaming bat feature stations, a total of 2,196 bat passes were recorded on 104 detector-nights, a mean of 21.11 passes per detector-night. The average across all bat feature stations was 64.59 bat passes per detector-night. Four roaming stations were established along Thing Valley Road in the northwest portion of the project area 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 bats (HF; 72.6% of all passes) followed by low-frequency passes (LF; 17.4%), mid-frequency passes (MF; 5.3%), and very low-frequency 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%). 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 high-frequency bats (HF; 86.1% of all passes) greatly outnumbered passes by low-frequency bats (LF; 9.7%), mid-frequency bats (MF; 3.4%), and very low-frequency 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 project area. Among raised stations, HF bats comprised about 68%, LF 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. Impacts Assessment – Golden Eagle

Estimating Collision Fatalities

The collision risk analysis follows the newly developed although untested model from the Service's Draft Eagle Conservation Plan Guidance which is based on the assumption that risk is proportional to use. The model uses the data available from two years of bimonthly avian point counts to estimate potential annual golden eagle fatalities at Phase I and Phase II of Tule separately. The analysis assumed that each golden eagle sighting within the RSA during a 30-minute point count equated to one minute of total time within the RSA; the same assumption used by USFWS in its analyses of such data (B. Millsap, USFWS, pers. comm. July 8, 2011). Data input for the analysis consisted of the average over two years of the total minutes of eagle sightings (t, exposure time). This sample exposure time was corrected 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 Project using the following equation:

> Exposure minutes (E) = T x (A/number of points/point count area) x (t/number of point counts/30).

From exposure minutes, we calculated the estimated annual fatality rate using the proportion of the project within 100 m of a turbine (D = 0.09 ha) and the observed collision rate (0.01) from Whitfield (2009) as:

Fatalities per year = E x D x collision rate.

= E * 0.09 * 0.01

Phase I Fatality Estimate – Applying the USFWS model published in the draft ECP Guidance (USFWS 2011) to point count data collected at points in the valley that encompass Phase I, the data input, t, for Phase I equaled 0 eagles. This produced an exposure minutes estimate of 0 minutes, and the estimated potential eagle fatalities per year for Phase I are therefore 0.

Phase II Fatality Estimate – Applying the USFWS model to point count data collected at points on the ridgetop that encompass Phase II, the data input, t, equaled 0.5 minutes. This produced an exposure minutes estimate of 56.7 minutes per year in the RSA, and the potential eagle fatalities were estimated to be 0.07 eagles per year or 1.5 eagles over a 20 year period for Phase II.

Eagle surveys to date at Tule indicate low use of the ridgetop (i.e., 2 golden eagles seen during two years of ridgetop avian point count (BUC) surveys; DEIS Appendix M). This pattern may reflect that eagles are foraging more frequently in the surrounding lowlands (D. Bittner, pers. comm.), as is supported by nest-based observations and satellite telemetry (Section 2.3.1, Figures 2.3-4 – 2.3-6). Additional surveys designed to document movements of eagles from known territories near Tule are ongoing in 2011, and will clarify the risk to foraging eagles with respect to Phase II (see Section 5.4) that was initially evaluated in the DEIR/DEIS. This supplementary analysis was contemplated in the DEIR/DEIS (see Mitigation Measure BIO-10f).

For new generation wind facilities, a standard assumption is that risk is proportional to use. For this Project, only two eagle sightings were recorded during two years of point count surveys conducted between 2006 and 2008, resulting in a rate of <0.01 eagles per 20 minutes in Tule. This rate is very low compared to wind projects of comparable scale in California, Oregon, and Washington for which information is available (Table 2.3-5). 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 have not (Young et al. 2003, Kerlinger et al. 2006, NWC & WEST 2007, Young et al. 2007, WEST 2008, . Thus, if risk is proportional to use, the probability of eagle fatalities is low. However, the presence of nesting and foraging eagles adjacent to the northern most portion of Tule suggest that turbine collisions may increase that risk for Phase II – Ridge Turbines.

For phase 1, the weight of evidence from the combination of quantitative fatality estimation based on avian point counts, 2011 ground surveys and telemetry monitoring of juvenile movements suggest low risk to eagles. As of June 2011, avian point counts had detected 0 minutes of use of the phase 1 project area, ground surveys had detected 2 flights potentially crossing the phase 1 project boundary, and telemetry studies had detected two flight connectors that may have crossed the phase 1 project boundary.

For phase 2, the weight of evidence from the combination of quantitative fatality estimation based on avian point counts, 2011 ground surveys and telemetry monitoring of juvenile movements suggest there may be higher risk to eagles. As of June 2011, avian point counts had detected 0.5 minutes of use of the northern portion of phase 2 project area, ground surveys had detected 65 flights crossing the phase 2 project boundary (primarily by the Cane Brake fledgling), and telemetry studies had detected 511 flight connectors that may have crossed the phase 2 project boundary (all but one by the Cane Brake fledgling and localized to the Cane Brake nest). The pattern of flights recorded to date suggests risk primarily to the Cane Brake nest, but ongoing surveys and telemetry are designed to refine this estimate.

FIGURE 2.3-5. 2011 Golden Eagle Satellite Telemetry REDACTED

REDACTED

FIGURE 2.3-6. 2011 Golden Eagle Satellite Telemetry Survey

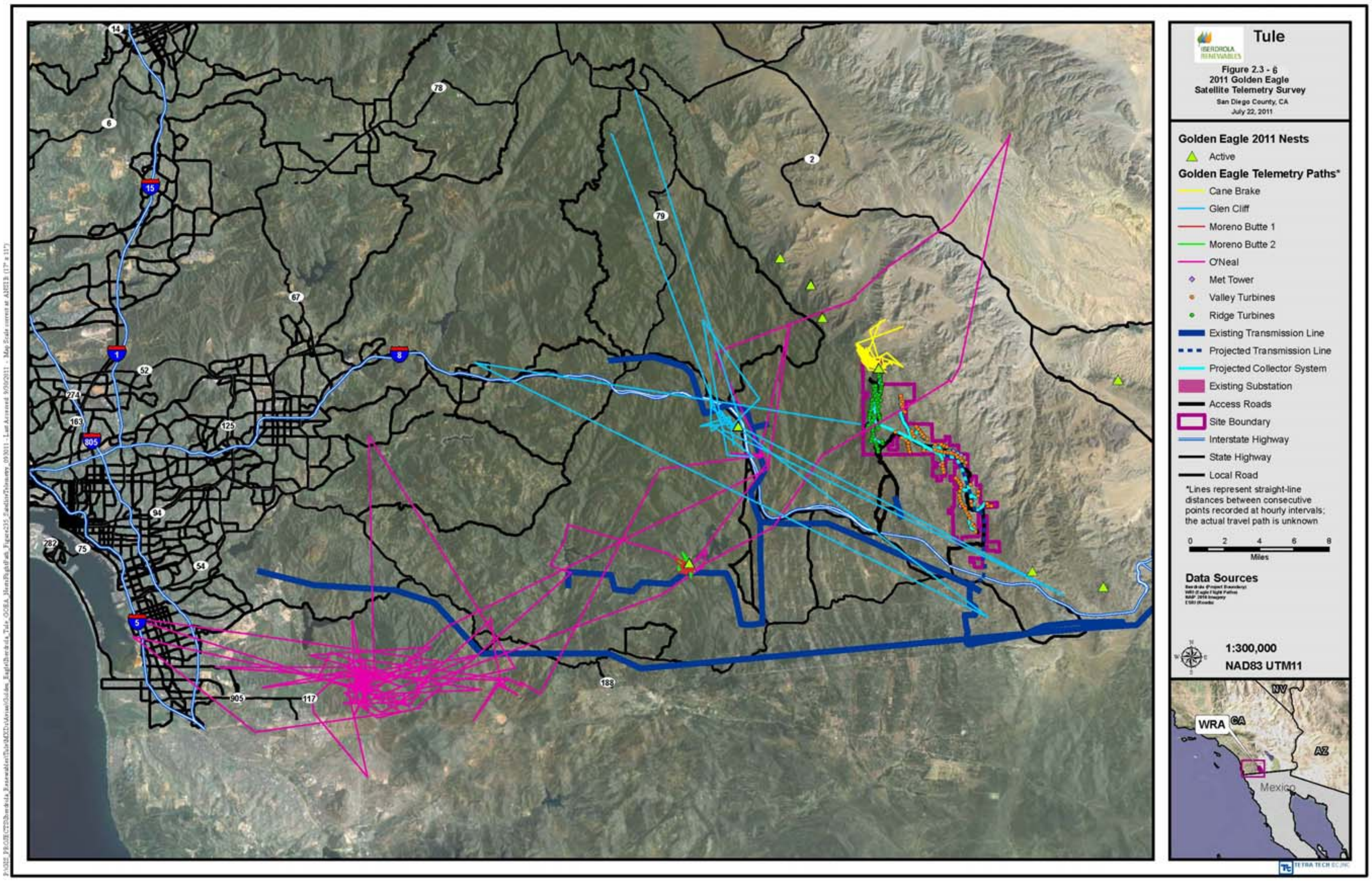


Table 2.3-5 Golden eagle use estimates in a variety of habitat in the western states standardized to number observed per 20-minute period (adapted from WEST, 2010)

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, 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). Tule will result in the installation of approximately 9.2 miles of 138 kV transmission line with 108 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). The risk of eagle electrocutions, discussed below, is low because the new lines will be constructed following APLIC guidelines. Golden eagle risk due to meteorological towers is likely to be low due to the absence of guy lines.

Electrocution

Golden eagle fatalities occur as a result of electrocution on power line structures (Harness and Wilson 2001, 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 Tule by following APLIC standards (APLIC 2006); therefore, overall risk from electrocution is very low to non-existent.

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 2.3-6), although USFWS Region 8 recommends a buffer ≥1 mile based in part on unpublished data (H. Beeler, pers. comm.) .

Table 2.3-6 Summary of research or policy-based buffer distances for golden eagles

Restrictions		Location	Activity	Notes	Reference
Spatial	Temporal				
Research-Based Literature					
1.0 mile	Unknown	CO and WY	Pipeline		Olendorff and Zeedyk 1978
0.19 mile	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 mile	Unknown	Unknown	General	Response to questionnaire provided to raptor experts	Fuller in Suter and Joness 1981
0.5 mile	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 mile	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

Restrictions		Location	Activity	Notes	Reference
Spatial	Temporal				
0.12 to 1 miles	March 1 to September 1	Western U.S.	Visual and audible disturbance		Suter and Joness 1981
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 Tule (Figure 2.3-1; WRI, 2011). Six of the territories were active per year in 2010 and 2011 (WRI 2010, 2011). The closest territory had an active nest within 500 m (1,640 feet) of a proposed string of turbines in the northern portion of Tule in 2010. Nest disturbance will be minimized through the implementation of minimization measures, including a 1-mile buffer around active eagle nests. Based solely on use of Tule, overall risk is low, because point counts suggest the eagles do not use the Project area frequently. Ongoing surveys are being conducted to provide more information regarding the Phase II area. The close proximity of the Cane Brake nest, within 1 mile of Tule, suggests moderate risk of disturbance from the northernmost turbines in Phase II, but the nest is below the ridgeline with no direct line of sight to the proposed turbines. Because of the distance to Phase I, there is no risk of nest disturbance for Phase I. Surveys at this nest to date suggest that the eagles primarily forage along the south side of the Cane Brake valley, below the ridgeline (WRI, unpublished data). Eagle surveys ongoing in 2011 will clarify this risk by providing information on the movements of eagles in this and other territories near Tule.

Habitat Loss and Fragmentation

Indirect impacts of Tule to eagles could occur from permanent and temporary disturbance of prey habitat due to construction of Tule facilities, a disturbance that would be limited to a maximum of 725 acres for both phases. The density of the shrubby vegetation and the overall low 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). Eagle use of the Phase I – Valley turbine landscape has been minimal to date, thus suggesting disturbance is likely to have minimal if any effect. Ground disturbance would be minimized to the extent practicable during Tule 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 this risk by providing information on the movements of eagle territories near Tule.

2.3.2 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. 2001; 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). 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 Tule suggest there are no major concentrations of non-raptors during the breeding season or during migration. Songbirds, crows/allies, and swifts/hummingbirds are likely to use Tule 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 Tule 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 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 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 Tule suggest that raptor mortality is anticipated to be low (Young et al. 2003). 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 area 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 rates observed for red-tailed hawks and turkey vultures result in low encounter rates for these species, indicating their probability of negative interactions with turbines is low.

Based on the summary above and information known on collision risk nationally (Table 2.3-7; mean fatality rate = 2.1 birds/MW/year), the collision risk for birds at Tule will be low. This risk will be further reduced through measures taken during the design, construction, and operational phases of Tule (Tables 3.1-1, 3.1-2, 5.1-1). Key avoidance and minimization measures include construction of the transmission line following Avian Power Line Interaction Committee (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 Tule 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 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 Project features may disturb or displace birds. The impacts to birds from disturbance or displacement from Tule are likely to be low. Also, Tule is in an area of intense human activity consisting of the existing BLM operated Off-Highway Vehicle staging and trail riding area; McCain Valley Road; a new high-voltage transmission line (Sunrise) currently under construction on the site of the 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 Tule (Tables 3.1-1, 3.1-2, and 5.1-1). 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. However, the construction of Tule is not likely to significantly increase the degree of habitat fragmentation of the area because the majority of the wind farm is located on habitat that is already fragmented due to the roads, trails and multiple uses within the area. Potential habitat fragmentation resulting from Tule will be reduced through avoidance and minimization measures taken during the design, construction, and operational phases of the Project (Tables 3.1-1, 3.1-2, and 5.1-1). Key measures include minimization of habitat disturbance, and burial of collector lines.

Table 2.3-7 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. 2003)	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	--

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
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	--
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

2.3.3 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 air-containing structures (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 2.3-8, 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 Tule (Table 2.3-5), 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 TWRA 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 should be 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 should be 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 roosting mesic habitat and the low quality foraging habitat present, bats are unlikely to be displaced or disturbed by the construction and operation of Tule.

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 Tule, and was investigated in 2010. None of the known mine shafts within Tule 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), 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 (*Lasiurus cinereus),* 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 Tule, fragmentation impacts are expected to be low.

2.3.4 Cumulative Impacts

The pre-existing developments within the area considered for cumulative impacts by the DEIR/DEIS include farming and ranching, interstate highway 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 risks of poisoning from evaporation ponds and burning at focal points.

Documented in this ABPP, Tule Wind LLC, in collaboration with the USFWS, have outlined a strategy within an adaptive management framework to ensure Tule will meet the current no-net loss standard for local breeding eagle populations (USFWS 2010a). 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) will account for any remaining unavoidable impacts.

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 Technical Advisory Council (TAC) comprised of individuals from the FWS, BLM, CDFG, a Tribal representative that is a biologist and Tule Wind LLC. Upon determination of impact levels that warrant a reaction from Tule, 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.

Table 2.3-8 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, litle brown, big brown
Buffalo Ridge, Phase II, MN (Johnson et al. 2000b)	Agriculture, grazed pasturelands	1.78	-	hoary, red, silver-haired, eastern pipistrelles, litle brown, big brown
Buffalo Ridge, Phase III, MN (Johnson et al. 2000b)	Agriculture, grazed pasturelands	2.04	-	hoary, red, silver-haired, eastern pipistrelles, litle 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. 2003)	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
Kewaunee County, WI (Poulton 2010)	Agriculture	4.26	6.45	red, hoary

Wind facility and state	Habitat	Estimated mean bat fatality/ turbine/year	Estimated mean bat fatality/MW/year	Documented bat species
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
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 agency proposed the avoidance and minimization measures are outlined in the following section and further documents in Tule Wind LLC's submittal to the lead agencies (HDR 2010) and in the DEIS/DEIR. Measures beginning with "MM-BIO" represent mitigation measures proposed in the draft DEIS/DEIR, and are subject to change by the lead agencies in the Final EIS/EIR. 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. 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 Tule Wind Project siting avoidance and minimization measures

Avoidance and Minimization Measures	Non-raptors	Raptors	Eagles	Bats	DEIS Reference
Phased Development Approach			X		MM-BIO-10f
Free-standing Met Tower	X	X	X	X	
Obtain and Implement Permits for Federal or State-Listed Species	X	X			MM-BIO-7f
Follow APLIC Guidelines	X	X	X	X	MM-BIO-10a, BIO-7f
Develop and Implement an ABPP	X	X	X	X	MM-BIO-10b, BIO-7e
Design Turbines to Avoid Bird and Bat Resources	X	X	X	X	MM-BIO-10c
Minimize Lighting	X			X	MM-BIO-10d, BIO-8b, BIO10
Minimize Impacts to Special Status Species	X	X			MM-BIO-10b, 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

Tule Wind LLC- and agency-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 DEIS/DEIR. Measures beginning with "MM-BIO" represent mitigation measures proposed in the DEIS/DEIR, and are subject to change by the lead agencies in the Final EIS/EIR. 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.

Construction of turbines in Phase II of the project will only be authorized following detailed behavioral telemetry studies and continued nest monitoring of known eagles in the vicinity of Tule (considered to be within approximately 10 miles of the project). Behavior studies will be used to determine eagle usage and forage areas, and authorization for construction at each turbine location in the Phase II will be at the discretion of the BLM or the appropriate land management entity.

The final criteria determining the risk each location presents to eagles will be determined by the BLM or the appropriate land management agency, in consultation with the required resource agencies, tribes and other relevant permitting entities and will be detailed in the Avian Protection Plan. Tule Wind LLC will work with the USFWS to develop criteria related to the proportion of the observed golden eagle use areas (based on the telemetry data) within proposed turbine strings to determine the risk of these turbines on individual eagles in the vicinity. Criteria will also be developed related to past and current nest occupancy and productivity (based on past and continued nest monitoring data) for the monitored nests in the project vicinity to determine the risk of the construction of turbines on the eagle population. Turbine locations exceeding the acceptable risk levels to golden eagles based on these final criteria will not be authorized for construction.

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

MM-BIO-7f. Obtain and Implement Permits for Federal or State-Listed Species. Obtain and implement the terms of agency permit(s) with jurisdiction federal or state-listed species. If determined necessary, the applicant shall obtain a biological opinion through Section 7 consultation between the BLM and USFWS for impacts to federally listed wildlife species and a Section 2081 permit (or consistency determination) from the California Department of Fish and Game for impacts to state-listed wildlife species resulting from this project. The terms and conditions included in these authorizations shall be implemented, which may include seasonal restrictions, relocation, monitoring/reporting specifications, and/or habitat compensation through restoration or acquisition of suitable habitat.

MM-BIO-10a. Follow APLIC Guidelines. Design all transmission towers and lines to conform to Avian Power Line Interaction Committee standards. The proposed project shall implement recommendations by the Avian Power Line Interaction Committee (2006), which will protect raptors and other birds from electrocution. These measures are sufficient to protect even the largest birds that may perch or roost on transmission lines or towers from electrocution.

MM-BIO-10b Develop and Implement Project-specific Avian Protection Plans. Develop and implement an Avian Protection Plan related to wire, transmission tower, and facilities impacts from electrocution and collision of bird species. An Avian Protection Plan shall be developed jointly with the USFWS and CDFG and shall provide the framework necessary for implementing a program to reduce bird mortalities and document actions. The Avian Protection Plan shall include the following: corporate policy (see http://www.iberdrolarenewables.us/pdf/Signed_ABPP_10-28-08.pdf), training, permit compliance, construction design standards, nest management, avian reporting system, risk assessment methodology, mortality reduction measures, avian enhancement options, quality control, public awareness, and key resources.

MM-BIO-10c. Develop and Implement an ABPP. Design and configure wind turbines to maximally avoid and minimize bird and bat resources. Various design features shall be used to reduce or avoid impacts to bird and bat species. These may include avoiding guy wires, reducing impacts with appropriate turbine layout based on micro-siting decisions that may include such refinements as placing all turbines on the ridgeline and avoiding placement of turbines on slopes and within canyons, placing power lines underground as much as feasible, and reducing foraging resources near turbines.

MM-BIO-10d. Minimize turbine lighting. Night-lighting may serve as an attractant for birds, especially migrants, which may be attracted to the light and then become unable to leave it. Except where FAA requirements determine the requirements for lighting, any lighting that attracts birds shall be avoided on the turbines.

MM-BIO-14b. Minimize Impacts to Special Status Species. Impacts to special status species shall 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 shall be put into place. These measures shall be designed to avoid any significant reduction in species viability. For special status species, impacts shall be mitigated through provision of habitat based mitigation, as required under Mitigation Measure BIO-1a.

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 agency-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 DEIS/DEIR. Measures beginning with "MM-BIO" represent mitigation measures proposed in the DEIS/DEIR, and are subject to change by the lead agencies in the Final EIS/EIR. 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.

Construction of Tule will require 12 months; currently scheduled to start in the third quarter of 2011 and be completed in late 2012. The timing estimate assumes that the construction of the project will not be remobilized to construct Phase II. If Phase II 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.

MM-BIO-1a. **Minimize Impacts.** Confine all construction and construction-related activities to the minimum necessary area as defined by the final engineering plans. All construction areas, access to construction areas, and construction-related activities shall be strictly limited to the areas identified on the final engineering plans. The limits of the approved work space shall be delineated with orange construction fencing that shall be maintained throughout the construction period. An environmental monitor shall complete regular observations to ensure that all work is completed within the approved work limits. In the event any work occurs beyond the approved limits, it shall be reported. During and after construction, entrances to access roads shall be gated to prevent the unauthorized use of these construction access roads by the general public. Signs prohibiting unauthorized use of the access roads shall be posted on these gates.

MM-BIO-1b. Contractor Training. Conduct contractor training for all construction staff. Prior to construction, all developer, contractor, and subcontractor personnel shall receive training regarding the appropriate work practices necessary to implement the mitigation measures and comply with environmental regulations, including plant and wildlife species avoidance, impact minimization, and best management practices. Sign-in sheets and hard hat decals shall be provided that document contractor training has been completed for construction personnel.

Table 3-2 Species groups that would benefit from Tule Wind Project construction avoidance and minimization measures

Avoidance and Minimization Measures	Non-raptors	Raptors	Eagles	Bats	DEIS Reference
Minimize Impacts	X	X	X	X	MM-BIO-1a
Contractor Training	X	X	X	X	MM-BIO-1b, GAMM-2,6d
Biological Construction Monitoring	X	X	X		MM-BIO-1c
Flagging of Wetlands	X			X	MM-BIO-2a
Noxious Weeds and Invasive Species Control Plan	X	X	X	X	MM-BIO-2a
Salvage and Reapplication of Topsoil	X	X	X	X	MM-BIO-3b
Fence Special Status Plant Species	X			X	MM-BIO-5a
Implement Construction BMPs	X	X	X	X	MM-BIO-6a
Cover Excavated Areas	X				MM-BIO-7a
Enforce Speed Limits	X	X	X		MM-BIO-7b
Minimize Night Construction Lighting	X	X	X	X	MM-BIO-7c, BIO-10
Trash Abatement	X	X	X		MM-BIO-7d, BIO-6c
Prohibit Harassment/feeding of Wildlife	X	X	X		MM-BIO-7e, Bio-6b
Pre-construction Nesting Bird Surveys and Avoidance Measures	X	X	X		MM-BIO-7j, BIO-7d
Follow APLIC Guidelines	X	X	X		MM-BIO-10a
Vegetation Removal Outside of Bird Nesting Season	X	X			MM-BIO-11a
Raptor Nest Surveys and Buffers					MM-BIO-12, BIO-12
Presence of a Biological Monitor	X	X	X	X	MM-BIO-14c, 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

MM-BIO-1c. Conduct biological construction monitoring. An authorized biological monitor must be present at the construction sites during all ground disturbing and vegetation removal activities. The monitor shall survey the construction sites and surrounding areas for compliance with all environmental specifications. Weekly biological construction monitoring reports shall be prepared and submitted to the appropriate permitting and responsible agencies through the duration of the ground disturbing and vegetation removal construction phase. Monthly biological construction monitoring reports shall be prepared and submitted through the duration of project construction to document compliance with environmental requirements.

MM-BIO-1c. Tule Wind LLC shall minimize the clearing of existing trees and shrubs during site design and construction to the greatest practicable extent. A biological monitor shall monitor and quantify impacts to be used for impacts assessment at the conclusion of construction.

MM-BIO-2a. Flagging of Wetlands. Limit temporary and permanent impacts to jurisdictional features to the minimum necessary as defined by the final engineering plans. Obtain and implement the terms and conditions of agency permit(s) for unavoidable impacts to jurisdictional wetlands and waters. All construction areas, access to construction areas, and construction-related activities shall be strictly limited to the areas within the approved work limits identified on the final engineering plans. The limits of construction shall be delineated with orange construction fencing and maintained throughout construction to avoid and minimize impacts to jurisdictional resources.

MM BIO-3a. Noxious Weeds and Invasive Species Control Plan. A Noxious Weeds and Invasive Species Control Plan shall be prepared and reviewed by applicable permitting agencies. The plan shall be implemented during all phases of project construction and operation. The plan shall include best management practices to avoid and minimize the direct or indirect effect of the establishment and spread of invasive plant species during construction. Implementation of specific protective measures shall be required during construction, such as cleaning vehicles prior to off-road use, using weed-free imported soil/material, restricting vegetation removal, and requiring topsoil storage. Development and implementation of weed management procedures shall be used to monitor and control the spread of weed populations along the construction access and transmission line right-of-ways. Vehicles used in transmission line construction shall be cleaned prior to operation off of maintained roads. Existing vegetation shall be cleared only from areas scheduled for immediate construction work and only for the width needed for active construction activities. Noxious weed management shall be conducted annually to prevent the establishment and spread of invasive plant species. This shall include weed abatement efforts targeted at plants listed as invasive exotics by the California Exotic Plant Pest Council in its most recent A or Red Alert list. Pesticide use shall be limited to non-persistent pesticides and shall only be applied in accordance with label and application permit directions and restrictions for terrestrial and aquatic applications.

MM-BIO-3a. Revegetating Temporary Impacts. Temporary impacts to vegetation communities will be mitigated through revegetaton of impacted areas. Revegetation will involve recontouring the land, replacing collected topsoil, planting seed and/or container stock, and maintaining (i.e., weeding, replacement planting, supplemental watering, etc.) and monitoring the restored area. Any revegetation efforts will be subject to a revegetation plan approved by the BLM, County of San Diego, and other regulatory agencies. Areas to be revegetated will include all areas temporarily impacted by construction, such as wind turbine construction sites, laydown/staging areas, and temporary access roads. Reclamation activities will be undertaken as early as possible on disturbed areas. Additional reclamation measures will be developed to address site-specific conditions, as necessary.

MM-BIO-3b. Salvage and Reapplication of Topsoil. Topsoil from all decommissioning activities will be salvaged and reapplied during final reclamation. All areas of disturbed soil will be reclaimed using weed-free native shrubs, grasses, and forbs. The vegetation cover, composition, and diversity will be restored to values commensurate with the area's ecological setting.

MM-BIO-5a. Fence Special Status Plant Species. Install fencing or flagging around identified special status plant species populations in the construction areas. For areas without existing rare plant data, prior to the start of construction, a qualified biologist shall conduct focused surveys during the appropriate blooming period for special status plant species for all construction areas. All of the special status plant locations shall be recorded using a Global Positioning System (GPS), which will be used to site the avoidance fencing/flagging. Special status plant species shall be avoided to the maximum extent possible by all construction activities. The boundaries of all special status plant species to be avoided shall be delineated in the field with clearly visible fencing or flagging. The fencing/flagging shall be maintained for the duration of project construction activities.

MM-BIO-6a. Implement Construction BMPs. Tule Wind LLC shall implement construction BMPs identified in applicable permits and required avoidance, minimization, and mitigation measures to minimize and/or avoid potential impacts the project could have on wildlife.

MM-BIO-7a. Cover Excavated Areas. Cover and/or provide escape routes for wildlife from excavated areas and monitor these areas daily. All steep trenches and excavations during construction shall be inspected twice daily (i.e., morning and evening) by a qualified biologist to monitor for wildlife entrapment. Large/steep excavations shall be covered and/or fenced nightly to prevent wildlife entrapment. Excavations shall provide an earthen ramp to allow for a wildlife escape route.

MM-BIO-7b. Enforce Speed Limits. Enforce speed limits in and around all construction areas. Vehicles shall not exceed 25 miles per hour on any gravel roads accessing the construction site or 20 miles per hour on the construction site.

MM-BIO-7c. Minimize Night Construction Lighting. Minimize night construction lighting adjacent to native habitats. Lighting of construction areas at night shall be the minimum necessary for personnel safety and shall be low illumination, selectively placed, and directed/shielded appropriately to minimize lighting in adjacent native habitats.

MM-BIO-7d. Trash Abatement. Prohibit littering and remove trash from construction areas daily. Littering shall not be allowed by the project personnel. All food-related trash and garbage shall be removed from the construction sites on a daily basis.

BIO-6c. Trash Abatement. Littering will not be allowed. Garbage and trash will be removed from the project area daily.

MM-BIO-7e. Prohibit Harassment/feeding of Wildlife. Prohibit the harm, harassment, collection of, or feeding of wildlife. Project personnel shall not harm, harass, collect, or feed wildlife. No pets shall be allowed in the construction areas.

BIO-6b. Prohibit Harassment of Wildlife. All construction employees will be trained and instructed to avoid harassment and disturbance of wildlife, and training will reinforce that no plants or wildlife should be collected from the proposed project site.

MM-BIO-7j. Pre-construction Nesting Bird Surveys and Avoidance Measures. Conduct pre-construction nesting bird surveys and implement appropriate avoidance measures for identified nesting birds. If the project must occur during the avian breeding season (February 1st to August 31st, as early as January 1 for some raptors) Tule should work with the CDFG, BLM and the USFWS to prepare a Nesting Bird Management, Monitoring, and Reporting Plan (NBMMRP) to address avoidance of impacts to nesting birds.

Tule will submit to the Agencies the NBMMRP (see following for details) for review and approval prior to commencement of the project during the breeding season. The NBMMRP should include the following:

1. Nest Survey Protocols describing the nest survey methodologies;
2. a Management Plan describing the methods to be used to avoid nesting birds and their nests, eggs, and chicks;
3. a Monitoring and Reporting Plan detailing the information to be collected for incorporation into a regular Nest Monitoring Log with sufficient details to enable USFSW and CDFG to monitor the Tule's compliance with Fish and Game Code sections 3503, 3503.5, 3511, and 3513;
4. a schedule for the submittal (usually weekly) of the Nest Monitoring Logs;
5. standard buffer widths deemed adequate to avoid or minimize significant project-related edge effects (disturbance) on nesting birds and their nests, eggs, and chicks;
6. a detailed explanation of how the buffer widths were determined; and
7. all measures Tule will implement to preclude birds from utilizing project-related structures (*i.e.*, construction equipment, facilities, or materials) for nesting.

To determine presence of nesting birds that the project activities may affect, surveys should be conducted beyond the project area - 300 feet for passerine birds and 500 feet for raptors. The survey protocols should include a detailed description of methodologies utilized by Department-approved avian biologists to search for nests and describe avian behaviors that indicate active nests. The protocols should include but is not limited to; the size of project corridor being surveyed, method of search, behavior that indicates active nests.

Each nest identified in the project area should be included in the Nest Monitoring Log. The Nest Monitoring Logs (NMLs) should be updated daily and submitted to the Department weekly. Since the purpose of the NMLs is to allow the Department to track compliance, the

NMLs should include information necessary to allow comparison between nests protected by standard buffer widths recommended for the project (300 feet for passerine birds, 500 feet for raptors) and nests whose standard buffer width was reduced by encroachment of project-related activities. The NMLs should provide a summary of each nest identified, including the species, status of the nest, buffer information, and fledge or failure data. The NMLs will allow tracking the success and failure of the buffers and will provide data on the adequacy of the buffers for certain species.

Tule will rely on its avian biologists to determine the appropriate standard buffer widths for nests within the project corridor/footprint to employ based on the sensitivity levels of specific species or guilds of avian species. The determination of the standard buffer widths should be site- and species/guild-specific and data-driven and not based on generalized assumptions regarding all nesting birds. The determination of the buffer widths should consider the following factors:

a. nesting chronologies;

b. geographic location;

c. existing ambient conditions (human activity within line of sight - cars, bikes, pedestrians, dogs, noise);

d. type and extent of disturbance (*e.g.*, noise levels and quality - punctuated, continual, ground vibrations - blasting-related vibrations proximate to tern colonies are known to make the birds flush the nests);

e. visibility of disturbance;

f. duration and timing of disturbance;

g. influence of other environmental factors; and

h. species' site-specific level of habituation to the disturbance.

Application of the standard buffer widths should avoid the potential for project-related nest abandonment and failure of fledging, and minimize any disturbance to the nesting behavior. If project activities cause or contribute to a bird being flushed from a nest, the buffer must be widened.

MM-BIO-11a. Vegetation Removal Outside of Bird Nesting Season. Conduct maintenance activities resulting in vegetation disturbance outside of the bird nesting season or conduct pre-construction nesting bird surveys. Maintenance activities with the potential to result in direct or indirect habitat disturbance, most notably vegetation management, shall be conducted outside of the bird nesting season to the maximum extent practicable. Where avoidance is not possible, the project proponent shall conduct pre-construction nesting bird surveys to determine the presence/absence of active nests in or adjacent to construction areas. If active nests are identified, appropriate avoidance measures would be identified and implemented to prevent disturbance to the nesting bird(s). If federal or state-listed nesting birds are identified, the project proponent shall contact the USFWS and/or CDFG to determine the appropriate course of action.

4. Post-Construction Studies

4.1 Tier 4: Post-Construction Fatality Studies

As part of the ABPP, Tule Wind LLC will implement the Wildlife Monitoring and Reporting System (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 (FAC) 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 post-construction fatality surveys (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 of Tule Wind, 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.

REDACTED

REDACTED

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.
REDACTED

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 (QA/QC) for the program.

REDACTED

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. REDACTED

- REDACTED

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

Steve Cannata
California Dept. of Fish and Game
3883 Ruffin Road
San Diego, CA 92123
SCANNATA@dfg.ca.gov
Phone: (858) 467-4236

- REDACTED

Training

REDACTED

Audits and Reporting

REDACTED

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 operation modifications (e.g., curtailment); 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 Migratory Bird Treaty Act (MBTA), the Bald and Golden Eagle Protection Act (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]

5.1 Operational Avoidance and Minimization Measures

Tule Wind LLC- and agency-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 DEIS/DEIR. Measures beginning with "MM-BIO" represent mitigation measures proposed in the DEIS/DEIR, and are subject to change by the lead agencies in the Final EIS/EIR. Other measures are delineated as follows: "BIO" represent applicant proposed measures, "AMM" represent applicant proposed mitigation measures, and "GAMMM" represent operational avoidance, minimization, and mitigation measures. A summary of species likely to benefit from avoidance and minimization measures is shown in Table 5-1.

MM-BIO-10b. Develop and Implement Project-specific Avian Protection Plans. Develop and implement an Avian Protection Plan related to wire, transmission tower, and facilities impacts from electrocution and collision of bird species. An Avian Protection Plan shall be developed jointly with the USFWS and CDFG and shall provide the framework necessary for implementing a program to reduce bird mortalities and document actions. The Avian Protection Plan shall include the following: corporate policy (see http://www.iberdrolarenewables.us/pdf/Signed_ABPP_10-28-08.pdf), training, permit

[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.

compliance, construction design standards, nest management, avian reporting system, risk assessment methodology, mortality reduction measures, avian enhancement options, quality control, public awareness, and key resources.

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	DEIS Reference
Implement an ABPP	X	X	X	X	MM-BIO-10b BIO-8d
Post-construction Mortality Monitoring	X	X	X	X	MM-BIO-10e
Golden Eagle Nest Surveys			X		MM-BIO-10g
Implement Adaptive Management Program	X	X	X	X	MM-BIO-10h
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 cies	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 was addressed in the EIR (see below). See Section 4 for details on post-construction mortality monitoring, including details about IRI's Wildlife Monitoring and Reporting System (WMRS), which consists of a systematic approach to monitoring and reporting bird and bat fatalities.

MM-BIO-10e. Post-construction Mortality Monitoring. Conduct a minimum of 3 years of post-construction bird and bat mortality monitoring, as described in a Post-Construction Monitoring Program developed 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, then an additional 2 years of data collection will be required such that the surveys are conducted during a good rain year. Additionally, if post-construction bird and bat mortality monitoring during the first 3 years identifies mortality inconsistent with the pre-project impact assessments, additional years of post-construction bird and bat mortality monitoring may be required by the wildlife agencies, as described the ABPP. This plan shall be reviewed by the permitting agencies prior to project initiation. At a minimum, the plan shall outline the monitoring methods, evaluation methods, threshold criteria for action, and types of management actions to be undertaken. Annual monitoring reports shall be submitted to the wildlife agencies and lead agencies as appropriate.

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

MM-BIO-10g. Golden Eagle Nest Surveys. Conduct periodic surveys of golden eagle territories as provided in the Avian and Bat Protection Plan. Conduct surveys to determine location of active nest, number of eggs laid and number of young fledged, as described by USFWS (2010a). Monitoring reports shall be provided to the wildlife agencies and the Bureau of Land Management.

Golden eagle nest surveys will be conducted every other year for the first 10 years of project operation to track nesting activity and nest productivity.

5.2.3 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. 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.

5.2.4 Prey-based 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.

5.2.5 Adaptive Management

MM-BIO-10h. Implement an Adaptive Management Program. Implement an adaptive management program in an Avian and Bat Protection Plan developed jointly with USFWS and CDFG that provides triggers for required operational modifications (e.g., seasonality, radar, turbine-specific modifications, and cut-in speed). An adaptive management program shall be prepared jointly with USFWS and CDFG and implemented by the project applicant that uses the information provided from implementation of Mitigation Measures 10e and

10g, which includes the post-construction bird monitoring and the golden eagle nest productivity monitoring. This program must be implemented in a manner that assures net zero loss of golden eagle on a population level basis. If mortality of any golden eagle occurs as the result of the Project's operation, regardless of age or gender, the responsible and adjacent turbines will be shut down while the adaptive management program is assessed for its validity and modified to the satisfaction of the resource agencies. This program will be based on monitoring of the active nest locations and eagle activity within 10 miles of the turbines. Measures to be considered for implementation will include curtailing operation of all or selected turbines during the fledging period of the active nests or potential permanent shutdown of turbines that are closest to active nests until the nest location changes to a farther location (eagles are known to build numerous nests within their territory and use different nest locations each year (Kochert et al. 2002)). Adaptive management measures may also include prey population control if populations of ground squirrels and rabbit species are noted in proximity (within 50 meters or 164 feet) to the turbine base to be developed in consultation with the agencies. The prey population may serve as an attractant to foraging raptors and could result in the collision with the turbines as a result. Other measures (e.g., radar monitoring and turbine modifications) will be implemented as dictated by the monitoring data and as specified by the adaptive management program. Based on the monitoring of bat mortality, the adaptive management program shall have triggers for the implementation of limited and periodic feathering or shut downs of turbines to avoid impacts to bats, if deemed commensurate to unanticipated levels of mortality. For example, IRI commits to continuing to work with Bat Wind Energy Cooperative's (BWEC) cut-in speed research effort begun at IRI's Casselman, PA wind project. Appropriate, pre-defined adaptive management measures employed in response to unanticipated impacts will be decided upon through the decision-making process, as defined and developed by Tule Wind LLC and USFWS as part of the AMP.

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

MM-BIO-1a. Mitigation for Sensitive Vegetation. At the conclusion of construction, sensitive vegetation communities and habitats permanently impacted by the proposed project shall be included in per acre compensatory mitigation. Mitigation ratios for impacts that cannot be avoided shall be taken from the County of San Diego Biological Mitigation Ordinance (BMO) (see Table 4-5, Proposed Mitigation for Permanent Project Impacts to Vegetation Communities). This habitat based mitigation will mitigate for vegetation and all sensitive species impacts using a regionally accepted habitat approach.

MM-BIO-1b. Mitigate for Disturbance to Ecologically Sensitive Areas. Whenever possible, project-related disturbances to ecologically sensitive areas (Tier I, Tier II, Tier III) shall be avoided or minimized. Residual areas deemed sensitive that are impacted shall be mitigated as appropriate.

MM-BIO-14b. Mitigate for Special Status Species. Impacts to special status species shall 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 shall be put into place. These measures shall be designed to avoid any significant reduction in species viability. For special status species, impacts shall be mitigated through provision of habitat based mitigation, as required under Mitigation Measure BIO-1a.

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 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, 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).

Additional measures will potentially be derived from the Draft EIR/EIS, when released, and from public comment thereon.

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.

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 Tule, 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, fatalities are not predicted at the Phase I - Valley turbines 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 24 hours 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). Sonoran 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	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	Apply for a programmatic take permit, if available, and comply with conditions. 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.	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.	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. The method selected will have the ability to curtail turbine(s) when an eagle(s)/large raptors approaches the RSA. A sufficient number of qualified monitors 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.

	Advanced Conservation Practices	Threshold or Trigger
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.
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.

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

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

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 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.

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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 stable or increasing 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).