Appendix B
Bird and Bat Conservation Strategy

Bird and Bat Conservation Strategy

Alta East Wind Project

Submitted to

U.S. Fish and Wildlife Service

Submitted by

Alta Windpower Development, LLC

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Prepared by

CH2MHILL®

Contents

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Acronyms and Abbreviations

Alta East	Alta East Wind Project
APLIC	Avian Power Line Interaction Committee
ASOS	Automated Surface Observing System
AWD	Alta Windpower Development, LLC
BBCS	Bird and Bat Conservation Strategy
BCC	Birds of Conservation Concern
BGEPA	Bald and Golden Eagle Protection Act
BLM	U.S. Bureau of Land Management
BMP	best management practice
CDFG	California Department of Fish and Game
CDFW	California Department of Fish and Wildlife
CEC	California Energy Commission
dBA	A-weighted decibel
FEIR	Final Environmental Impact Report
FEIS	Final Environmental Impact Statement
FLPMA	Federal Land Policy and Management Act
GPS	global positioning system
kV	kilovolt
MBTA	Migratory Bird Treaty Act
MM	mitigation measure
MW	megawatt(s)
PA/FEIS	Plan Amendment/Final Environmental Impact Statement
SR	State Route
USC	United States Code
USFWS	U.S. Fish and Wildlife Service
WEST	Western EcoSystems Technology, Inc.
WRRS	Wildlife Response and Reporting System
WTG	wind turbine generator

SECTION 1.0

Introduction

1.1 Project Description

Alta Windpower Development, LLC (AWD) operates the 153-megawatt (MW) Alta East Wind Project (Alta East) in the Tehachapi Wind Resource Area of southern California. Portions of the project are located on land managed by the U.S. Bureau of Land Management (BLM) and privately owned land under the jurisdiction of Kern County. The project is located on approximately 2,300 acres on the southern side of State Route (SR) 58 in southeastern Kern County, California. The project area is approximately 3 miles northwest of the town of Mojave and approximately 11 miles east of the city of Tehachapi. The location of the project site is shown in Figure 1.

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

Kern County approved the project and certified the Final Environmental Impact Report (FEIR) on December 13, 2012, pursuant to the California Environmental Quality Act (Kern County and BLM, 2012). The U.S. Fish and Wildlife Service (USFWS) issued a biological opinion for the project and its effects on federally listed species (California condor [*Gymnogyps californianus*], desert tortoise [*Gopherus agassizii*], and Bakersfield cactus [*Opuntia basilaris* var. *treleasei*]) on May 8, 2013.

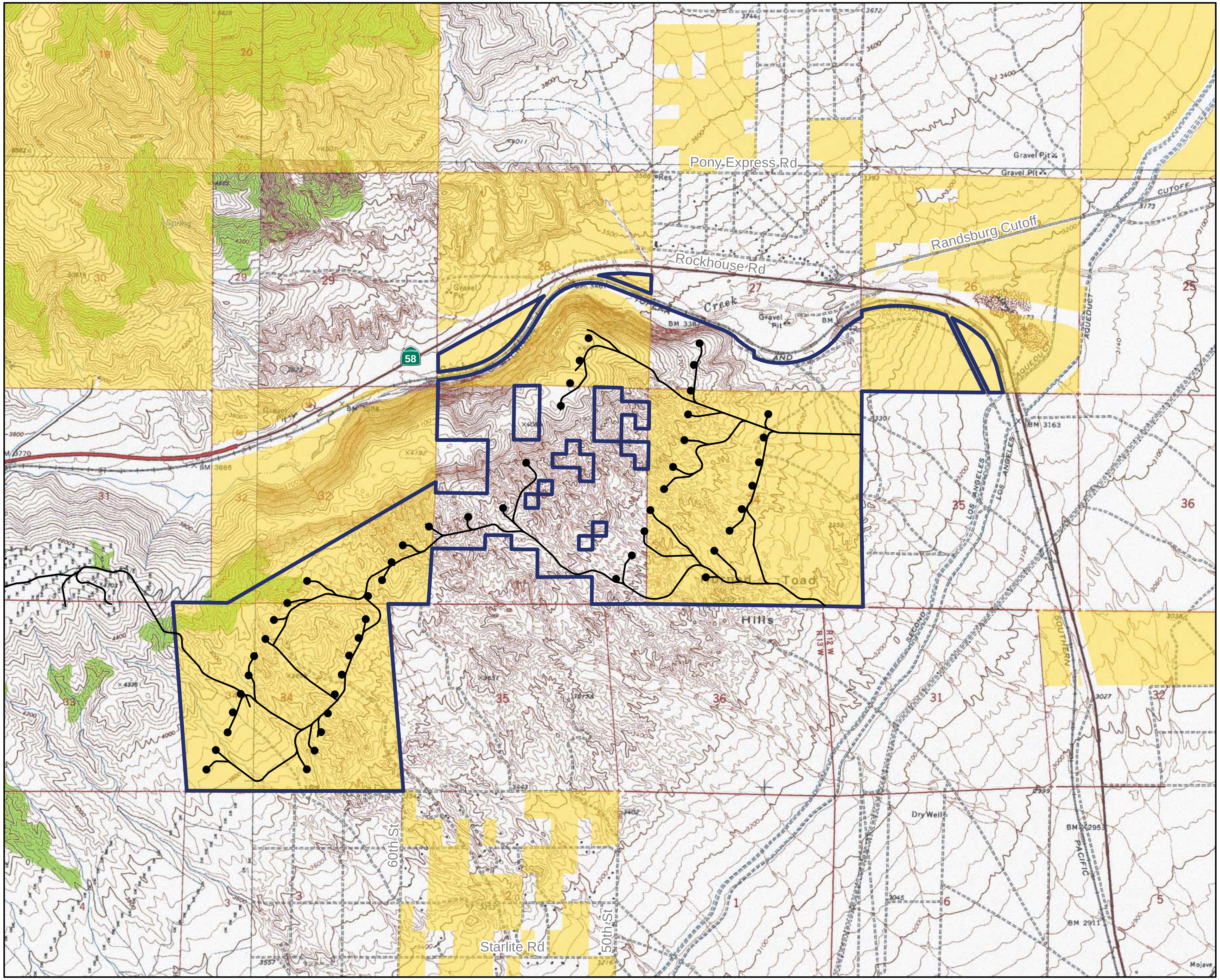
1.2 Purpose of the Bird and Bat Conservation Strategy

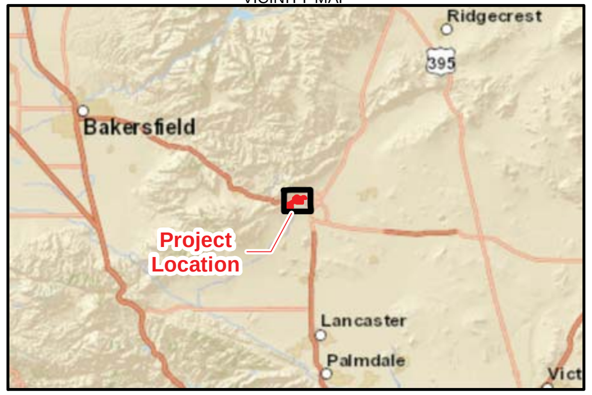
AWD has developed a Bird and Bat Conservation Strategy (BBCS) for the project to identify the reasonably foreseeable threats to avian and bat species and to develop effective response measures to avoid or minimize these potential impacts. Additionally, this BBCS identifies monitoring measures that will detect potential threats that have not yet been identified, allowing AWD to develop a response to unforeseen threats. This BBCS is AWD's commitment to construct and operate the project in a manner that proactively addresses potential impacts on protected avian and bat species.

Under the Migratory Bird Treaty Act (MBTA) (16 United States Code [USC] §§ 703–712) it is "unlawful to pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, offer to or sell, barter, purchase, deliver or cause to be shipped, exported, imported, transported, carried or received any migratory bird, part, nest, egg or product..." The MBTA does not have provisions for authorizing "take" of migratory birds that may be killed or injured by otherwise lawful activities. Golden eagles, which are afforded protection under the MBTA and the Bald and Golden Eagle Protection Act (BGEPA) (16 USC §§ 668–668c), are addressed in the *Conservation Plan for Avoidance and Minimization of Potential Impacts to Golden Eagles* (Eagle Conservation Plan; CH2M HILL, 2013) prepared for the project in accordance with the Applicant's intent to obtain a programmatic take permit from the USFWS authorizing a limited number of golden eagle mortalities during the life of the project; however, many of the avoidance and conservation measures identified in this BBCS have the added benefit of minimizing risk and potential impacts on eagles.

1.3 Interagency Coordination and Communication History

April 29, 2010	AWD provided USFWS with the biological resources study plan for review and input.
November 29, 2010	Representatives from AWD met with Ashleigh Blackford and Danielle Dillard of USFWS and Justin Sloan of the California Department of Fish and Wildlife (CDFW; formerly California Department of Fish and Game [CDFG]). Jacqui Kitchen of the Kern County Planning Department participated via telephone. The project was introduced and the results of baseline wildlife studies completed to date were presented.
November 30, 2010	AWD received correspondence from USFWS regarding the baseline study plan presented to USFWS in April 2010.
December 10, 2010	AWD responded to correspondence from USFWS regarding the baseline study plan.
March 22, 2011	Draft Eagle Conservation Plan submitted to USFWS.
April 29, 2011	Draft BBCS submitted to USFWS.
September 26, 2011	Comments on draft BBCS from USFWS provided to AWD.
March, 2012	Draft BBCS submitted to USFWS.
June 20, 2013	Comments on draft BBCS from USFWS provided to AWD.
April 4, 2014	AWD responses and revised BBCS provided to USFWS.
June 23, 2014	Comments on draft BBCS from USFWS provided to AWD.





LEGEND

- ● Proposed Wind Turbine Layout
- — Proposed Access Road
- BLM Lands
- Alta East Wind Project Area

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Feet

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FIGURE 1
Project Area Map
Alta East Wind Project
Alta Wind Energy Center Project

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SECTION 2.0

Site Assessment and Surveys

2.1 Initial Site Assessment

In July 2009, AWD completed an initial site assessment to evaluate potential constraints or risks to successful project development. This area of the Tehachapi Wind Resource Area was specifically selected for evaluation because of the extensive existing wind energy development in the region, habitat associated with low levels of avian and bat use, the lack of critical habitat for federally endangered species, and the manageable issues related to other special-status species potentially present onsite. Based on pre-field review of publicly available resources (California Natural Diversity Database [CDFG, 2009], California Native Plant Society database [2009], BLM special-status species management manual [BLM, 2001], and the California Desert Conservation Area Plan [BLM, 1999]), as well as reconnaissance surveys conducted at the site between 2006 and 2009 and during a March 19, 2009, site visit specifically designed to evaluate potential resource issues, it was determined that the site presented low levels of risk to avian resources and that investment in site-specific resource studies was warranted.

AWD determined that avian species are present on the site, but that no wetlands or riparian areas exist onsite that would attract avian species or provide unique habitat that would preclude potential development of a commercial-scale wind energy project. AWD determined that further study to understand and define the risk issues would yield sufficient information to construct and operate the project without significant adverse impacts to protected avian and bat species and, therefore, completed detailed site surveys to identify potential risk issues warranting impact avoidance or minimization measures.

2.2 Site-specific Surveys and Assessment

AWD has implemented a comprehensive avian study program to consider avian and bat species and their habitat. Survey protocols were presented to USFWS and CDFW for review in April 2010; comments were received and suggestions incorporated into the protocols where feasible. The avian and bat study program consisted of vegetation mapping, avian use surveys, burrowing owl surveys, raptor nesting surveys, and bat surveys. Additionally, in 2009, AWD completed a general biological resource assessment for the project to determine the likelihood of special-status species occurring in the area proposed for development, as well as to identify important or unique avian habitats such as riparian corridors, wetlands, unique topography, or potential migratory stopover habitat that might warrant consideration in avian studies and BBCS development.

Baseline avian use studies for the project included 30-minute point counts conducted from May 2009 through March 2011 at approximately 1-week intervals throughout the area proposed for development. The avian point count surveys were completed in accordance with *The California Guidelines for Reducing Impacts to Birds and Bats from Wind Energy Development* (CEC Guidelines; California Energy Commission [CEC], 2007). These surveys were designed to document species using the proposed project site, identify seasonal and spatial patterns of use, and identify general and specific risk factors that could be eliminated or reduced through micrositing or modification of project features.

Helicopter surveys for raptor nests were completed in April and May 2010, and February, April, and June 2011, to identify golden eagle nests within 10 miles of the project boundary and all other raptor nests within 2 miles of the project. Additionally, to augment the helicopter surveys to search specifically for Swainson's hawk nests, three ground-based surveys were completed between April 25 and April 30, 2011, of the area within 5 miles of the project. The analysis area for Swainson's hawk nests was determined in accordance with *Swainson's Hawk Survey Protocols, Impact Avoidance, and Minimization Measures for Renewable Energy Projects in the Antelope Valley of Los Angeles and Kern Counties, California* (CEC and CDFG, 2010).

The 2-mile analysis area was established for other nesting raptor species to enable detection of nests that could potentially be subject to project-related construction disturbance. Additionally, surveys to detect burrowing owls were completed in 2010 in accordance with the *Burrowing Owl Survey Protocol and Mitigation Guidelines* prepared by the California Burrowing Owl Consortium (1993).

Bat acoustic studies were conducted within the project area from July 2009 to July 2010, and from December 2010 to November 2011. Additionally, a bat roost survey was conducted for the project area in June 2011. The Category 2 protocol used for conducting bat acoustic studies followed the CEC Guidelines (2007).

Site-specific survey methods and results are summarized below, and complete avian reports that include detailed discussion of methods and results are presented in Chatfield et al. (2010a, 2010b, and 2011) and Phoenix Ecological Consulting (2010). A detailed presentation of the results of golden eagle survey data can be found in AWD's Eagle Conservation Plan (CH2M HILL, 2013).

2.2.1 Habitat Assessment

CH2M HILL biologists identified eight general community types on the project site: creosote bush scrub, brittlebush scrub, rabbitbrush scrub, California buckwheat scrub, scalebroom scrub, desert almond scrub, California juniper woodland, and Joshua tree woodland. Substantial overlap in species composition occurs among the community types and the boundaries are generally diffused with gradual transitions between the mapped community types. Therefore, the vegetation boundaries shown in Figure 2 are intended to show the general distribution of the community types within the project area.

Each community type and edge habitat area likely presents suitable nesting and foraging habitat for a variety of avian communities. Avian survey locations were distributed across these habitat types to adequately document the species composition present at the project site, but surveys were not designed to specifically document habitat associations for each species.

2.2.2 Avian Point Count Surveys

The objective of the fixed-point bird use surveys was to estimate the seasonal and spatial use of the study area by birds, particularly diurnal raptors. Fixed-point surveys (variable circular plots) were conducted using methods described by Reynolds et al. (1980). All birds seen during each 30-minute fixed-point survey were recorded. These surveys are standard assessment techniques used to assess most wind energy projects in California and adhere to CEC Guidelines (2007). Similar methods are used throughout the U.S. (Strickland et al., 2011). The point counts completed for this project are used to identify the species using the project area and to determine seasonal mean use values by species that serve as an index to abundance. The index correlates well to raptor fatality estimates for projects that have both baseline and post-construction fatality data and, thus, is an effective statistic for estimating fatality risk for many species likely to use the project area. Similarly, risk can be evaluated as a function of mean use and behavior (flight height) to compare relative risk by species.

Six points were selected to survey representative habitats and topography, while providing relatively even coverage of the area that was proposed for development in May 2009 (Figure 3). The project boundary was modified to include additional areas in June 2010, so the locations of three of the six avian use survey points were modified to ensure coverage of the revised project area (Figure 4). Specifically, avian survey point 4 was moved approximately 0.5 mile south to allow the assessment viewshed to encompass the entire parcel located north of SR 58. Point 5 was moved approximately 0.5 mile south of SR 58 and Point 6 was moved approximately 2 miles southeast of the highway, to enable full assessment of eagle use along the ridge located south of the highway and of the southwestern portion of the current project area. Survey points in the modified project boundary were evaluated for one full year during Year 2 of the avian point count study.

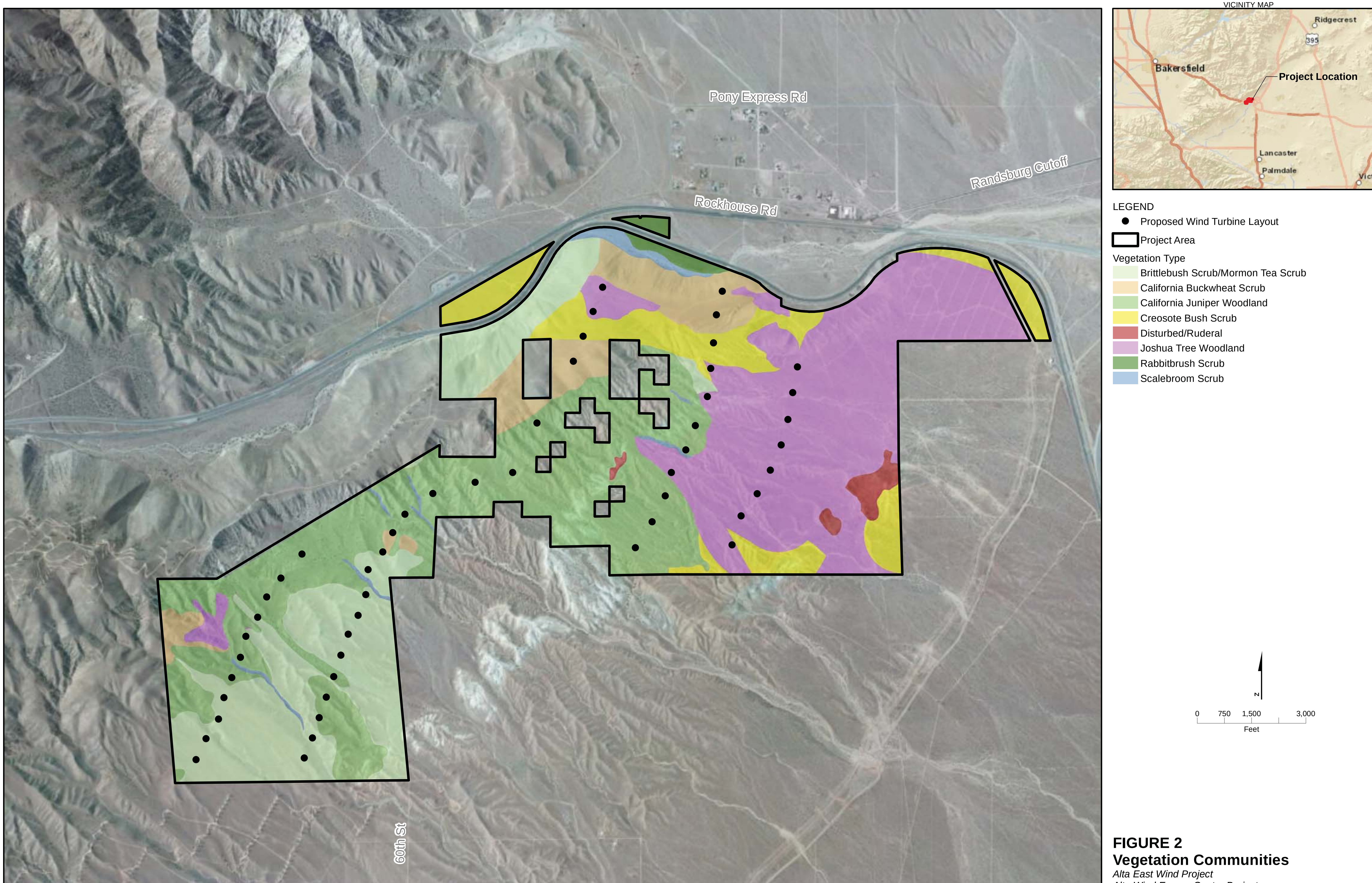

FIGURE 2
Vegetation Communities
Alta East Wind Project
Alta Wind Energy Center Project

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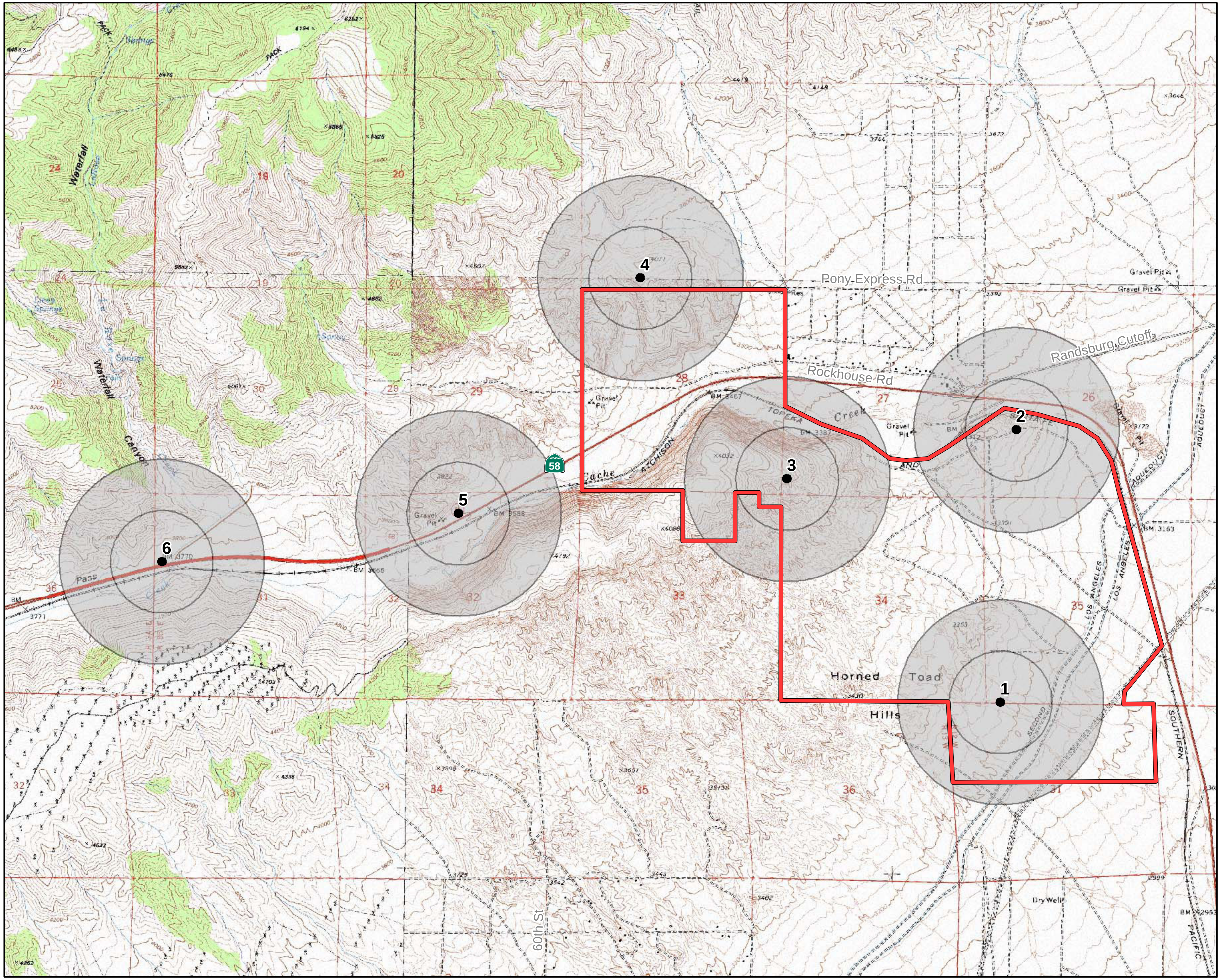

LEGEND

- Alta East Original Project Area
- Year 1 Observation Point
- Year 1 400/800-m Buffers

0 1,100 2,200
Feet

FIGURE 3
Alta East Project Boundary and Avian Use Survey Points from May 11, 2009 to May 6, 2010

Alta East Wind Project
Alta Wind Energy Center Project

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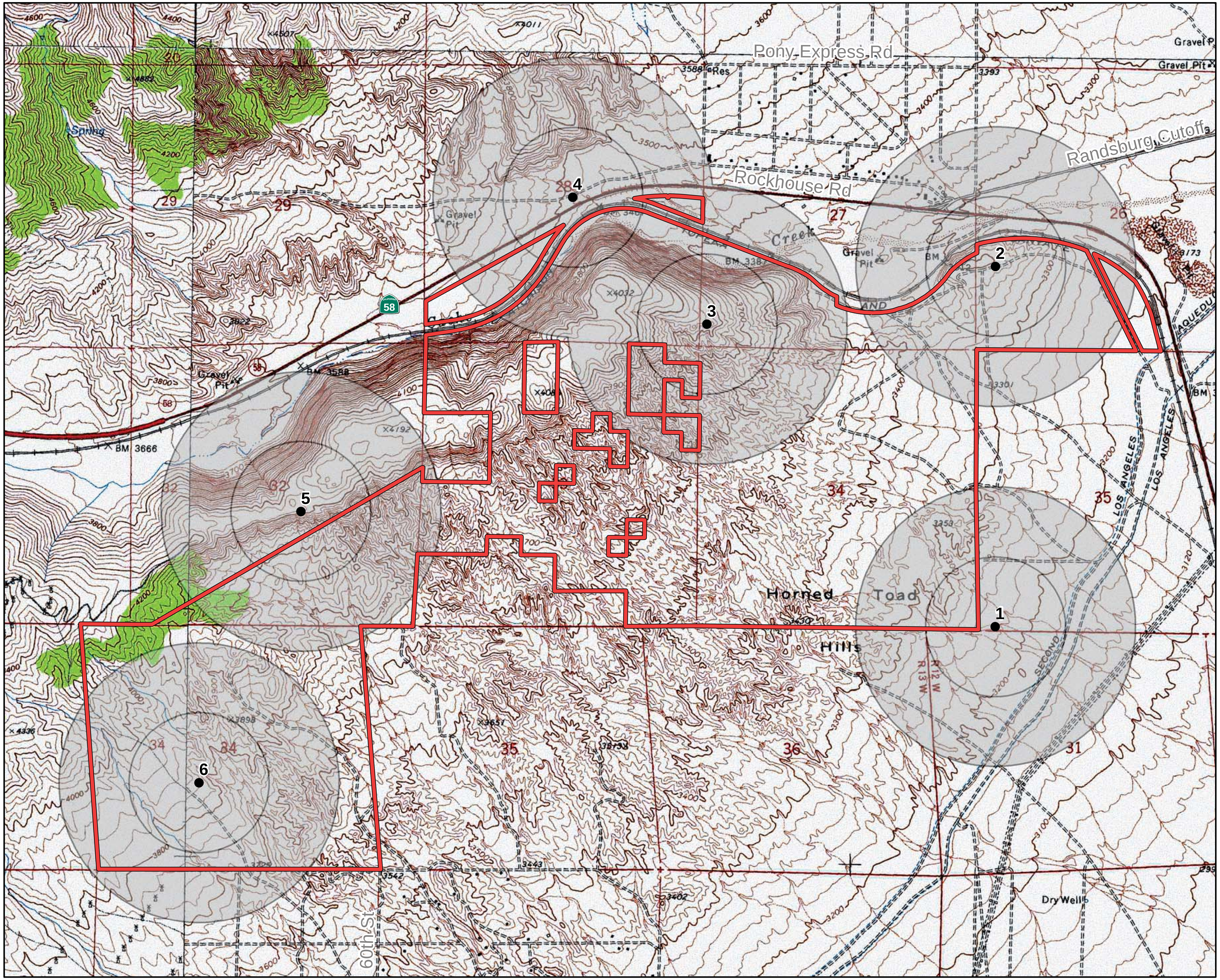
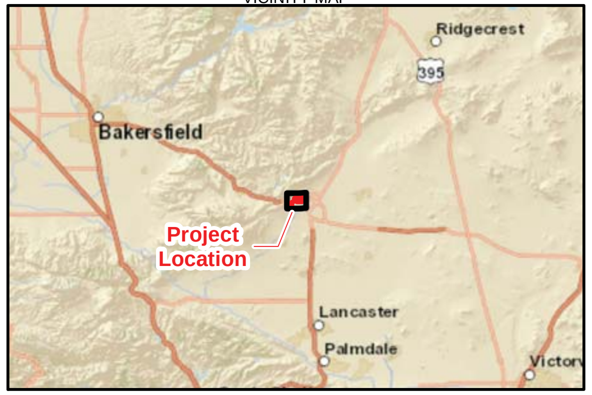


VICINITY MAP



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- Alta East Project Area
- Year 2 Observation Point
- Year 2 400/800-m Buffers

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FIGURE 4
Alta East Project Boundary and Avian Use Survey Points from July 10, 2010 to June 1, 2011
Alta East Wind Project
Alta Wind Energy Center Project

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Relocating these avian survey points assists in the analysis of avian use of the area planned for wind turbine generator (WTG) installation by focusing the study within the current project area.

A total of 311 30-minute fixed-point bird use surveys were conducted during 52 site visits, from May 2009 through May 2010. Sixty-one unique bird species were identified over the course of 311 30-minute surveys, representing 2,581 individuals within 1,044 groups. Among large birds, common raven had the highest use of any other species across all seasons (spring 1.56 birds/plot/30-minute survey; summer, 0.44; fall, 1.29; and winter, 0.89). Waterbird use was recorded only during spring (0.73 birds/plot/30-minute survey), while vulture use was recorded during spring (1.04) and fall (0.23). Raptor use was highest during the winter (0.20 birds/plot/30-minute survey) and lowest during the summer (0.10). A total of 43 individual raptors, representing six species, were observed during surveys, with red-tailed hawk and golden eagle being the most commonly observed raptor species. All golden eagle observations in Year 1 were recorded north and west of the current project area at points 4, 5, and 6; these observations are discussed in detail in the Eagle Conservation Plan (CH2M HILL, 2013) prepared for the project. Use by passerines was higher in winter (7.26 birds/plot/30-minute survey) and spring (7.07), compared to fall (5.23) and summer (2.28). Bird types most often observed flying within the turbine rotor-swept area were vultures (58.3%) and raptors (23.1%). Most of the passerines (94.4%) were observed below the rotor-swept heights, and the remaining 5.6% were observed flying within the rotor-swept area.

The annual mean raptor use estimate (number of raptors divided by the number of plots and the total number of surveys) for this period was compared to mean raptor use estimates from 39 other studies that implemented similar protocols and had data for three or four different seasons. Mean annual raptor use at all six monitoring stations was 0.09 raptors/plot/20-minute survey from May 2009 to May 2010, ranking second lowest compared to raptor use at the 39 other wind resource areas (Chatfield et al., 2010a). Raptor mean use at points 1, 2, and 3, which are located within the current project boundary, was 0.03 raptors/plot/20-minute survey. Mean raptor use at points 4 through 6 was notably higher (0.22 raptors/plot/20-minute survey), and these points are located outside the current project boundary. The revision of the project area avoided the sites with higher avian use, reducing the potential risk to raptors. However, the use rates provided above show that raptor use is higher during the winter and relatively low during other times of the year, so collision risk may vary seasonally.

A total of 260 30-minute fixed-point bird use surveys were conducted during 47 site visits, from July 10, 2010, through June 1, 2011, at the six avian use points evaluated during Year 2. During this survey period, the avian use survey areas were focused more specifically on the project area as currently proposed for development (see Figure 4). Forty-eight unique species were observed during the fixed-point bird use surveys, with a mean of 0.67 large bird species/800-m plot/30-minute survey and 1.37 small bird species/100-m plot/30-minute survey. Bird diversity (number of unique species) was greater in the spring (38 species) than in the fall (26), winter (20), and summer (16; Table 1). Large bird species richness (mean number of species per survey) was highest in the winter (0.94 species/survey), followed by spring (0.69), fall (0.67), and summer (0.35).

Passerines (not including ravens) were the most frequently recorded bird type, accounting for 59.6% of observations, of which sage sparrow, house finch, western meadowlark, and cactus wren were the most frequently observed and accounted for 45.1% of the total bird observations. Common ravens were the second most frequently observed bird type, making up 19.4% of total bird observations. Raptors accounted for only 1.9% of all observations, with red-tailed hawk and American kestrel being the most commonly observed raptor species during this period. The majority of passerines, large corvids, and raptors recorded during this period were observed in the fall (80.6%, 95.1%, and 85.7%, respectively) indicating extremely low use of the project area by all birds during summer months.

Six species (12.5% of all species) composed 74.6% of total observations: common raven (*Corvus corax*; 451 observations), sage sparrow (*Amphispiza belli*; 409), white-crowned sparrow (*Zonotrichia leucophrys*; 404), western meadowlark (*Sturnella neglecta*; 269), western bluebird (*Sialia Mexicana*; 214), and California quail

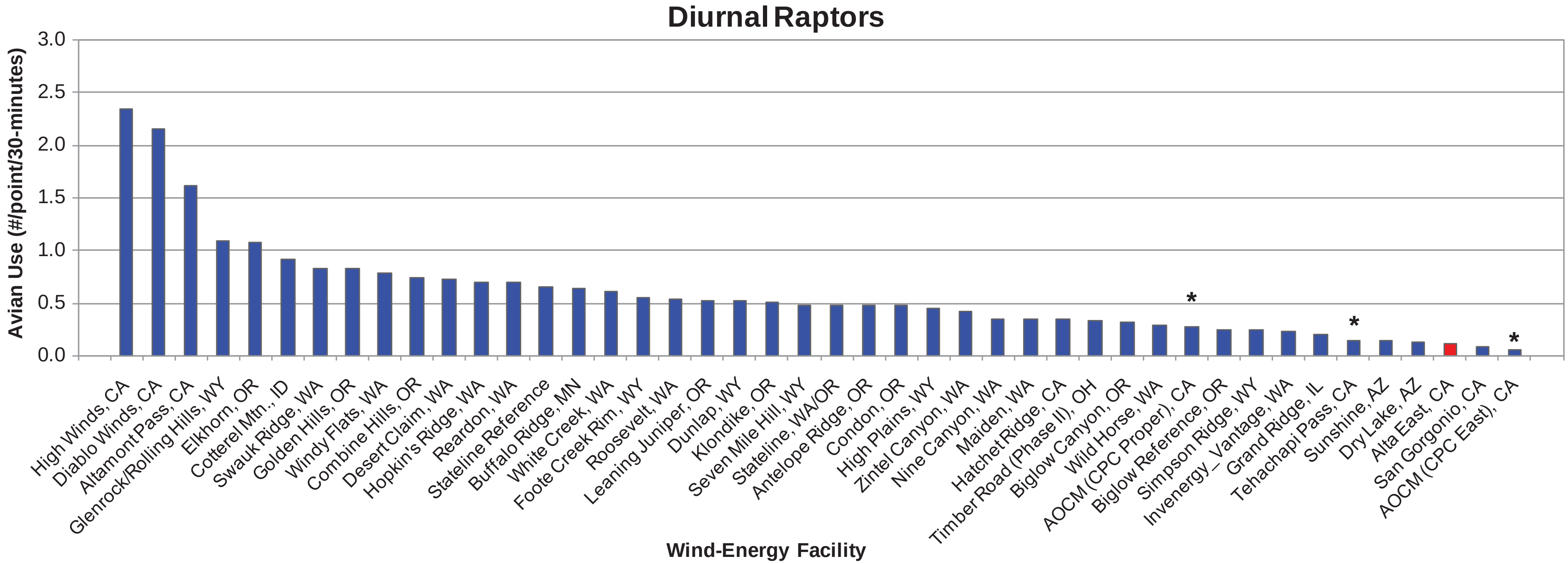
(*Callipepla californica*; 112). All other species constituted less than 4% of total observations, individually. Forty-eight individual raptors were recorded within the project area, representing nine species: Cooper's hawk (*Accipiter cooperii*; one observation), red-tailed hawk (*Buteo jamaicensis*; 18), Swainson's hawk (*Buteo swainsoni*; one), northern harrier (*Circus cyaneus*; two), golden eagle (*Aquila chrysaetos*; eight), American kestrel (*Falco sparverius*; seven), peregrine falcon (*Falco peregrines*; one), prairie falcon (*Falco mexicanus*; two), and osprey (*Pandion haliaetus*; one; CH2M HILL 2013). Unidentified accipiter (one observation) and unidentified hawk (six) were also observed during surveys.

Mean bird use, percent composition, and frequency of occurrence were calculated by season for each bird type and species. Large bird use (within 800-m plot) was highest in the winter (4.41 birds/plot/30-minute survey), followed by fall (2.75), summer (2.39), and spring (1.64). For small birds (i.e., passerines, swifts/hummingbirds, and woodpeckers), use (within 100-m plots) was highest in the spring and winter (7.70 and 7.41 birds/plot/30-minute survey, respectively), and lower in fall (5.35) and summer (1.65). Because different viewsheds were used in the analyses for large and small birds, use estimates calculated for the two groups are not directly comparable.

Diurnal raptor use was highest during the winter (0.27 birds/800-m plot/30-minute survey), with spring and fall having moderate use (0.19 and 0.18, respectively) and summer having considerably lower use (0.04). Higher use in the winter was primarily due to higher use of the area by red-tailed hawk (0.09 birds/plot/30-minute survey) and golden eagle (0.08). Red tailed hawk and American kestrel made up the majority of raptor use during both spring (0.08 and 0.04 birds/plot/3-minute survey; respectively) and fall (0.08 and 0.07; respectively). Diurnal raptor use in summer was attributed entirely to a single red-tailed hawk and a single unidentified accipiter. Diurnal raptors made up 11.7% of overall large bird use in spring, 6.7% in fall, 6.0% in winter, and 1.6% in summer. Diurnal raptors were observed during 13.8% of spring surveys, 3.7% of summer surveys, 13.3% of fall surveys, and 22.7% of winter surveys.

Among large bird types, four species (common raven, red-tailed hawk, golden eagle, and mourning dove) had at least five groups observed flying. Of these, golden eagle had the greatest percentage of observations within the rotor-swept area (87.5%), followed by common raven (75.0%), and red-tailed hawk (73.4%). Four other species (osprey, Copper's hawk, Swainson's hawk, and rock pigeon) were recorded flying within the rotor-swept area during 100% of the observations; however these were each based on only a single observation. Among small bird types, nine species had at least five groups observed flying. Of these, the only species observed flying within the rotor-swept area were white-crowned sparrow (21.6% of observations) and sage sparrow (3.1%). Additional details are provided in Chatfield et al. (2011).

Annual mean raptor use (number of raptors divided by the number of 800-m plots and the total number of surveys) at the project was compared with raptor use at 43 other sites proposed for wind-energy development in the western and Midwestern U.S. that implemented similar protocols and had data for three or four seasons. The annual mean raptor use at these wind-energy facilities ranged from 0.06 to 2.34 raptors/plot/20-minute survey (Figure 5). Based on the results from these wind-energy facilities, a ranking of seasonal mean raptor use was developed as low (0 to 0.5 raptors/plot/20-minute survey), low to moderate (0.5 to 1.0), moderate (1.0 to 2.0), high (2.0 to 3.0), and very high (more than 3.0). Under this ranking, mean raptor use at the project site for Year 2 studies (0.12 raptors/plot/20-minute survey) is considered to be low, ranking third-lowest compared to the other wind-energy facilities. On a seasonal basis, mean raptor use estimates at the project were consistently low across all seasons when compared with other projects with the highest ranking occurring during the winter, when the project site presents the thirteenth lowest mean use value out of 41 sites (Chatfield et al., 2011).



Data from the following sources: * – Wind developments in the Tehachapi WRA

Wind Energy Facility	Reference	Wind Energy Facility	Reference
Alta East, CA	This study.		
High Winds, CA	Kerlinger et al. 2005	Stateline, WA/OR	Erickson et al. 2002b
Diablo Winds, CA	WEST 2006	Antelope Ridge, OR	WEST 2009
Altamont Pass, CA	Erickson et al. 2002b	Condon, OR	Erickson et al. 2002b
Glenrock/Rolling Hills, WY	Johnson et al. 2008a	High Plains, WY	Johnson et al. 2009b
Elkhorn, OR	WEST 2005a	Zintel Canyon, WA	Erickson et al. 2002a
Cotterel Mtn., ID	BLM 2006	Nine Canyon, WA	Erickson et al. 2001
Swauk Ridge, WA	Erickson et al. 2003a	Maiden, WA	Erickson et al. 2002b
Golden Hills, OR	Jeffrey et al. 2008	Hatchet Ridge, CA	Young et al. 2007a
Windy Flats, WA	Johnson et al. 2007	Timber Road (Phase II), OH	Good et al. 2010
Combine Hills, OR	Young et al. 2003c	Biglow Canyon, OR	WEST 2005d
Desert Claim, WA	Young et al. 2003b	Wild Horse, WA	Erickson et al. 2003c
Hopkin's Ridge, WA	Young et al. 2003a	AOCM (CPC Proper), CA	Chatfield et al. 2010c
Reardon, WA	WEST 2005b	Biglow Reference, OR	WEST 2005d
Stateline Reference	URS et al. 2001	Simpson Ridge, WY	Johnson et al. 2000
Buffalo Ridge, MN	Erickson et al. 2002b	Invenergy_Vantage, WA	WEST 2007
White Creek, WA	NWC and WEST 2005	Grand Ridge, IL	Derby et al. 2009
Foote Creek Rim, WY	Erickson et al. 2002b	Tehachapi Pass, CA	Erickson et al. 2002b
Roosevelt, WA	NWC and WEST 2004	Sunshine, AZ	WEST and the CPRS 2006
Leaning Juniper, OR	Kronner et al. 2005	Dry Lake, AZ	Young et al. 2007b
Dunlap, WY	Johnson et al. 2009a	San Gorgonio, CA	Erickson et al. 2002b
Klondike, OR	Johnson et al. 2002	AOCM (CPC East), CA	Chatfield et al. 2010a
Seven Mile Hill, WY	Johnson et al. 2008		

FIGURE 5
Comparison of annual raptor use between the Alta East Project and Other Wind Energy Facilities, using data collected at the Alta East Project from July 10, 2010 to June 1, 2011

Alta East Wind Project
Alta Wind Energy Center Project

2.2.3 Nesting Territory Surveys

Helicopter surveys for raptor nests were completed in April and May 2010, and February, April, and June 2011, to identify golden eagle nests within 10 miles of the project boundary and all other raptor nests within 2 miles of the project. Additionally, to augment the helicopter surveys to search specifically for Swainson's hawk nests, three ground-based surveys were completed between April 25 and April 30, 2011, of the area within 5 miles of the project.

No Swainson's hawk nests were recorded and nine inactive raptor nests and one active raven nest were located within 2 miles of the project. No active raptor nests were located within the boundary of the project, or within 2 miles of the project during the 2010 surveys.

Four active golden eagle nests were identified during the surveys within 10.0 miles of the project area, and one additional nest was located 10.9 miles from the project. Additionally, in 2010 nine inactive nests and in 2011 eight inactive nests that could have been constructed or used by golden eagles were documented within the survey area, the closest of which was approximately 2.3 miles northwest of the nearest proposed turbine.

In addition to evaluating potential nesting habitat for new or previously undocumented nests, all nests detected in 2010 were specifically evaluated. Findings were consistent with 2010 surveys—no Swainson's hawk nests were observed within 5 miles of the project and no active raptor nests were detected within 2 miles of the project. One inactive raptor nest and two active common raven nests were identified within 2 miles of the project. All nests reported in the 2010 and 2011 surveys are presented in Figure 6, which shows a 10-mile buffer around the project.

2.2.4 Burrowing Owl Surveys

Protocol-level surveys for burrowing owl were completed for 992 acres of the project area from May 30 to July 15, 2010. The survey results were positive for burrowing owl sign, but negative for breeding burrowing owls during the 2010 survey efforts. Burrowing owl whitewash was detected at two burrows located near avian use survey point 2 in the northeastern portion of the project, near an incidental observation reported by Western EcoSystems Technology, Inc. (WEST) in their Year 1 avian use surveys on March 19, 2010; however, no burrowing owls were recorded during the protocol-level survey efforts. Details of the burrowing owl survey are provided in Phoenix Ecological Consulting (2010) and in Figure 7.

2.2.5 Species Recorded

During the course of all surveys completed for the project, a total of 73 avian species were recorded (Table 1). Sixty-one species were recorded during Year 1 avian use surveys and 48 species were recorded in Year 2, of which 10 were not recorded during Year 1 surveys. Two additional species were reported during the burrowing owl survey (lesser nighthawk and lesser yellowlegs). Species designated as Birds of Conservation Concern (BCC) for Bird Conservation Region 32 are noted per the 2008 BCC list (USFWS, 2008). Species with BCC status that are likely to breed/nest in the project area based on likely habitat associations are also noted.

TABLE 1
Avian Species Recorded during All Biological Resource Surveys Completed for the Alta East Wind Project from May 11, 2009 to June 1, 2011

Common Name	Scientific Name	Status
Raptors		
American kestrel	*Falco sparverius*	
burrowing owl	*Athene cunicularia*	BLMS, BLMSSC, CASSC, BCC, b
Cooper's hawk	*Accipiter cooperii*	

TABLE 1
Avian Species Recorded during All Biological Resource Surveys Completed for the Alta East Wind Project from May 11, 2009 to June 1, 2011

Common Name	Scientific Name	Status
golden eagle	*Aquila chrysaetos*	BLMS, BGEPA, CAFP
northern harrier	*Circus cyaneus*	CASSC
Osprey	*Pandion haliaetus*	
peregrine falcon	*Falco peregrines*	CAFP, BCC, b
prairie falcon	*Falco mexicanus*	
red-tailed hawk	*Buteo jamaicensis*	
sharp-shinned hawk	*Accipiter striatus*	
Swainson's hawk	*Buteo swainsoni*	CAT
Others		
Anna's hummingbird	*Calypte anna*	
ash-throated flycatcher	*Myiarchus cinerascens*	
barn swallow	*Hirundo rustica*	
Bewick's wren	*Thryomanes bewickii*	
black-throated sparrow	*Amphispiza bilineata*	
blue-gray gnatcatcher	*Polioptila caerulea*	
Brewer's blackbird	*Euphagus cyanocephalus*	
Brewer's sparrow	*Spizella breweri*	
cactus wren	*Campylorhynchus brunneicapillus*	BCC, b
California gull	*Larus californicus*	
California quail	*Callipepla californica*	
California towhee	*Pipilo crissalis*	
Cassin's vireo	*Vireo cassinii*	
chipping sparrow	*Spizella passerina*	
Chukar	*Alectoris chukar*	
cliff swallow	*Hirundo pyrrhondota*	
common grackle	*Quiscalus qiscula*	
common raven	*Corvus corax*	
Costa's hummingbird	*Calypte costae*	BCC, b
dark-eyed junco	*Junco hyemalis*	
dusky flycatcher	*Empidonax oberholseri*	
European starling	*Sturnus vulgaris*	
fox sparrow	*Passerella iliaca*	
great egret	*Ardea alba*	
greater roadrunner	*Geococcyx californianus*	
horned lark	*Eremophila alpestris*	
house finch	*Carpodacus mexicanus*	
house wren	*Troglodytes aedon*	
unidentified hummingbird		
ladder-backed woodpecker	*Picoides scalaris*	

TABLE 1
Avian Species Recorded during All Biological Resource Surveys Completed for the Alta East Wind Project from May 11, 2009 to June 1, 2011

Common Name	Scientific Name	Status
lark sparrow	*Chondestes grammacus*	
Le Conte's thrasher	*Toxostoma lecontei*	BLMS, BLMSSC, CASSC, BCC, b
lesser goldfinch	*Carduelis psaltria*	
lesser nighthawk	*Chordeiles acutipennis*	
lesser yellowlegs	*Tringa flavipes*	
Lincoln's sparrow	*Melospiza lincolnii*	
loggerhead shrike	*Lanius ludovicianus*	CASSC, BCC, b
mourning dove	*Zenaida macroura*	
northern flicker	*Colaptes auratus*	
northern mockingbird	*Mimus polyglottos*	
rock pigeon	*Columba livia*	
rock wren	*Salpinctes obsoletus*	
ruby-crowned kinglet	*Regulus calendula*	
sage sparrow	*Amphispiza belli*	
savannah sparrow	*Passerculus sandwichensis*	
Say's phoebe	*Sayornis saya*	
Scott's oriole	*Icterus parisorum*	
Townsend's warbler	*Dendroica townsendi*	
tree swallow	*Tachycineta bicolor*	
turkey vulture	*Cathartes aura*	
Vaux's swift	*Chaetura vauxi*	CASSC
verdin	*Auriparus flaviceps*	
violet-green swallow	*Tachycineta thalassina*	
western bluebird	*Sialia Mexicana*	
western kingbird	*Tyrannus verticalis*	
western meadowlark	*Sturnella neglecta*	
western scrub-jay	*Aphelocoma californica*	
western tanager	*Piranga ludoviciana*	
white-crowned sparrow	*Zonotrichia leucophrys*	
white throated swift	*Aeronautes saxatalis*	
Wilson's warbler	*Wilsonia pusilla*	
yellow-rumped warbler	*Dendroica coronate*	

*California: species of special concern (CASSC), Threatened (CAT), Fully protected (CAFP)
BLM: Sensitive Species (BLMS), species of special concern (BLMSSC)
USFWS: Bald and Golden Eagle Protection Act (BGEPA), Bird of Conservation Concern in BCR 32 (BCC), Breeding (b)

2.2.6 Bat Assessment

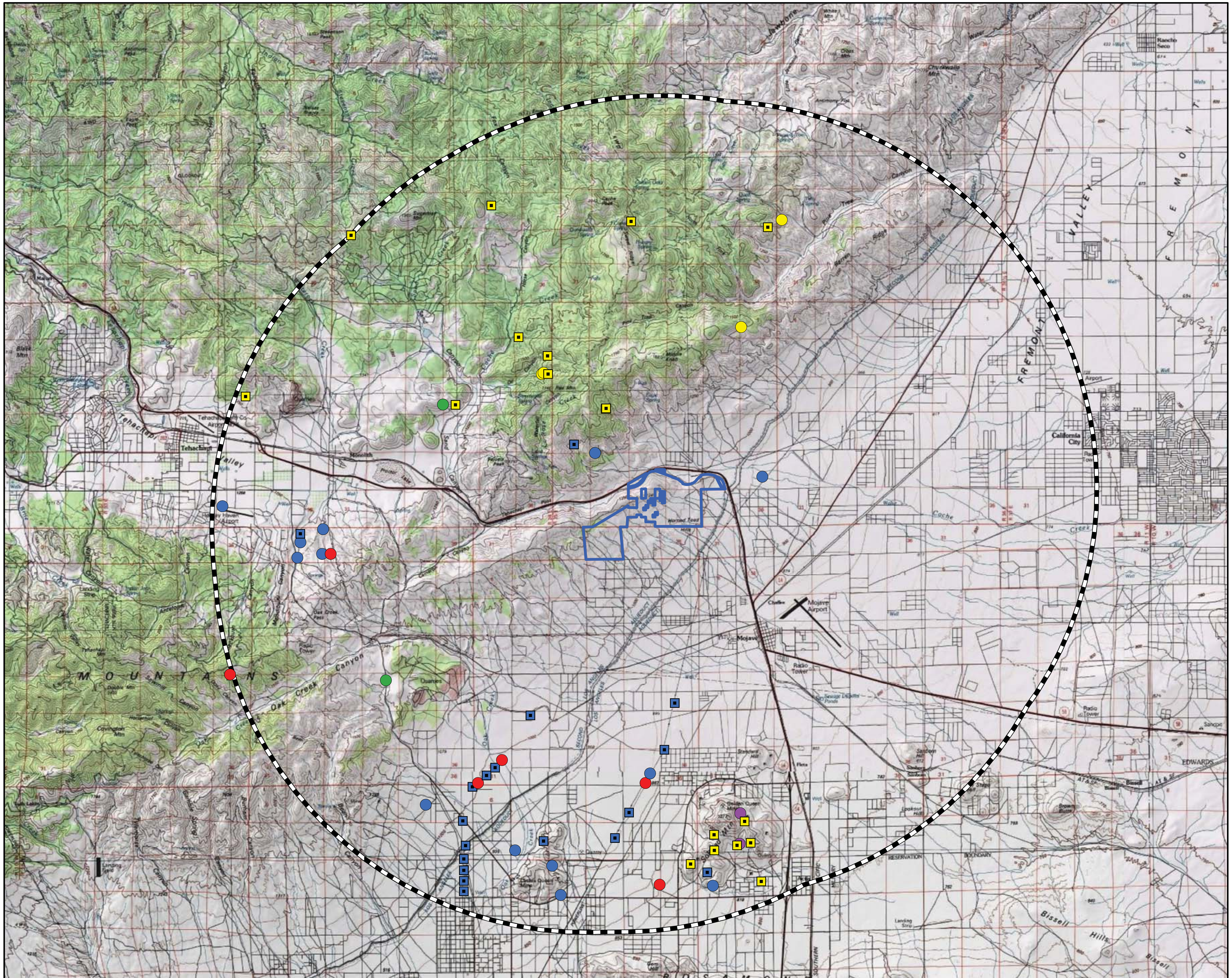
Based on desktop research of bat species range maps, a total of 21 bat species could occur within the Tehachapi Wind Resource Area (WEST, 2012; Harvey et al., 1999; BCI, 2012).

Bat acoustic studies were conducted within the project area from July 7, 2009, to July 9, 2010 (Year 1), and from December 13, 2010, to November 1, 2011 (Year 2), and a bat roost survey was conducted for the project area from June 27 to 30, 2011. The CEC (2007) Category 2 protocol was used because little was known about the potential for impacts to bats in the area. The CEC Guidelines suggest continuous monitoring of bat activity at meteorological towers for twelve consecutive months. Surveys were initiated at two meteorological tower locations, and at two altitudes at each of the two locations during the first monitoring year (Figure 8). In 2010, the project boundary for Alta East was revised, so a third meteorological tower was used for two monitors at two altitudes (Figure 8). The detectors were set at 2 meters and 30 meters altitude on each meteorological tower.

A total of 217 bat passes were detected during Year 1 (of 1,192 detector nights; four stations were active) and 124 bat passes during Year 2 (of 557 detector nights; two stations were active). The bat use during Year 1 was 0.19 bat passes per detector night, and during Year 2 the rate was 0.23 bat passes per detector night.

The number of bat passes detected at each station was recorded and sorted by call frequency for identification of a call into a group of species that echolocate within each frequency range. For example, 212 of 217 calls (98 percent) were low-frequency during Year 1 and 104 of 124 call (84 percent) were low-frequency calls during Year 2. The silver-haired bat (*Lasionycteris noctivagans*), big brown bat (*Eptesicus fuscus*) and Mexican free-tailed bat (*Tadarida brasiliensis mexicanus*) are the species that likely make up the majority of the low-frequency calls. During Year 2, nine of the low-frequency bat calls were positively identified as hoary bats (*Lasiurus cinereus)*, though likely more calls were from that species but insufficient call data was captured to make a positive identification. The remaining calls (2 percent Year 1; 16 percent Year 2) were not identifiable to species.

Bat passes were detected throughout the year during all four seasons during both study years. During Year 1, most bats were detected during spring (0.30 bats/detector night) and summer (0.20 bats/detector night), while during Year 2, most bat passes occurred during fall (0.13 bats/detector night) and winter (0.64 bats/detector night).



VICINITY MAP

LEGEND

- Alta East Wind Project Area
- 10-Mile Radius

2011 Raptor Nests

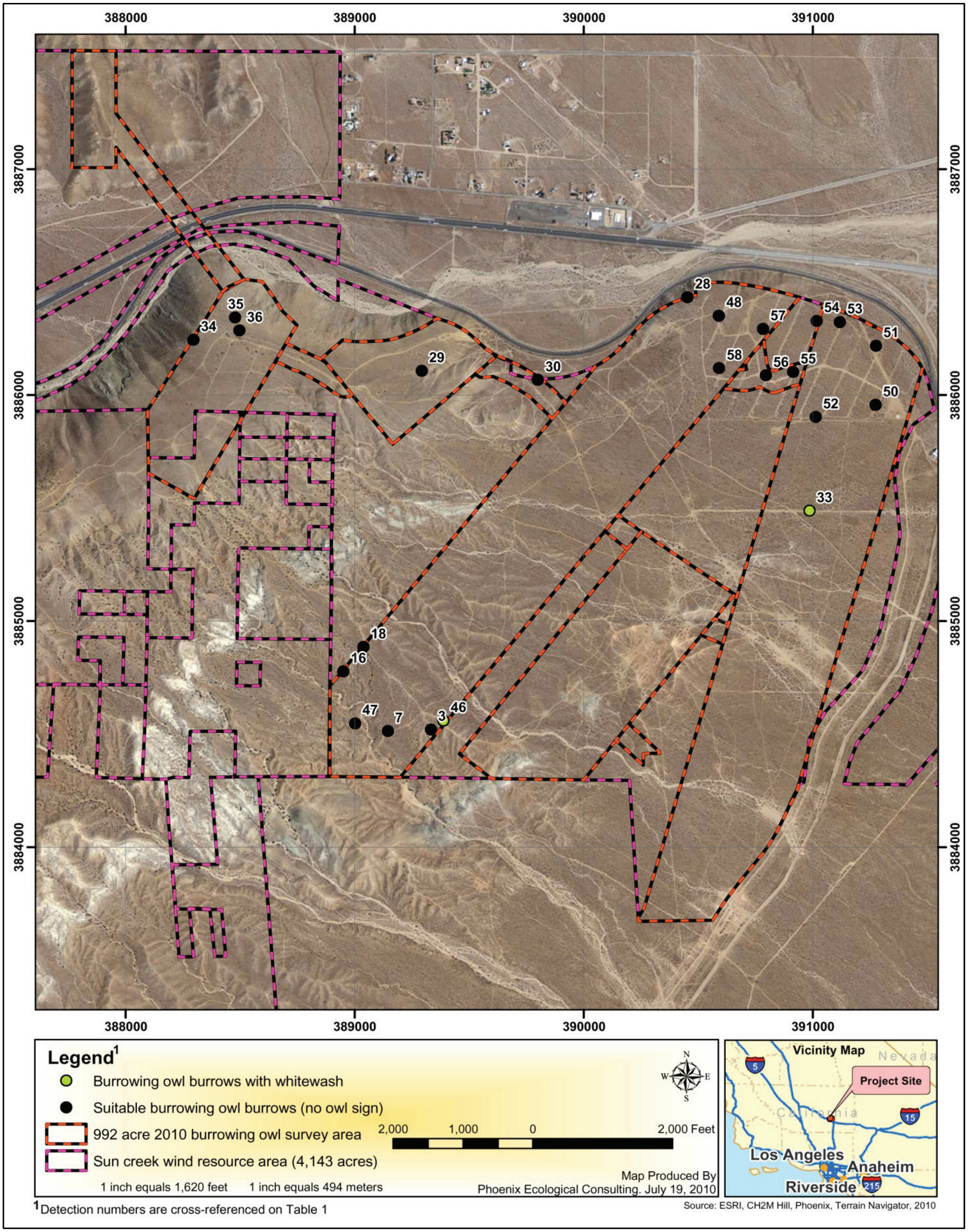
- Active Golden Eagle Nest
- Active Common Raven Nest
- Active Great Horned Owl Nest
- Active Prairie Falcon Nest
- Active Red-tailed Hawk Nest
- Inactive Raptor/Raven Nest
- Inactive Golden Eagle Nest

N

0 1.5 3 6
Miles

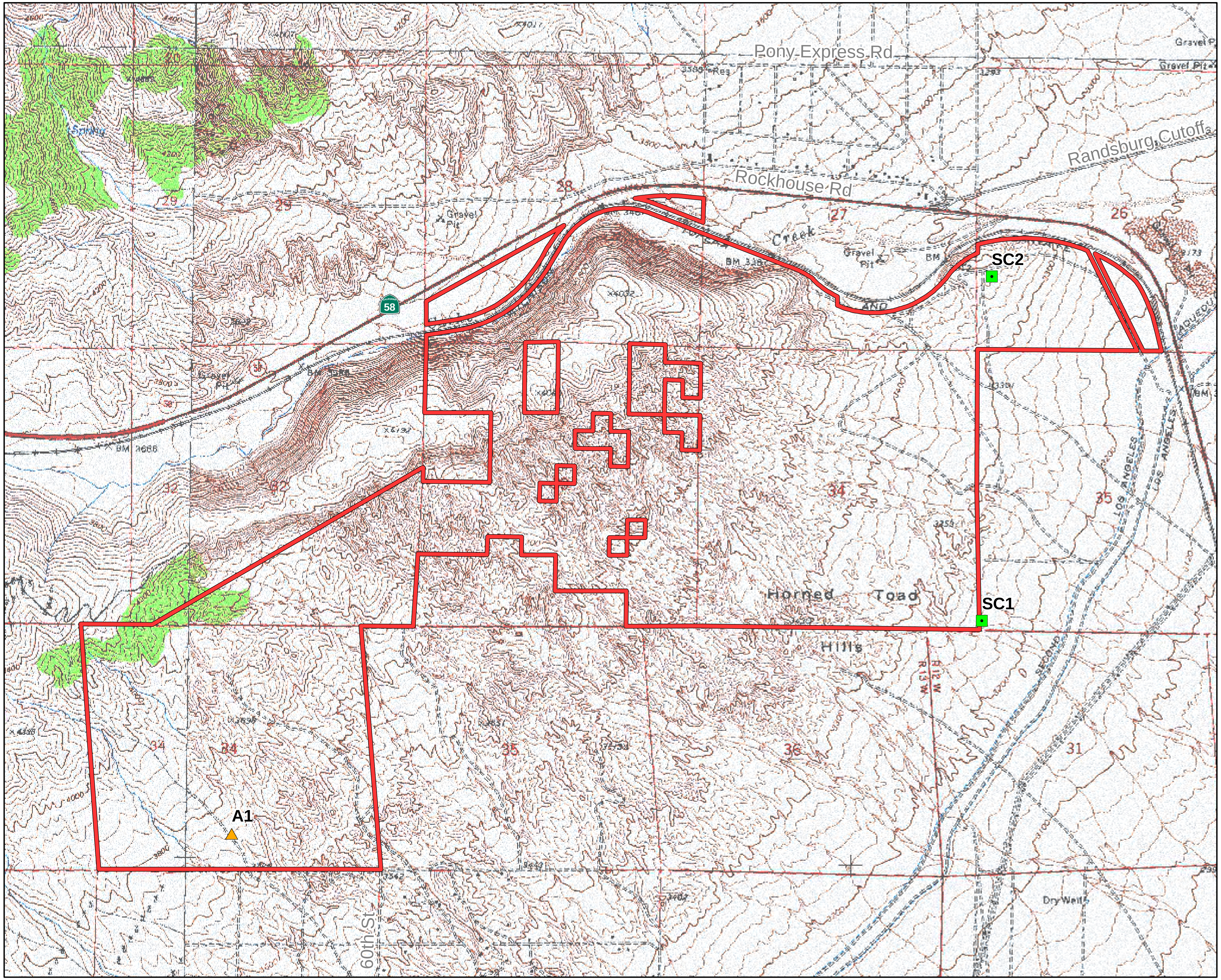
FIGURE 6
Results of Raptor Nest Survey Results Completed for the Alta East Project Area in 2011
Alta East Wind Project
Alta Wind Energy Center Project

CH2MHILL

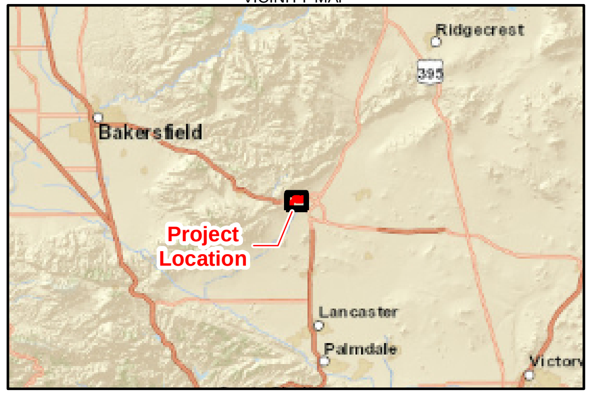


[1]Detection numbers are cross-referenced on Table 1

FIGURE 7
Results of Burrowing Owl Surveys completed for the Alta East Project Area from May 30-July 15, 2010
Alta East Wind Project
Alta Wind Energy Center Project



VICINITY MAP



LEGEND

Bat Acoustic Monitoring Locations

- July 7, 2009 to July 9, 2010
- December 13, 2010 to November 1, 2011
- Alta East Project Area

N

0 1,100 2,200
Feet

FIGURE 8
Alta East Project Boundary and Bat Acoustic Monitoring Locations from 2009 to 2011
Alta East Wind Project
Alta Wind Energy Center Project

CH2MHILL

SECTION 3.0

Risk Assessment

3.1 Indirect Risk from Construction and Operation

3.1.1 Construction

Construction of the project will include installation of the WTGs, roads, underground electrical collector lines, a collector substation, an aboveground transmission line, a temporary construction laydown area, and an operations and maintenance building. Noise from the equipment would vary throughout the day with equipment use and location of construction, but would be reasonably expected to be as high as 95 A weighted decibels (dBA) at the point of origin, attenuating to 63 dBA at 800 feet. Shrub- and ground-nesting species, as well as their nests and young, could be at risk during vegetation removal and ground-disturbing activities during construction (to the extent it occurred during the nesting season), and disturbance during construction would displace birds from the project site and surrounding area. In addition to being at risk of collision with vehicular travel during project construction and operation, raptors and other bird species could be susceptible to injury or mortality from collision with rotating WTG blades and transmission lines, electrocution from contact with the electrical conductors, and displacement from nests or nesting habitat.

Bats have not been found to be at high risk of mortality during construction, because they are able to navigate around the relatively slow-moving equipment or to avoid the installation of turbine towers and blades before they are put into operation.

3.1.2 Operation

Operation of the project will include up to 51 operating WTGs, approximately 15 miles of aboveground 230-kilovolt (kV) transmission line, and 15 full-time-equivalent personnel, all of which present potential hazards to avian species potentially using the project area. Maintenance activities will occur regularly and will generally require only pick-up trucks travelling on project roads. When repairs are required, other vehicles, such as cranes and excavation equipment may be used.

The project area has no natural substrates for diurnal raptor nesting. Although no raptor nests are documented in the project area, nests in power poles are sometimes at risk of disturbance and nest abandonment if human activity levels increase following nest initiation. Potential diurnal raptor nesting habitat exists outside the project vicinity in the rugged topography located north of the project where rocky terrain could support cliff-nesting species, and potentially in Joshua tree or other treed habitats in the project vicinity. However, the proximity of these potential nests to project area activities indicates that they are highly unlikely to be disturbed if they exist. The project area currently provides suitable foraging and hunting habitat for raptors, but use is documented as low based on the avian use surveys completed to date. Although habitat functionality may be altered during and after construction, raptors might continue to forage or hunt in this area. Burrowing owl could currently use the project area for nesting, although no nesting territories have been documented in the project area. During Year 2 studies, no burrowing owls were observed onsite; however, one burrowing owl was incidentally recorded near avian survey point 2 on March 19, 2010. This location coincided with the approximate location of the burrowing owl sign observed during the protocol burrowing owl survey (described in Section 2.2.4).

Habitats used by the avian species documented on the project site, as well as other species that may potentially occur, but have gone undetected, would be disturbed by construction of the project. Habitat fragmentation could influence habitat functionality for some species, but more likely will simply reduce the density of affected birds proportional to the amount of habitat lost. Habitat fragmentation may exacerbate the problem of habitat loss for birds by decreasing patch area and increasing edge habitat, potentially reducing avian productivity through increased nest predation and brood parasitism, and reducing pairing success of males in some species. However, the construction of the project is not likely to significantly increase the degree of habitat fragmentation of the area because the majority of the project is located on habitat that is already fragmented with roads, trails, and multiple uses within the area. Potential habitat fragmentation resulting from development of the project would be minimized through avoidance and minimization measures taken during the design, construction, and operational phases of the project, the most significant of which include minimization of habitat disturbance, burial of collector lines, and use of existing roadways where practicable.

Following construction, only a small portion of the project area will be converted to developed lands that will be unsuitable for avian use. The human activity within and around the project structures may deter some birds from nesting in the project area; however, human activity and vehicle traffic are typically so minor that most avian species would be unaffected by such activity during project operation. Additionally, placement of project features, such as transmission lines and WTGs, can influence risk of impact on avian species. These risk factors are present and are therefore considered in AWD's assessment of risk from the avian use and raptor nest survey data.

Bat use of the project area is relatively low, and following construction, the prey base is not likely to be notably changed because of the installation of the wind development. No water sources will be added or removed, and no riparian areas will be affected.

3.2 Collision Risk

3.2.1 Avian Risk

Bird density, age, residency status and season, flight style, interaction with other birds, and presence of foraging opportunities all may influence the likelihood of birds colliding with a WTG or other project feature. The majority of birds detected at the Alta East project site were passerines, and over 94 percent of the passerines were documented below the rotor-swept area during the May 2009 to May 2010 studies. Although migrant passerines have been found more frequently in fatality studies than other bird groups (Arnett et al., 2007), they also occur at substantially higher numbers than other bird groups.

Nocturnally migrating birds are commonly identified as of concern because most fatality studies to date have not discriminated between daytime and nocturnally killed birds (Kunz et al., 2007). Of the non-raptor fatalities, as many as half have been documented as nocturnal migrants (Erickson et al., 2001; Johnson et al., 2007). However, tens of millions of nocturnal migrants pass over wind developments annually, and Erickson (2007) estimated that less than 0.01 percent of these birds are killed. Nocturnal migrant studies generally are not conducted because of both cost and because the data from these studies do not provide information that could be effectively used to reduce mortality.

In general, nocturnal migrants typically fly at altitudes well above the rotor-swept area unless ascending or descending in response to available stopover habitats or heavy fog that reduces flight visibility (Barclay and Kurta, 2007). The topography and habitats near the project site do not contain features that would concentrate migrations into narrow and obvious pathways, nor are there existing habitat features that would concentrate migrants during daytime stopovers.

WEST analyzed relative exposure risk using the first year of data collected for the site and concluded that with exception of turkey vultures and ravens, most raptors had relatively low exposure values because of low use estimates or the majority of birds were flying below the rotor-swept area (Table 2; Chatfield et al., 2011).

The relative collision exposure (R) risk was calculated for bird species observed during the fixed-point bird use surveys using the following formula:

$$R = A*P_f*P_t$$

Where A equals mean relative use for each species; P_f equals the proportion of all observations of each species where activity was recorded as flying (an index to the approximate percentage of time each species spends flying during the daylight period); and P_t equals the proportion of all initial flight height observations of each species within the likely rotor-swept area.

The only sensitive bird species with an exposure index greater than zero was Vaux’s swift, in Year 1, with a value of <0.01. Because very few non-raptor species were observed in the rotor-swept area, and no non-raptor USFWS-designated BCC species were observed in the rotor-swept area, it is extremely unlikely that non-raptors will be adversely affected by direct mortality from the operation of the wind energy facility. Similarly, WEST analyzed raptor use for this period and, based on comparisons with other projects in the west and Midwest, fatality rates of raptors are expected to be lower than the fatality rates observed at nearly all other facilities (Figure 5). These results and conclusions are consistent with the Year 2 data collected to date, in which year-round mean raptor use was 0.12 raptor/20-minute point count, yielding a predicted fatality rate of less than 0.01 fatalities/megawatt/year, or less than 3 raptors/year for a 300-megawatt project.

TABLE 2
Relative Exposure Index and Flight Characteristics for Large Bird Species during the Fixed-point Bird Use Surveys at the Alta East Wind Resource Area from July 10, 2010 to June 1, 2011

Species	Exposure Index
Common raven	0.85
Turkey vulture	0.07
Red-tailed hawk	0.03
Golden eagle	0.01
Unidentified hawk	<0.01
Prairie falcon	<0.01
Swainson’s hawk	<0.01
Cooper’s hawk	<0.01
rock pigeon	<0.01
California quail	0
Chukar	0
Mourning dove	0
American kestrel	0
Greater roadrunner	0
Northern harrier	0
Unidentified accipiter	0
Osprey	0
Peregrine falcon	0

Field data analyzed to date indicate that topographic features within the project area are not conducive to slope soaring or creation of potential flight corridors for any bird species. WTGs have been moved from the area of rugged topography located to the north and northwest where orographic uplift would be probable, and where higher incidence of golden eagle observations were recorded in Year 1. The low levels of documented use by all bird species suggest that bird density is very low and migration corridors or stopover habitat are not present onsite. No foraging sites, roost sites, or perch structures have been identified for raptors and, although minor raptor use is documented within the project area during baseline studies, the actual risk of collision with proposed WTGs appears to be very low for raptors (Figure 5). The majority of the WTGs are planned for installation in lower-elevation, less-rugged areas, although four turbines on the northern portion of the site are on a ridgeline south of SR 58. Based on relatively very low avian use of the project site observed during the 2 years of diurnal avian use studies completed to date, it is appropriate to conclude that potential collision risk to birds (other than eagles) is low and would be unlikely to be significant at the population level, with the possible exception of some BCC-listed species. The risk to eagles is detailed in the Eagle Conservation Plan (CH2M HILL, 2013).

Avian species are known to be at risk because of collisions with power lines (Drewitt and Langston, 2006; Janss, 2000) and other project-related features. Fatal collisions can occur when birds collide with transmission and distribution wires, transmissions tower guy wires, and other structures associated primarily with electrical power transmission (CEC, 2002). The number of collisions that occur is not related to flight frequency (Rusz et al., 1986) but instead is due to a bird’s flight performance (Savereno et al., 1996). Density, age, residency status, season, flight style, interaction with other birds, and hunting or presence of foraging opportunities all may influence the likelihood of a bird colliding with a power line or other project features.

The project area is within the Pacific Coast Migratory Route; migratory birds moving northwest from Mexico into California and the Pacific northwestern United States utilize this route (United States Geological Survey, 2006). There are no prominent agricultural fields in the project area, nor are there wetlands or riparian features that would attract avian species and potentially increase collision risk. Based on the habitat characteristics and the avian data collected to date, it would be unlikely that large numbers of any species would utilize or be supported by the habitats present in and near the project site.

3.2.2 Bat Risk

Of the 21 bat species whose range overlaps the Tehachapi Wind Resource Area, twelve are known to occur as fatalities at wind developments in North America (WEST, 2012).[1] Of these twelve, the Mexican free-tailed bat, silver-haired bat, and hoary bat are the most common species found during fatality studies at wind energy developments.

Bat fatalities can occur throughout the year, but are typically concentrated during late summer and fall months, after young-of-the-year pups take flight (Arnett et al., 2008). Bat activity occurred throughout the year at Alta East, so fatality risk is present during every season; however, given historical trends in mortality data, it is not unlikely that bat fatalities will be higher from August to October.

To date, bat fatality rates in California vary from 0.24 to 3.92 bats/MW/year (WEST, 2012). However, no preconstruction bat activity studies are available to identify whether a direct correlation exists among the California wind energy developments. There is a loose direct correlation in North America between bat passage rate and bat fatality rate, which suggests the Alta East project would have a relatively low mortality rate. Where preconstruction bat passage rates and bat mortality rates are available, there is a trend where, to date, mortality rates are below 5 bats/MW/year when the preconstruction activity is below 5 bats/detector night. The Alta East bat passage rate is lower than the lowest passage rate at a wind energy development with both preconstruction activity and fatality data, suggesting that Alta East is reasonably

[1] The species include: canyon bat, cave bat, long-legged bat, western red bat, little brown bat, western long-eared bat, western yellow bat, big brown bat, hoary bat, Mexican free-tailed bat, pocketed free-tailed bat, and silver-haired bat.

expected to have among the lowest bat mortality rate among all wind energy developments in North America.

3.3 Electrocution Risk

Power lines are present in many wildlife habitats and can result in the electrocution of raptor and other bird species (Lehman et al., 2010; and references therein). Electrocutions are caused by the arrangement and spacing of energized and grounded components of poles and towers that are used for perching and other activities (Avian Power Line Interaction Committee [APLIC], 2006). However, nearly all electrocutions occur on residential and commercial electrical distribution lines that are less than 69 kV (APLIC, 2006). The 230-kV transmission line planned for this project will have clearances between electrical components that are greater than 60 inches, as recommended by APLIC (2006), which is greater than the physical dimensions of all large birds that would potentially use the transmission structures for perching, with the possible exception of California condor.

To protect avian species from electrocution, the APLIC has established guidelines to reduce this risk. Incorporating appropriate design standards into the project, such as 60 inches of horizontal separation and a vertical separation of 40 inches between phase conductors and/or grounded hardware, will reduce electrocution risk. In the event that adequate separation is not feasible, insulation or covering of phases and grounds will be used to ensure avian protection from electrocution. Examples of insulation or covering are phase covers, bushing covers, jumper wire hoses, and covered conductors. Thus, electrocution of raptors on this project’s transmission line would be highly unlikely. Additionally, design measures will be incorporated to prevent perching by raptors, which will further reduce the attractiveness of the transmission line for species that use transmission line structures for perching or nesting.

3.4 Impacts on Nests or Nesting Territories

Areas proposed for installation of project components may provide suitable nesting habitat for burrowing owl and other avian species associated with the vegetation types present on the project site, and these species could potentially be affected during construction and operation activities. Bird nesting could also occur in vegetation (particularly shrubby plants) and in ground burrows on or near the project site. In the project vicinity, the avian nesting season for most bird species is from late February to early July.

No raptor nests were located within 1 mile of proposed project features; therefore, direct disturbance of raptor nests is not expected to occur and indirect disturbance associated with human activity in proximity to these nests is extremely unlikely. Ground- or shrub-nesting non-raptor bird species would, however, be vulnerable to construction activities during the nesting season. Active burrowing owl nests were not observed within the project area, although potential habitat is present in the project area and along the transmission line corridor. The project area could also provide foraging habitat for other raptor species. Preconstruction surveys, construction timing, and/or nest-specific response (if nests are found) will be employed to avoid or minimize indirect impacts, if nesting species are present during construction.

3.5 Nocturnal Migration

Nighttime visibility data available for the area suggest that risk of nocturnal avian fatality during migration is low because of infrequent low visibility events that are associated with bird strike risk. Historical visibility information within the region of the project site was accessed through airport Automated Surface Observing System (ASOS) and Automated Weather Observation System databases to assess the frequency of occurrence of low-visibility conditions that could increase risk to birds from the project. Data from all 24 hours of the day were collected from the nearest reporting station near Edwards Air Force Base, California, from January 1, 2006, through December 31, 2009 (Table 3). Current reportable ASOS values of visibility in statute miles are: <1/4, 1/4, 1/2, 3/4, 1, 11/4, 11/2, 13/4, 2, 21/2, 3, 4, 5, 6, 7, 8, 9, 10+. For avian risk assessment, low visibility resulting in bird strike risk would reasonably be defined as visibility of less than

1/3 mile; however, AWD uses 0.5 mile as the threshold value for low visibility to be more conservative than what would seem biologically appropriate. Using 0.5 mile as the threshold for low visibility, this area reported only 590 hours (1.8%) of visibility conditions less than 0.5 mile.

TABLE 3
Summary of Historical Visibility Data

Weather Station	Date Range	Number of Observation Hours	Number of Hours with Visibility Less Than 0.5 Mile	Percentage
HRL (Valley International	1/1/2006—1231/2009	33,540	590	1.76%

AWD is not aware of any significant fatality events involving nocturnal migrants in the region. Nocturnal migrants typically fly at altitudes well above the rotor-swept area unless ascending or descending in response to available stopover habitats. The largely uninterrupted expanse of land mass with relatively uniform vegetative cover present in and near the project area does not contain topographical scenarios that would concentrate migrations into narrow and obvious pathways.

3.6 California Condor

The California condor was federally listed as an endangered species by USFWS in 1967 (32 *Federal Register* 4001) and is designated fully protected under California law. A Final Biological Opinion was issued on May 8, 2013, concluding that the AWD project “is not likely to jeopardize the continued existence of the species” (BLM, 2013). Current threats to the California condor include low population numbers in the wild, mortality from ingesting lead from shotgun- and rifle-killed game, predation of newly released condors, and collisions with manmade structures, such as power lines (Southwest Condor Working Group, 2007). Condor fatalities have been documented as a result of ingestion of microtrash and hazardous materials such as ethylene glycol. No condor collision fatalities with meteorological towers, or wind turbines have been reported. During the first 2 years of reintroduction, four condors were reported killed by transmission line collision/electrocution (Snyder and Snyder, 2000). Since 1995, condors have been receiving negative conditioning to discourage perching on transmission towers; however, occasional collisions/electrocutions are still reported.

Site-specific avian use data, collected for almost 2 years, indicate that currently condors are not using the project site. This conclusion is supported by 2005–2011 GPS data provided by USFWS, in which the nearest documented condor was located in the Tehachapi Mountains approximately 3.8 miles northeast of the project and a historical location approximately 2.3 miles west of the project site.

3.7 Cumulative Impacts

Typical activities that may be disruptive or detrimental to avian species occurring throughout the project region, although very limited within the project area, include illegal shooting, loss of habitat to development through wind and non-wind-industry-related development, and general encroachment into avian habitats, each of which could potentially contribute to negative impacts on the regional avian populations. However, implementation of best management practices (BMP) designed specifically to avoid and minimize potential impacts on avian species will reduce the likelihood of any cumulative impacts associated with the project.

Additional wind power projects are operating in the Tehachapi region. AWD is aware that avian fatalities have been documented at the Pine Tree wind project approximately 7 miles north of the Alta East project, the Alite project located approximately 10 miles east, and the Alta-Oak Creek Mojave project located approximately 2 miles west. Impacts resulting from Alta East may be cumulative with those caused by these operating projects and were considered in the FEIS/FEIR for the project and determined to be significant and unavoidable.

SECTION 4.0

Avoidance, Minimization, and Mitigation Measures

The analyses and documentation provided in this BBCS show the project is well sited; however, it does present some risk to avian species using the project area. Based on the preconstruction avian monitoring, the risk is relatively low to all avian species in comparison to other wind energy developments in the west and Midwest (Table 2 and Figure 5); note that eagles are analyzed in the Eagle Conservation Plan (2013). Baseline studies have been completed and the results were used to avoid and minimize site-specific threats through micro-siting, construction and operation measures. Effects on eagles are described in the Eagle Conservation Plan (2013). Additionally, mortality monitoring during operation will allow ongoing assessment of loss, enabling documentation of species composition and fatality rates. Avoidance and minimization measures are presented in the following sections.

4.1 Project Siting

Avian use, bat use, and raptor nesting were evaluated during baseline studies for the project area from 2009 through 2011. The project site was modified in June 2010 to exclude some areas with higher avian use, and include additional areas that extended development southward and away from the rugged topographical areas that seemed to provide conditions more suitable for raptor nesting and use of thermals (Figure 1). Additionally, two potential bat roosting locations north of SR 58 were eliminated from the project area after adjusting the proposed layout. The resulting proposed project area is predominantly in a flat, comparatively gentle topography.

The project location allows AWD the opportunity to avoid impacts on federal or state listed avian species, as well as other important resource areas such as BLM Areas of Critical Environmental Concern or USFWS Designated Critical Habitat. No known areas of breeding, concentrated winter use, or migratory concentrations are documented in or near the project site. Raptor use is highest during winter, and passerine use is highest during spring (followed by winter), but these use values are very low. The data collected show no evidence of concentrated winter or migratory use. Additionally, lower visibility conditions caused by fog, mist, and low clouds that would present high risk to avian species are infrequent in the area. Overall, the project area presents a very low risk of direct impacts and the potential for very minor indirect impacts on birds. The project is appropriately sited on the landscape as it relates to the risk of impact on avian species.

4.2 Micro-siting of Project Features

Baseline surveys for the project resulted in no areas of unique or high use by avian species. Although some avian use of the project area will occur during construction and operation, no unique habitat features such as prominent raptor perch sites (rock outcrops, cliffs, trees) or concentrations of prey were detected during any biological resource studies performed for the project area that would attract predatory avian species. Additionally, the areas where raptor nests are documented are at sufficient distance from the project site to avoid direct disturbance or displacement impacts on nesting raptors. Additionally, Cameron Ridge, in the western portion of the project site and south of SR 58, has operating WTGs along the ridge.

All other project features are located away from the higher-elevation and rugged topography that would be potentially associated with higher raptor use and/or provide potential to concentrate movements of migratory species. Habitats are generally expansive and regionally common, with 87% of the area composed of four types: California buckwheat scrub (27 percent), Joshua tree woodland (23 percent), California juniper woodland (22 percent), and brittlebush scrub (15 percent); therefore, use by smaller birds will be affected but direct impacts to individuals and nests will be minimized and avoided through the following construction-related measures. Therefore, micrositing in response to avian use or habitat is not necessary for the remainder of the project features.

The following design features will be built into the project as a means to reduce risk:

- WTGs will generally be grouped in parallel linear arrangements
- Electrical collector lines will be located underground
- The following APLIC (2006) design guidelines will be exceeded for overhead transmission lines in order to be protective of raptors and potential condor electrocution:
  - APLIC (2006) recommends a 60-inch minimum horizontal separation between energized conductors and/or energized conductors and grounded hardware for raptors; AWD has a greater than 108-inch horizontal separation between conductors and the structural poles;
  - APLIC (2006) recommends spacing between conductors greater than 32 inches so that perch guards are not necessary to prevent electrocution of raptors; AWD has more than 120 inches between conductors, which are diagonally oriented to each other

4.3 Construction Measures

Appropriate site-specific avoidance and minimization measures have been identified by AWD and include, but may not be limited to, measures specified in the following BMPs. These measures are consistent with those identified in BLM right-of-way grants received by AWD on nearby wind development projects, and applicable measures from the adjacent Alta-Oak Creek Mojave project. All potentially applicable measures from the Alta-Oak Creek Mojave project are listed below. The BLM *Wind Energy Programmatic Environmental Impact Statement* (BLM, 2005) also includes BMPs and mitigation measures for a plan of development and project design.

Because raptor nesting areas are not located in the project vicinity, construction activities would not need to be scheduled to avoid important periods of courtship or nesting. If new nests are detected during project construction, timing and avoidance measures would be implemented as appropriate in coordination with USFWS.

Any dead birds or bats found during construction will be reported to AWD’s environmental manager and USFWS, and collected by staff with a Special Purpose–Utility permit.

4.3.1 Minimizing Potential Habitat Disturbance

To mitigate habitat reduction or alteration during construction, the following measures may be implemented:

- Where applicable, the extent of habitat disturbance will be reduced by keeping vehicles on access roads and minimizing foot and vehicle traffic through undisturbed areas.
- Habitat restoration activities will be initiated as soon as possible after construction activities are completed.
- Appropriate control measures will be implemented to control the introduction and spread of non-native plants, as specified by the project’s Noxious Weed Management and Habitat Rehabilitation plans, which will reduce impacts on the quality of avian habitats.
- Existing roads and utility corridors will be used to the maximum extent feasible.
- Potential for creating temporary or permanent habitats suitable for rodents, such as rock piles, eroded slopes with openings or overhangs, or stockpiling of construction debris will be avoided.

- The potential for wildfire will be minimized by implementing safety measures in accordance with the requirements of the California Fire Code (California Code of Regulations, Title 24, Chapter 4, Emergency Planning and Preparedness).

4.3.2 Minimizing Potential Direct Disturbance

- Permanent meteorological towers, transmission towers, and other facility structures would be designed to discourage birds from perching or nesting on them (for example, non-lattice towers, APLIC [2006] standards).
- Guy wires installed on project structures, such as temporary meteorological towers, will be marked with bird flight diverters. Meteorological towers placed on BLM lands will adhere to BLM Guidelines (BLM, 2006).
- Permanent meteorological towers will be free-standing without the use of guy wires.
- Power lines will be configured to minimize the potential for electrocution of birds, by following established guidelines (for example, APLIC, 2006).
- Explosives will be used only within specified times and at specified distances from sensitive wildlife or surface waters as established by BLM.
- If any federally listed species is injured or killed during construction, AWD will immediately notify USFWS.
- Vegetation removal and initial ground disturbance will be timed to occur outside the nesting season (August 1 through March 1) to reduce potential for direct disturbance of ground- or shrub-nesting species.
- If vegetation must be cleared during the nesting season (March 1 through August 1), a qualified biologist will conduct a preconstruction sweep of the area proposed for disturbance. The biologist will inspect the area for nests, or signs of nesting or courtship behavior. If a nest, or sign of nesting is discovered, measures such as altering the timing of construction or distance of construction activity from the nest will be taken to ensure that no impacts on these nests or individuals occur during construction.
- A Raven Management Plan will be prepared to provide instructions on how to avoid and minimize providing subsidies to common ravens in the project area.
- AWD will provide environmental training to all personnel working on the site during project construction. The training will include a review of federally protected species identification and promote awareness and facilitate implementation of appropriate measures to minimize risk of impacts on avian species.

4.4 Operation Measures

As part of AWD's mortality monitoring and reporting program, AWD will provide environmental training to all personnel working onsite during project operation. The training will include a review of federally protected species identification and will teach appropriate avoidance and minimization measures, as well as response measures if dead or injured avian or bat species are found. The importance of onsite staff is significant in that they are onsite daily, can become familiar with how all wildlife move through and use the project site and vicinity, are the eyes and ears of environmental staff for identifying project risk or impact issues, and can help identify ways to reduce unexpected impacts if they are detected.

- Onsite management efforts will reduce attractants to predatory and scavenging species, such as avoiding creation of attractive features for prey and removing carrion (livestock carcasses).

- Any dead avian or bat species will be reported to USFWS, and retrieved by staff with a Special Purpose–Utility Permit. Outdoor lighting will be limited to that necessary for facility safety and security, using motion or infrared sensors when appropriate and practical, and lights will be focused downward whenever possible to reduce skyward illumination.
- Informal operational monitoring will be performed during the life of the project as a course of business by all AWD operations staff. Staff will be required to report all avian or bat fatalities and observations of nesting behavior. While this monitoring will not be statistically based, it will allow detection of issues that may potentially occur onsite.
- Formal operational monitoring and reporting measures will also be implemented and are described in detail in Section 5.0, Post-construction Monitoring.

4.5 Condor Measures

AWD will implement its Condor Monitoring and Avoidance Plan (see appendix) as detailed in the Biological Opinion for the project, and all mitigation measures stipulated in the FEIS (BLM, 2013). Additionally, mitigation strategies are presented in the California Recovery Contribution. The California condor was addressed in detail through the Endangered Species Act Section 7 process and measures resulting from that consultation process will be implemented. Key mitigation measures that directly address the potential for an impact to condors include the following:

1. Hiring of a full-time biological monitor and implementation of a VHF condor monitoring system to curtail turbines whenever a condor approaches within 2 miles of a turbine
2. Implementation of a carcass removal program
3. Funding for lead outreach and education programs
4. Funding for California condor scientific research to guide future wind developments in the Tehachapi Wind Resource Area

4.6 Compensation for Habitat Loss

The BLM FEIS stipulated numerous measures for restoration of all habitats disturbed during construction, and additional compensatory mitigation for high-value habitats (BLM, 2013). Desert wash and riparian habitats are required to be mitigated at a 3:1 ratio (mitigation measure [MM] 4.17-1). A designated biologist will monitor construction activities, ensure restoration is completed as per Kern County and BLM requirements, and will submit annual reports on habitat restoration success (MM 4.21-1).

SECTION 5.0

Post-construction Monitoring

Post-construction monitoring will enable AWD to document avian and bat fatalities if they occur and identify factors associated with fatalities that might warrant additional or improved measures, or might warrant elimination of BMPs found to be ineffective. As part of AWD's mortality monitoring and reporting program, AWD will complete post-construction monitoring and reporting to determine whether baseline predictions of low levels of avian and bat mortality are consistent with operational outcomes. Species-specific predictions for mortality have not been generated because, to date, a strong correlation between preconstruction avian use data and post-construction fatality results has not been shown for non-raptor species. The Alta East project has preconstruction avian use data that will be compared with the fatality monitoring results to identify species for which a strong correlation exists. Alternately, species with low avian use but disproportionately high mortality rates will be identified. The analysis will include a comparison of the pre- and post-construction monitoring and fatality distributions to learn whether any predictive relationship may be evident from the preconstruction data. Further, for species with relatively high numbers of fatalities, the population estimates will be provided to learn whether any species are potentially being affected at a population level. The monitoring program is explained below.

5.1 Fatality Studies

Following construction, mortality monitoring for birds and bats will occur for 3 years in accordance with MM 4.21-11 of the BLM Record of Decision (BLM, 2013). A statistically significant sampling of turbines will be monitored, and all dead birds and bats will have their species, number, location, and distance from the nearest turbine documented. The results of monitoring will be reported to the Wildlife Response and Reporting System (WRRS) database with completion of each annual study. The WRRS database will be used to store all incidental and systematic fatality data found at the Alta East project, and includes species, quantity, location, and comments for each entry. The mortality study design will be consistent with guidance from the CEC (2007) and USFWS (2012). Study design will include searcher efficiency and carcass scavenging trials.

AWD or its representatives will perform post-construction mortality monitoring during the first three consecutive years of operation to evaluate if its risk assessment was correct. Fatality study results will be used as part of an adaptive management framework.

Post-construction mortality monitoring will include four types of surveys: (1) general avian mortality and injury surveys consisting of transect surveys at 33 percent of the WTGs twice per month, (2) eagle-specific surveys consisting of transect surveys at the remaining 67 percent of the WTGs twice per year, (3) monthly visual inspection of the area around all WTGs once per month, and (4) incidental fatality monitoring consisting of opportunistic discovery of fatalities. Details of the mortality surveys are as follows:

1) **General Avian Mortality and Injury Surveys**: Qualified biologists will conduct mortality monitoring of 33 percent of the WTGs at biweekly (twice per month) intervals under the direction of a USFWS-approved Lead Biologist overseeing all avian fatality monitoring activities. General avian mortality and injury monitoring will follow CEC guidelines (CEC, 2007). Details of the general avian mortality and injury monitoring are presented in Table 4. However, if improved field or data analyses methods become generally accepted practice by the wind and wildlife scientific community, and are deemed acceptable by AWD's avian biologists, such methods will be implemented for the project in coordination with USFWS, BLM, and Kern County.

TABLE 4
Basic Search Parameters for Alta East General Avian Mortality and Injury Survey

Topic	Details	Comments
Number of Turbines Searched	17 (33% of total)	
Survey Interval	Every other week	Subject to adjustment in response to scavenger removal rates as determined during scavenger removal trials.
Plot Size	250 meters x 250 meters square	Search plot based on distance from the tower that is equal to the maximum blade tip height (125 meters) per USFWS guidelines (USFWS, 2012).
Transect Spacing	Approximately 6 to 10 meters*	Spacing may vary for searchers to maximize visibility considering vegetation density and topography (CEC, 2007; USFWS, 2012).
Transect Length	250 meters	
Rate of Travel	1.7 to 2.2 miles per hour	Slow pace to allow careful visual inspection on each side of transect.
Duration of Surveys	During first 3 years of operation	As required per Kern County Environmental Impact Report Mitigation Measures (Kern County, 2012) and BLM conditions (BLM, 2013).

*Transect spacing of 6 to 10 meters is selected based on experience surveying for avian fatalities in low-growing desert vegetation and topography comparable to conditions present in the facility area. Six to 10 meters is a standard and generally accepted for fatality monitoring at other wind energy projects in similar vegetation and topography. The CEC guidelines recommend 6-meter spacing with adjustments based on vegetation and topographic conditions (CEC, 2007). Additionally, USFWS (2012) recommends spacing at 4- to 10-meter intervals based on vegetation and topography.

- **Carcass Persistence and Searcher Efficiency Trials**: Carcass persistence trials will be conducted concurrently with the other study components during the study period. The approach presented in this field study is modified from and consistent with those described in Smallwood (2007), Huso (2009), Strickland et al. (2011), and Warren-Hicks et al. (2013). Approximately 100 carcasses of small birds, 50 carcasses of medium to large birds, and 30 bat carcasses, if available, will be randomly placed within the general mortality and injury survey plots, for a total of approximately 180 trial carcasses throughout the entire year. Searcher efficiency trials will be completed concurrent with the scavenger trials using the same test subjects. The carcasses will be placed on a minimum of two dates during each season (spring, summer, fall, and winter), thereby spreading the trials throughout the survey period to incorporate the effects of varying weather, climatic conditions, and scavenger types and densities. Carcasses will be dropped from waist high or higher and allowed to land in a random posture. Each trial carcass will be discreetly marked (with tape or thread) prior to placement so that it can be identified as a study carcass if it is found by observers or wind facility personnel, particularly if the carcass is moved by a scavenger. Observers conducting carcass searches will monitor the trial birds over a 40-day period according to the following schedule as closely as possible. Carcasses will be checked every day for the first 4 days, and then on days 5, 7, 10, 14, 18, 25, and 40. This schedule may vary slightly depending on weather and coordination with the other survey work. At each visit, the observer will note the condition of the carcass (e.g., intact, scavenged, feather spot [i.e., more than 10 feathers], or absent [less than 10 feathers]). Trial carcasses will be left at the location until the end of the 40-day trial or until the carcass is removed entirely by scavengers. After 40 days, any remaining evidence of the carcasses will be removed.

  These carcass removal and searcher efficiency trials will not be used to adjust estimates of eagle fatalities due to the potential difference in scavenger removal and detection rates between the test subjects and eagles, but are instead intended for adjustment of fatality rates for other species as described in the BBCS. Searcher detection of eagles or eagle remains is assumed to be near 100 percent due to the sparse vegetation and the long persistence times of large raptors (Smallwood, 2007).

2) **Eagle-specific Surveys**: Every 6 months a thorough search will be conducted for dead or injured eagles at the remaining 67 percent of WTGs not evaluated in the general avian mortality and injury surveys described in Table 4. These surveys will use standardized transect methodology and square search plots that are 250 meters by 250 meters, as used in the general avian mortality and injury surveys, and assume that at least partial eagle remains will persist for up to 6 months. Transects will be spaced from 6 to 30 meters apart depending on vegetation and topography to allow for complete visual inspection of the search plot. Transect spacing will be set to allow the assumption of near 100 percent detection probability for eagles due to their large size.

3) **Monthly Visual Inspections:** Monitoring will also include short-duration monthly inspections of areas visible from drivable surface (roads, pads, and open areas) at all turbines for the life of the project or until cessation is approved by USFWS and BLM. These searches will be completed by onsite environmental and operational staff.

4) **Incidental Fatality Monitoring**: In addition to the standardized monitoring during the first 3 years of operation required as permitting conditions for BLM and Kern County, if the biologists or any operational staff incidentally detect an injured or dead bird, the incident will be documented and reported to environmental staff.

5) **Reporting**: The mortality analysis will note species, number, location, and apparent cause of fatality for each individual. The results of the mortality analysis will be provided to USFWS, BLM, and Kern County annually. At a minimum, the mortality analysis will consider the following:

    a) Number of annual bird mortalities per turbine and facility

    b) Comparison to existing public data on wind farm mortality at projects with similar habitats and study methodology.

    c) Evaluation of preconstruction avian monitoring and post-construction fatality data for species-specific correlations (direct and inverse), and distribution comparison by percent composition of the avian use and fatality data.

    d) Presentation of population estimates of avian species which have relatively high numbers of fatalities, to compare the mortality rates with the population estimates and identify whether significant population-level effects may be occurring.

5.2 Nesting/Breeding Monitoring

AWD will conduct post-construction breeding monitoring of eagle nests within 10 miles of the project site and raptor nests within 2 miles of the project site over the first 3 years following the project’s initial operation. Post-construction breeding monitoring will include aerial surveys or ground surveys where access is available, and comparison with results from the 2010 and 2011 nest surveys (Figure 6). Survey results will be provided annually to USFWS and will include eagle-specific data as outlined in the Eagle Conservation Plan (2013).

If the project results in a level of incidental injury and mortality to nesting raptors that constitutes levels of take that might influence productivity of a species, AWD will undertake supplemental compensatory measures that are commensurate with the impacts identified, to support regional conservation of that species in accordance with measures presented in Section 6.0, Adaptive Management. If fatality monitoring indicates that nesting passerines are being affected, then these species will be considered for adaptive management measures.

SECTION 6.0

Adaptive Management

6.1 Accounting for Policy Changes

With the possibility of future implementation of new policies it is understood that commitments made in this BBCS may require adaptation relative to potential forthcoming guidance. AWD will work collaboratively with USFWS to apply necessary policy changes to the project BBCS.

6.2 Agency Coordination

To ensure that impacts on avian species do not reach levels of significance during project operation or result in a net loss of avian or bat species in the regional population, study results will be provided to USFWS on an annual basis.

6.3 Implementing Adaptive Management

Results and work products produced throughout the permitting process will be used to guide management decisions that are made in the development process but extend beyond development and into all phases of construction, operations, repowering, and decommissioning. The foundation for guiding management decisions made during the development process should be well-founded and science-based risk assessments. This work will establish a baseline for identifying the need for future actions that may be required to avoid, minimize, or mitigate impacts to avian and bat species. Well-founded risk assessment and forecasted avian and bat fatalities will be evaluated periodically by AWD environmental managers to determine if assumptions and forecasts used to predict low levels of mortality were correct. If unexpectedly high levels of mortality are determined to exist at the project site, corrective actions will be evaluated to avoid, minimize, or mitigate the impacts. Implementing a system by which mortality risk assessments established during the development of a project are monitored during the operation of a project allows AWD to potentially modify operations for long-term reductions in avian and bat mortality.

Uncertainty in mortality predictions from work performed within the permitting process should establish the first step necessary to establish a feedback loop that may identify the need for action to address unexpected mortality. Modifications made in response to monitoring operational mortalities and comparing them to predictive mortality is the foundation of adaptive management. Adaptive management should be considered at the project site where observed avian or bat mortality is notably above levels common to well-sited wind developments in the region.

6.4 Mortality Reduction and Conservation Measures

The results of mortality monitoring for avian and bat species will be used in conjunction with any agency requirements among other factors including but not limited to economic considerations to determine if adaptive management is necessary. Observed mortality will be monitored by project biologists and by operations staff in accordance with AWD's operational monitoring and reporting protocols, and compared with the mortality results from other studies in the west.

AWD acknowledges the importance of understanding potential impacts to avian and bat species during the operation of wind energy projects. Adaptive management will be implemented to avoid, minimize, and mitigate for unexpected impacts in accordance with state, federal, and local laws pertaining to the protection of avian and bat species.

Adaptive management assessment techniques will be incorporated to assess the level of unexpected avian or bat mortalities. Observed mortalities will be evaluated for the likely causes of mortality and possible mortality reduction coordinated with the appropriate state and federal agencies. Conservation measures will be implemented to address the cause of the mortality. Details of conservation measures will be determined from site-specific assessment and will focus on reducing mortality relative to what has been observed.

6.5 Supplemental Measures

If the avoidance, minimization, and mitigation measures proposed in Section 4.0 have not been sufficient in reducing project impacts to an acceptable level, the supplemental measures listed below may be considered for implementation. Mitigation measures would be incorporated into this BBCS in response to specific issues identified during post-construction monitoring and may include such actions as:

- Upgrade existing power lines following APLIC guidelines to reduce the risk of electrocution.
- Provide assistance with a conservation project.
- Provide opportunities to enhance avian populations through enhancement techniques, such as creating nesting platforms, such as poles or nesting boxes, or habitat improvements for migratory birds on conservation lands or nearby BLM-administered land.

6.6 California Condor

Although California condors may occur in the project area, the frequency of this occurring is expected to be extremely low based on the results of the avian studies and evaluation of existing data for the project. Based on the baseline data collected for the project, the likelihood of occurrence of California condors is low to nonexistent in or near the project area at this time, making the current probability of collision fatality close to zero. A Final Biological Opinion was issued on May 8, 2013, concluding that the AWD project “is not likely to jeopardize the continued existence of the species” (BLM, 2013).

SECTION 7.0

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Appendix
California Condor Monitoring and Avoidance Plan

APPENDIX

Condor Monitoring and Avoidance Plan

Introduction

The range of the southern flock of California condor currently includes the ridges and western slopes of the Tehachapi Mountains generally west of operational wind farms in Kern County, California. For the past 25 years, there have been no reported condor fatalities resulting from operation of over 2,600 wind turbines in the region. This is likely because the current range of the species does not overlap with the operational wind projects, as evidenced by the documented locations of individual condors that travel within the occupied range, all of which are too far from existing or proposed wind projects for the turbines to pose an immediate threat of collision. Currently available data from telemetry-marked condors are too limited to conclusively predict where condors may occur in the next 30 years (expected operational duration of the Alta East Wind Project); however, the potential exists that condors may range east of the currently occupied areas and into areas where operational wind farms are or will be located.

Recent assessments have determined that although no condors have occurred within the existing or proposed wind farm sites in the Tehachapi area, in June 2009, a single condor (#428) was documented along a ridge to the north of Highway 58 northwest of the city of Mojave, California. This puts a known condor position approximately 4 air miles from the proposed Alta East Wind Project. The reason for this individual condor to occur at this location is unknown and cannot be determined. Therefore, a level of uncertainty exists regarding the likelihood of whether another condor will venture east, and perhaps move through areas that pose a threat of direct mortality from colliding with a wind turbine blade.

A completely remote and automated system for monitoring incidental occurrence and avoiding direct mortality of condors at wind energy facilities is currently not available. Therefore, it is reasonable and practical to establish a Condor Monitoring System (CMS) that combines available and feasible early remote detection technologies with real-time field responsiveness in order to avoid condor mortality and prevent unnecessary turbine curtailment scenarios. This strategy, together with strategies currently being implemented for wind energy development in the Tehachapi Mountains, including but not limited to microtrash removal, carcass monitoring and removal, and monetary contributions toward purchase and maintenance of telemetry/global positioning system equipment, will provide effective avoidance and minimization of risks of condor collision with wind turbines.

System Description and Validation

The objective is to develop a reliable CMS that will detect VHF-tagged condors as far as 16 miles away from the Alta East Wind Project. The detection system will be deployed at TerraGen Power's (TGP) retired operations and maintenance (O&M) building (now used for office functions) located west of the Alta East Wind Project site (see Figure 1). A viewshed analysis shows that such placement should allow full detection coverage for a 16-mile radius (Figure 2). The detection system antenna will be mounted on a tower (minimum of 20 feet in height), with the remaining equipment housed inside the O&M building. The main power from the O&M building will power the system. The internet connection within the O&M building will be used to transmit the high-urgency email alerts to the intended recipients.

FIGURE 1

The Proposed Location of the Detection Station and the Area within a 16-mile Detection Radius

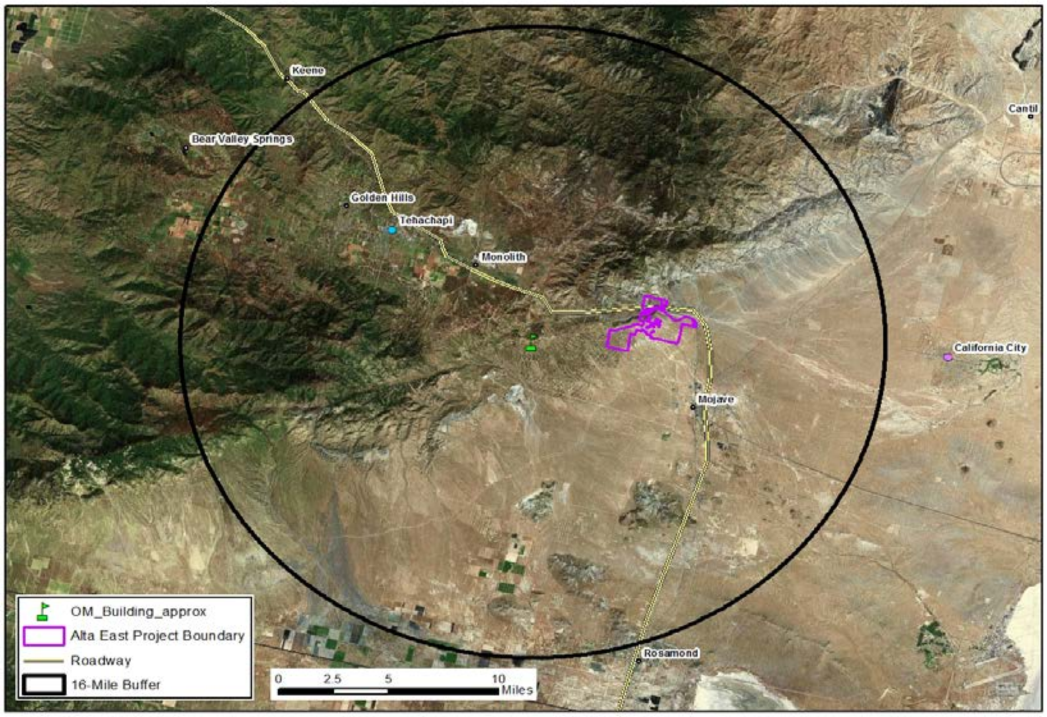
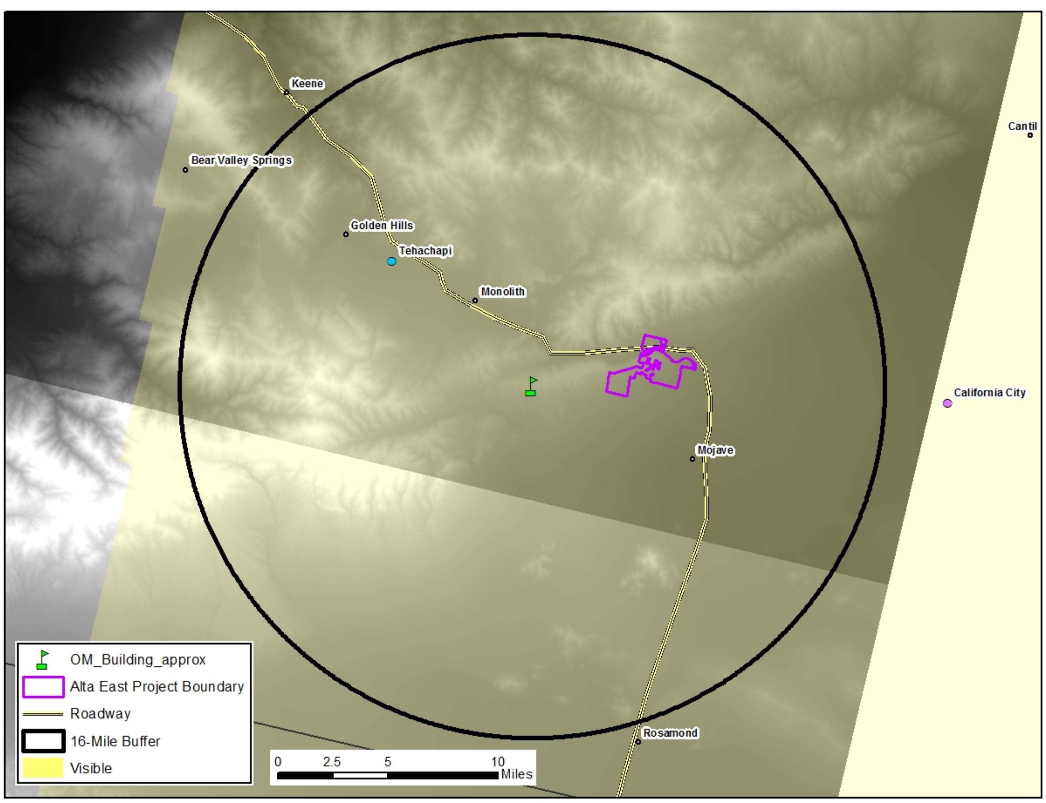


FIGURE 2

The Proposed Location of the Detection Station Provides Good Detection Probabilities for the Entire 16-Miles Radius



Equipment

Radio telemetry has been used to monitor wildlife movements since the 1960s and has been integral to Condor management since the 1980s. The proposed automated system uses these well-tested components and adds a personal computer (PC) interface to translate the receiver-generated audio signal into an email alert.

The equipment (Table 1) for the detection system uses off-the-shelf materials that have been used for the last several decades to detect and track animal movements. The system consists of the following components:

- Receiver with datalogger
- Antenna Switchbox with amplifier
- Omni-directional antenna
- PC with Internet connection
- Transmitter—for receiver qualification testing, as well as for use as a sentinel signal once permanently deployed

TABLE 1
Detection Equipment

Component	Description	Other Information
Receiver	ATS R4500S Receiver/Datalogger with Digital Signal Processor	http://atstrack.com/pdfs/R4500SSpecsheet.pdf
Antenna Switchbox	With 4-way amplifier	
RingoRanger antenna	Omni-directional, 3dBi gain	http://www.dxengineering.com/
PC	Internet connection	
Transmitter	Holohil Systems Ltd. RI-2C. 163.000Mhz, Pulse Width & Rate: 20 to 24 ms, nominal 0.6 p/s (36 p/m)	http://www.holohil.com/ri2c.htm This is the unit U.S. Fish and Wildlife Service places on the southern flock of condors in California

The ATS R4500S receiver is a VHF scanning receiver optimized for telemetry use. The receiver is capable of scanning 400 channels, as programmed into the frequency tables using the receiver's PC configuration software. Scan time per channel is programmable, trading off total scanning time versus likelihood of false indications (if channel scan time is set too low). One second per channel is the recommended starting point for testing. Assuming there are 50 possible condors to monitor then all channels can be scanned in under 1 minute.

Additionally, the receiver is programmed for specific pulse width and rate (pulses per minute). The DSP signal-processing firmware performs multiple functions, most notably differentiating a valid signal from noise, as well as matching on the programmed pulse width and rate.

While the telemetry transmitter sends out a simple continuous wave signal with no modulation (other than the information contained in the pulse width and rate), a beat frequency oscillator function of the receiver heterodynes the telemetry transmitter signal with a signal whose difference from the telemetry signal yields an audible tone (1000 Hz for example), which is audible in the receiver's speaker. The tone is generated each time a condor VHF tag is detected.

System Validation

Despite an extensive history of telemetry use on condors and other wildlife, the system will undergo validation testing. Validation will test several aspects of the system including reliability of detection, rate of false negatives (missed detections), and mapping detection and coverage gaps.

The validation will occur in three phases: (1) initial system familiarization and validation in relatively controlled environment, (2) a reliability of detection test at Bitter Creek, and (3) a detection mapping exercise at the Alta East Wind Project site.

Validation Phase 1. The initial testing will be done to become familiar with system components, ensure reliable communication among components, and evaluate the circumstances under which false negatives might occur.

Validation Phase 2. The system will be temporarily deployed at Bitter Creek to field test detection reliability under conditions in which numerous detection events can be assured of occurring within a short duration. Human observers will be co-deployed with the system. Both monitors (system and human) will record the number of condor presence events in 1-minute increments. The number of events (within each 1-minute interval) recorded by the two methods will be compared. The telemetry system will be deemed successful if it detects an equal or greater number of detection events as compared to the human observer. Agency personnel (Bureau of Land Management, US. Fish and Wildlife Service, California Department of Fish and Game) will be invited to a demonstration of the system.

Validation Phase 3. The system will then be installed on the tower at the O&M building (Figure 1) and an active transmitter will be systematically positioned across the landscape to test detection. The resulting detection map will indicate the presence of any gaps in coverage. If detection distance or area is insufficient then the system will be modified to rectify the deficiency. Corrective actions may include more or different antennas at the O&M receiver station, raising the antenna to a higher location, establishment of additional receiver stations, or other similar responses to optimize detectability of condors and minimize the potential for false negatives. The system will be deployed before the project begins commercial operation.

Possible System Modifications and Refinements

Initially, an omni-directional antenna will be used, if it performs unsatisfactorily then the addition of a more complicated system of at least four unidirectional (Yagi) antennas will be evaluated.

Although more complex, the directional nature of the Yagi antennas, provides a signal gain function compared to the omni-directional receiver, and hence would detect signals from a greater distance. Having a minimum of four antennas would increase the total channel scan time by a factor of 4 if only one receiver is incorporated into the system, because it would scan the frequency list on each antenna separately and in sequence; however, if the scan rate is unsatisfactory then additional receivers can be added.

Placement of the telemetry antennae towers will be determined as an iterative process. With additional mapping and determination of the most affective antennas on the project site, antennas will be placed to avoid blind spots and eliminate or greatly minimize the possibility that a condor might enter the wind farm with little advance warning. At present, no continuous corridor exists that would allow a condor to reach turbines without detection; however, some blind spots have been identified.

Preliminary mapping of the detection perimeter was completed by helicopter in October 2012. Additional detailed detection perimeter mapping will be conducted during December 2012 and January 2013 to identify number of additional telemetry antennae towers needed and their placement. This mapping will be conducted using helicopters, vehicles, and walking surveyors. The mapping process will be iterative in order to determine the reliable detection network required for detecting condors. Following the October 2012 initial mapping, three-dimensional GIS visual analyses was performed using digital elevation model (DEM) at a 10-meter scale. View sheds and line-of-sight interference was further evaluated for locations and elevations of antenna sites relative to locations and elevations of placed “targets.” This assessment will be the foundation for the nest steps in mapping the detailed network of detection that will ultimately be monitored by the remote monitoring (CMS) system. The results of the mapping conducted in December 2012 and January 2013 of the CMS detection network will be a GIS layer that accurately depicts the "lattice" of line-of-sight detection vectors that represent the areas that a condor will not be able to cross without detection. Though current mapping indicates that no continuous corridors exist that would allow a condor to reach project turbines without being detected, the follow-up detailed mapping will ensure that any blind spots are minimized or eliminated.

Alerting System

A previous study by Ventana Wildlife Society at a proposed wind energy facility[1] found that condor mean flight speed was 45.7 kph (28.33 mph). This translates to a movement rate of roughly 1 mile every 2 minutes. If the CMS's detection radius is 16 miles and the turbines are at least 10 miles from the detection perimeter, than a detection event at the perimeter would allow a 20-minute response time before the condor reached the nearest location where it may be at risk from project operations.

The audio signal from the receiver will be passed to the audio input in the PC, where custom software written by Normandeau software engineers will apply validation criteria to the received audio (tone frequency, pulse width and rate, signal to noise ratio, etc.) in order to determine a probable match on receiving an actual telemetry transmitter signal. When a match is verified, indicating the presence of a VHF-tagged condor, the PC will send email alerts using the normal Simple Mail Transfer Protocol (SMTP) email protocol, to a configurable list of recipients, at which time the Condor Notification Response Procedures (Attachment 1) will be immediately implemented. The list of recipients is discussed in the Staffing section of this document and in the Condor Notification Response Procedures.

The contents of the email will make clear whether it is an actual condor detection event, or a system health email, and all emails will contain the date and time.

The system health emails will be generated upon receipt of a "sentinel" signal. The sentinel is a telemetry transmitter programmed to transmit on a fixed schedule (for example, hourly). Reception of these emails is a positive indication of overall signal health, and if scheduled emails are NOT received, for whatever reason (for example, loss of Internet connectivity), it will trigger an investigation of the situation and corrective action, as needed.

The PC will also be configured for remote access (with requisite security) so that the system can be monitored remotely. This includes being able to run the receiver's configuration software which allows programming of the frequency tables so that if the number or frequencies of monitored channels change, the system can be configured accordingly without need to visit the receiver station.

Staffing and Training

Staffing

The CMS will be staffed by TGP employees who have been trained to receive and respond to a notification message email generated by the monitoring system. TGP staff that have been trained and are actively involved with the CMS are termed the Condor Initial Response Team (CIRT). The CIRT will be a mix of environmental and operations staff that, upon receiving a CMS notification message via email, will be available for immediate response and monitoring of condors that fly into monitored areas. The selection of CIRT members will be determined in part by where each person is located while performing their daily work routine. Operations staff are located throughout TGP projects and perform a wide range of daily activities. During daylight hours and for every work shift that occurs, no less than three (3) operation staff that have

[1] Ventana Wildlife Society. 2007. *Presence and Movements of California Condors Near Proposed Wind Turbines*. Final report prepared for HT Harvey and Associates. November 15. Available online at: http://www.ventanaws.org/pdf/about_research/HTharveyreport_finalNov07.pdf

been trained specifically to monitor, receive, and respond to the CMS will be on duty. Two of these operations staff will be appointed by an operation supervisor, and the third will be the lead operator in the SCADA room. The primary duties of these operation staff will not be altered other than to be in constant contact with the CIRT via email, phone, or radio. Because email access is not 100 percent reliable in all locations onsite, the response system incorporates the SCADA system operator to ensure condor protection in the event that notification emails are not received by onsite personnel (see Attachment 1, Condor Notification Response Procedures).

If a condor is detected, the CIRT will proceed in accordance with the Condor Notification Response Procedures for the CMS (Attachment 1).

Attachment 2 provides several examples of difficult condor detection scenarios and the proposed strategy for responding and avoiding condor fatalities at the site.

The CIRT Response Form is provided as Attachment 3.

Training

Environmental staff will be trained in operation, programming, and maintenance of the CMS equipment. All environmental staff will be responsible for upkeep and regular updates that are required by the telemetry equipment as individual condor frequencies change over time. A system update and maintenance schedule will be kept so that accurate frequencies and scanning capabilities are current at all times. Updates will occur weekly or as updates become available. As an alternative, the Condor Recovery Program staff can update the CIRT lead as birds are re-tagged on a real-time basis. It will be the responsibility of the environmental staff to train operation CIRT members on the use of hand-held telemetry equipment required to locate and track condors should the need arise. Additionally, all hand-held telemetry equipment will be updated on the same maintenance schedule as the CMS remote equipment so that responders have the ability to track condors as necessary.

It shall be the responsibility of the Director of Environmental Permitting (or appointed staff) to coordinate a monthly update meeting with CIRT members to discuss the previous month's activities, training needs, and equipment updates. These meetings will be oriented to increase the responsiveness of the CIRT to CMS notification messages and assuring that all equipment and CIRT members are capable of prompt action should a condor be reported within monitored areas.

Coordination with other project operators (non-TGP) with projects within the western slopes of the Tehachapi Mountains may be beneficial in optimizing the widespread success of the CMS in avoiding direct mortality of condors. Coordination of staff, monitoring equipment, and responses should be discussed with other project operators whenever possible in order to avoid any direct mortality of a condor from any wind turbine operating in the area. Coordination with other project operators may be initiated by any party and is subject to agreement by both parties on how staffing and equipment will be used to accomplish the goal of avoiding direct mortality of a condor.

Annually, during the first week of each quarter, the CIRT will be trained on the following topics. Environmental staff will have training on items 1–6 in the morning and administer training to operation staff joining in the afternoon for items 7–11.

1. Current status of the remote or hand-held equipment
2. Updates that have been or need to be performed on equipment or training
3. Refresher on the use of hand-held telemetry equipment
4. How and when to perform routine inspection on hand-held telemetry equipment
5. How and when to perform inspection and report problems with remote VHF equipment
6. Refresher on implementation of Condor Notification Response Procedures

7. Background and introduction to the CMS
    a. Purpose of the CMS
    b. How CMS works
    c. Importance of CIRT in implementing the CMS
    d. Organization of CIRT
    e. Location of equipment
    f. Description of equipment (stationary and hand-held VHF)
8. Condor life history and current population status
    a. Proximity of wind projects to current range
    b. Briefing on any condors previously reported
9. Responsibilities of CIRT Members
    a. How being a CIRT member interfaces with your job
    b. How to maintain contact with CIRT
    c. Filling out the CIRT Response Form
10. Operation of hand-held telemetry equipment
    a. How to set up and adjust the equipment
    b. How to acquire a visual observation and take a compass bearing
    c. How to report visual observations and bearing information to monitoring team
    d. Where and what condition the equipment will be stored
    e. Who is responsible for maintaining the equipment
11. Training is concluded with a drill on CMS

Curtailment

The extent of curtailment (a specific number or all turbines) will be driven by conditions that existing at the time a condor comes within 1 mile of the project site. One mile has been established as the minimum distance that turbines must be curtailed to avoid collision based on maximum travelling speed of a condor and curtailment times for turbines during field trials. Curtailment Zones (groups of turbines) will be identified and built into the software controls for the wind farm. Curtailment commands may be given for curtailment of specific zones or all zones of the facility at the discretion of the PSO, depending on the threat presented to condors.

To minimize the speed at which a feathered (curtailed) turbine blade moves, engineers will yaw the turbine out of the direction of the wind while the blades remain in a feathered position. The aerodynamic effect on the rotor would be eliminated and rotational motion would be limited to sway motion due to wind loading on the surface of the blade (approximately 3 mph at 25 meters/second). This approach is supported by Dr. Robert Thresher (pers. comm. 2012) of the National Renewable Energy Laboratory.

Pete Bloom of Bloom Biological, Inc. (pers. comm. 2012) asserts that condors have powerful eyesight and are capable of making sharp turns to avoid golden eagles as well as aggressively behaving condors. Bloom concludes it would be extremely unlikely for a condor to be struck by a turbine blade spinning at 15 mph or less. Further, given that condors routinely fly in 25 to 45 mph winds, Bloom concludes that condors would be unlikely to have difficulty maneuvering around turbine blades spinning at 15 mph or less.

Reporting

TGP will staff the CIRT lead position with a full time biologist. The responsibility of the CIRT lead will be to coordinate with USFWS staff in regular reporting of data collected by the CMS. USFWS will provide the point of contact for coordination and will establish a reporting protocol.

TGP will report a condor alert that results in a visual observation and/or curtailment order that at the project.

A central data collection and reporting system is being developed to organize and manage information regarding the CMS. This will allow for future analyses of detection information if the need occurs.

A copy of the CIRT Response Form (Attachment 3) will be provided to the USFWS within 48 hours of completion.

System Maintenance

Besides the initial system qualification testing, once permanently deployed at the O&M building, the system will require minimal periodic maintenance.

As previously described, a "sentinel" telemetry transmitter will provide ongoing system health assurance. The model of the sentinel transmitter to be deployed has an integral battery life of 2 to 5 years. If no provision for external power for this transmitter is made, then this transmitter will have to be replaced as needed.

Also as previously described, the PC will be accessible remotely for receiver configuration or adjustment as needed.

The CMS system components will be maintained on a weekly, monthly, and annual basis. Maintenance will be performed onsite. If system is taken offline, a monitor will scan for condors using binoculars and hand-held telemetry equipment.

1. **Weekly Maintenance**
    a. Remote VHF Equipment—Performed by Environmental Staff
        i. Update VHF frequencies
        ii. Check cables from antenna to power box
        iii. Inspect equipment for damage from weather or vandalism
        iv. Check all equipment is running and free of debris
        v. Fill out and sign inspection sheet located at the unit
    b. Hand-held VHF Equipment—Performed by Environmental Staff
        i. Update VHF frequencies
        ii. Check all connections are free of dirt, corrosion, physical damage
        iii. Check battery is fully charged—charge or replace as needed
        iv. Make sure extra batteries are in equipment bag
        v. Check antenna for physical damage
        vi. Check for cables
        vii. Equipment free from tangles or kinks
        viii. Make sure equipment bag is clearly marked, easily identifiable and accessible when needed.
        ix. Bag contains the following
            1. Current decision tree
            2. Map of project area
            3. Hand-held compass
            4. Binoculars
            5. VHF receiver
            6. VHF antenna
            7. Range finder
        x. Fill out and sign inspection sheet on equipment bag

2. **Monthly Maintenance**
   a. Remote VHF Equipment—Performed by Environmental Staff
      i. Same as for Weekly inspection with the addition of manufacture suggested maintenance.
      ii. Fill out and sign inspection sheet
   b. Hand-held VHF Equipment **– None to be performed in addition to weekly inspection**
3. **Annual Maintenance**
   a. Remote VHF equipment— Performed by manufacturer
   b. Hand-held VHF equipment—Performed by manufacturer

References

Pete Bloom. November 28, 2012. Letter to Kevin Martin/Terra-Gen Power LLC regarding condor avoidance of wind turbines.

Robert Thresher. November 28, 2012. Meeting with Kevin Martin/Terra-Gen Power LLC regarding lack of turbulence and effects on avian and bat species flying through feathered turbine blades.

ATTACHMENT 1

Condor Notification Response Procedures

The VHF telemetry receiver system will scan during daylight hours under all conditions, 365 days per year, as described in the Condor Monitoring and Avoidance Plan. If a condor VHF signal is detected, the following response system would immediately be implemented.

1. Detection of a condor VHF signal in the search area will trigger the **Condor Notification System**.
2. An urgent email and/or text **Notification Message** will immediately be sent to all members of the **Condor Initial Response Team** (CIRT), which consists of the following:

   A. TGP Environmental Staff

   - Mark Casper
   - Kevin Martin
   - Karla Nelson
   - Amanda Faivre
   - Dian Rowe

   B. Onsite TGP Alta East Project Operations Staff (two onsite at any given time)

   - Dean Landon
   - Raudel Castanon
   - Joel Peel
   - NAME
   - NAME
   - NAME
   - NAME
   - NAME

   C. SCADA System Operator (one onsite at all times)

   - Name
   - Name
   - Name
   - Name

3. **Notification Received**: With the exception of the **SCADA System Operator**, all CIRT members who are available to respond will immediately reply all as a **CIRT Responder**, notifying the CIRT of their availability to participate in the condor response process and to which vantage point they are in route to and expected time of arrival.

   After 90 seconds from the initial notification message, the **CIRT Responder** at highest level on the above notification hierarchy will issue a **Command Response Message** to the CIRT using the reply all function, notifying the CIRT that they have placed themselves in command of the response procedure from this time forward as the **Command Response Lead.**

   SCADA System Operator initiates the CIRT Response Form as CIRT members respond to notifications. ***Instructions are provided on the CIRT Response Form***.

   The CIRT Response Form is maintained from this stage until the time that the incident is concluded by the Command Response Lead. **GO TO Step 5**

4. **Notification Not Received**: If no CIRT Responders respond to the Notification Message within 90 seconds of the initial Notification Message, the **SCADA system operator** will implement a **Complete Emergency Shutdown** of all project turbines. The Complete Emergency Shutdown will be project wide and take approximately TBD seconds to be completed from initiation until complete braking of all turbines. TGP has attained engineering solutions to minimize the speed at which a feathered (curtailed) turbine blade would move. The solution is to rotate the machine out of the direction of the wind to a yawed position while the blades remain in feathered position. The aerodynamic effect on the rotor would be eliminated and rotational motion would be limited to sway motion due to wind loading on the surfaced of the blade (< 0.35 rotor rpm or approximately 3 mph at 25 m/s).

   SCADA System Operator initiates the CIRT Response Form indicating that "NO NOTIFICATION WAS RECEIVED FROM ANY CIRT MEMBERS" and note the time curtailment was initiated.

   GO TO STEP 10

5. **Command Response Lead** immediately implements the following:

   A. If the time for any **CIRT Responder** to access the appropriate detection point is expected to exceed 5 minutes, the **SCADA Operator** will be immediately notified to implement a **Complete Emergency Shutdown**. **GO TO Step 10**

   B. Otherwise, all **CIRT Responders** immediately

      i. Retrieve the closest telemetry equipment bag and

      ii. Move to the appropriate detection point providing proper vantage. And perform the following steps:

         1) The hand-held telemetry receiver system is tuned to the detected VHF signal and direction of the signal is determined.

         2) Binoculars and/or spotting scope are used to obtain visual location of condor, if possible.

         3) If no condor is observed, **GO TO Step 6.**

         4) If condor is observed, **GO TO Step 7.**

         5) If multiple condors are observed, **GO TO Step 9.**

6. If no condor can be visually observed, but it is clear that the detected condor is not in **harm's way** (within 1 mile of the project) based on interpretations of the telemetry signal, the condor will be monitored until it is clearly out of the monitoring area or until visual observation occurs.

   A. If each condor moves out of the monitoring area, no action is required. **(END)**

   B. If visual observation occurs, **GO TO STEP 7.**

7. Flight path of each condor is monitored visually and with telemetry equipment. If a condor approaches within 1 mile (approximate) of the project boundary or nearest turbine, **Selective Emergency Shutdown** of turbines in proximity to condor will be implemented immediately. Selective Emergency Shutdown may include individual turbines, arrays, multiple arrays, or select groups of turbines, all turbines in a particular portion of the project area, or all project turbines. Selective Emergency shutdown procedures will take approximately TBD seconds from start of implementation until complete braking of selected turbines. **GO TO Step 8**

8. Flightpath of each detected condor will be continuously monitored visually and with telemetry equipment during all **daylight periods** (from 30 minutes prior to sunrise until 30 minutes after sunset).

   A. Additional turbines will be curtailed as appropriate or necessary using Selective Emergency Shutdown procedure.

B. Each condor will be monitored until it is clearly out of the monitoring area based on visual observation and telemetry signal interpretation. **GO TO Step 11**

C. If at any time during monitoring, signal or visual is lost and it is not clear that each condor is out of harm's way, the **SCADA Operator** will be notified to implement a Complete Emergency Shutdown. **GO TO Step 10**

D. If daylight period ends while any monitored condor is still in the monitoring area, monitoring will resume 30 minutes prior to sunrise the following day, at the beginning of Step 5. **GO TO Step 5**

9. If multiple condors are reported via the Notification System, or if multiple condors are observed during implementation of the Response System, and flight paths of each condor can be monitored visually and/or with telemetry equipment, **GO TO Step 7**.

   If multiple condors are reported via the Notification System and flightpaths of each condor CANNOT be effectively monitored visually and/or with telemetry equipment, but it IS clear that the detected condors are not in harm's way based on interpretations of the telemetry signal and/or the general location of the observations/detections, **GO TO Step 6a**.

   If multiple condors are reported via the Notification System and flightpaths of each condor CANNOT be effectively monitored visually and/or with telemetry equipment, and it is NOT clear that each condor is out of in harm's way **GO TO Step 8c**.

10. Turbines will remain stopped until the **TGP Environmental Lead** determines that conditions are safe to resume operations, at which time the **TGP Environmental Lead** will notify the **SCADA operator** to resume operations of all curtailed turbines. (**END**)

11. Selectively curtailed turbines will remain stopped until the **Command Response Lead** determines that conditions are safe to resume operations, at which time the **Command Response Lead** will notify the **SCADA Operator** to resume operations of all curtailed turbines. (**END**)

ATTACHMENT 2

Potentially Difficult Condor Detection Scenarios

If a signal on a condor is lost and visual contact cannot be established, it will be treated as though the condor is moving toward the project site and can't be detected by the CMS network. TGP operations staff will continually use hand-held VHF equipment and visual outlook to make sure that, if a condor comes within 1 mile of the project site, they can give the curtailment command.

If observers are unable to locate, either visually or with a VHF receiver, a condor that has triggered the detection system, there are two potential scenarios for risk management:

- Good visibility weather conditions (e.g., no fog or sand storm) allow for a condor to be detected by TGP operations staff, but for reasons of juxtaposed terrain or long distance operations staff cannot see the condor. Unless the operations staff otherwise feels a threat exists, this scenario will not result in curtailment because operations staff will be able to see the condor as it moves closer into visible range, and certainly before it is within 1 mile of the project site. The curtailment command will not be issued until the condor is seen within the 1-mile perimeter of the project site if operations staff feels no threat to a condor exists
- Poor visibility weather conditions (e.g., heavy fog or sand storm) may preclude a condor from being detected by operations staff, regardless of juxtaposed terrain or long distances from operations staff. This scenario will, upon issuance of a CMS alert, result in curtailment because operations staff may not be able to see the condor. Visual range is predicated on two factors regarding condor observation: distance between the condor and observer, and obstruction between the condor and the observer. In this scenario, it is neither distance nor topographic obstruction that is responsible for reducing visibility. The reduction in visibility is from conditions that may reduce detection range to less than 1 mile from the project site, thus reducing or eliminating the capacity of operations staff to visually see the condor within 1 mile of the project site.

If a particular condor is detected more regularly within the detection network than historically reported, the frequency, location, and duration of recurring condor alerts will be used by the CIRT to determine the relative level of risk that exists and how the future response will be carried out in order to avoid condor mortality at the project site. Condors that continually enter the CMS detection network and regularly spend time in locations beyond 1 mile from the project site do not risk collision. In this situation, the operations staff would be on high alert and maintain awareness of any condor occurrence, either visually or with handheld VHF, entering the 1 mile curtailment area. At no time will an alert be ignored regardless of the number of times a condor may trigger the system.

If a condor establishes a roost within the 16-mile CMS detection area, TGP will work with USFWS, as appropriate, based on condor behavior and CMS tracking information. Some refinement in the detection of specific birds that establish or use a new roost may be necessary. Details for refining the monitoring and detection of changed occurrence patterns of future condor roosts will be based on specific behavior observed as changes occur. If particular birds are roosting in a new area inside the 16-mile CMS network detection perimeter, their VHF frequencies can be programmed into a secondary antenna that has a smaller detection range centered at the project site. This secondary antenna will be programmed to only scan for birds that are known to be regularly using a roost within the CMS detection perimeter and will only scan to a 3-mile radius. Scanning for condors that roost within the 16-mile CMS detection network perimeter, but that do not enter within 3 miles of the project site with two antennas each set to monitor different risk zones will allow for initiation of the appropriate response by the CIRT when a condor that regularly triggers alerts within the 16-mile CMS detection network triggers an alert within 3 miles of the project site.

ATTACHMENT 3

CIRT RESPONSE FORM

(TO BE COMPLETED BY SCADA OPERATOR)

DATE:________________ TIME OF NOTIFICATOIN NOTICE:____________________

CIRT Members	Member Designation Responder – (R) Command Response Lead – (CRL)	Time Member Replied Available	Vantage Point Location	Time of Arrival at Vantage Point	Time VHF Signal Established	VHF Frequency	Time Visual Established	Comments (Curtailment requests, information from observers, special instructions, etc.) Use additional sheets if necessary.

DIRECTIONS:

Fill out the columns as CIRT members respond to the notification message.

Designate each member that indicates they are available as either a Responder (R) or Command Response Lead (CRL)

Indicate the time member sent availability response, vantage point they are in route to, time of arrival at vantage point, VHF signal established, what the frequency is, time of visual established, any comments regarding communication.

TIME INCIDENT WAS CONCLUDED BY COMMAND RESPONSE LEAD: _________________________