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Bird and Bat Conservation Strategy
Blythe Solar Power Project
Riverside County, California

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LIST OF ACRONYMS AND ABBREVIATIONS

ABPP	Avian and Bat Protection Plan
AO	BLM Authorized Officer
APLIC	Avian Power Line Interaction Committee
BBCM	Bird and Bat Conservation Measure
BBCS	Bird and Bat Conservation Strategy
BBS	Breeding Bird Survey
BCI	Bat Conservation International
BGEPA	Bald and Golden Eagle Protection Act
BLM	Bureau of Land Management
BSPP	Blythe Solar Power Project
CBOC	California Burrowing Owl Consortium
CDFG	California Department of Fish and Game
CDFW	California Department of Fish and Wildlife
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
cm	centimeter
CI	confidence interval
COD	commercial operation delivery
CPM	CEC Compliance Project Manager
CRS	Colorado River Substation
CV	coefficient of variation
CVSR	California Valley Solar Ranch
DB	Designated Biologist
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ESA	Endangered Species Act
FEIS	Final Environmental Impact Statement
ft	foot
GIS	Geographic Information System
GPS	Global Positioning System
GSEP	Genesis Solar Energy Project
ha	hectare
HMANA	Hawk Migration Association of North America
I-10	Interstate 10
gen-tie	generation tie line
km	kilometer
kph	kilometers per hour
kV	kilovolt
Linear Facilities	the transmission line, distribution line, and a main access road
m	meter

MBTA	Migratory Bird Treaty Act
min	minute
mph	miles per hour
MSEP	McCoy Solar Energy Project
MW	megawatt
NEPA	National Environmental Policy Act
NextEra Blythe Solar	NextEra Blythe Solar Energy Center, LLC
PA	Plan Amendment
PA/FEIS	Plan Amendment/Final Environmental Impact Statement
PEIS	Programmatic Environmental Impact Statement
Project	Blythe Solar Power Project
PV	photovoltaic
REAT	Renewable Energy Action Team
SCE	Southern California Edison
SEZ	Solar Energy Zone
Solar Plant Site	the solar arrays, power generating equipment, and support facilities
SPUT Permit	Special Purpose Utility Permit
SSC	Species of Special Concern
TAG	Technical Advisory Group
US	United States
USC	United States Code
USFWS	United States Fish and Wildlife Service
WBWG	Western Bat Working Group
WEAP	Worker Environmental Awareness Program
WRI	Wildlife Research Institute
solar field	solar plant Units 1, 2, 3, and 4

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1.0 INTRODUCTION

NextEra Blythe Solar Energy Center, LLC (NextEra Blythe Solar) is developing the Blythe Solar Power Project (BSPP or Project), a 485 megawatt (MW) photovoltaic (PV) solar power plant, on Bureau of Land Management (BLM)-administered land in Riverside County, California (Figure 1.1). The previously-approved project was a solar thermal energy generating project, and was regulated by the California Energy Commission (CEC). The CEC decided to retain its role as the lead agency under the California Environmental Quality Act (CEQA) after the project was converted to a PV solar project.

To monitor and manage Project-related avian and bat injuries and mortalities, the CEC in consultation with BLM, CDFW, and USFWS, established Conditions of Certification and Design Feature BIO-15 that require NextEra Blythe Solar to develop a Bird and Bat Conservation Strategy (BBCS), formerly known as an Avian and Bat Protection Plan (ABPP). An Avian Protection Plan previously was developed and approved in 2011 for the approved Project (AECOM 2011). Once approved, this BBCS will replace that ABPP. This BBCS is based on the results of biological resource surveys at the Project and other publicly-available information for the area. This BBCS provides a written record of efforts by NextEra Blythe Solar to understand potential project impacts to birds and bats and to document conservation measures that have or will be taken to avoid, minimize, and/or mitigate for those potential impacts.

1.1 Project Description

The Project is located in the Colorado Desert in Riverside County, California, approximately 11.3 kilometers (km; 7.0 miles) northwest of the City of Blythe, California (Figure 1.1). Surrounding mountain ranges include the McCoy Mountains to the west, the Little Maria Mountains to the north, and the Big Maria Mountains to the northeast. McCoy Wash is located northeast of the Solar Plant Site, and Interstate 10 (I-10) is located approximately 4.5 km (2.8 miles) south of the Solar Plant Site.

The Project is a solar electric generating facility that uses PV technology. The permanent Project footprint will be approximately 4,138 acres (1,675 hectares [ha]), including Linear Facilities. The Solar Plant Site includes the solar arrays, power generating equipment, and support facilities. The Linear Facilities include a transmission line, distribution line, and a main access road (Figure 1.1). To the extent possible, linear facilities will be shared with the McCoy Solar Energy Project (MSEP), located directly north of the BSPP, as a means of minimizing environmental impacts. The general arrangement of the facility and the overall site plan is presented in Figure 1.2. A detailed Project description can be found in the CEC's Final Decision (CEC 2014) and BLM's Final Environmental Impact Statement (FEIS; BLM 2014).

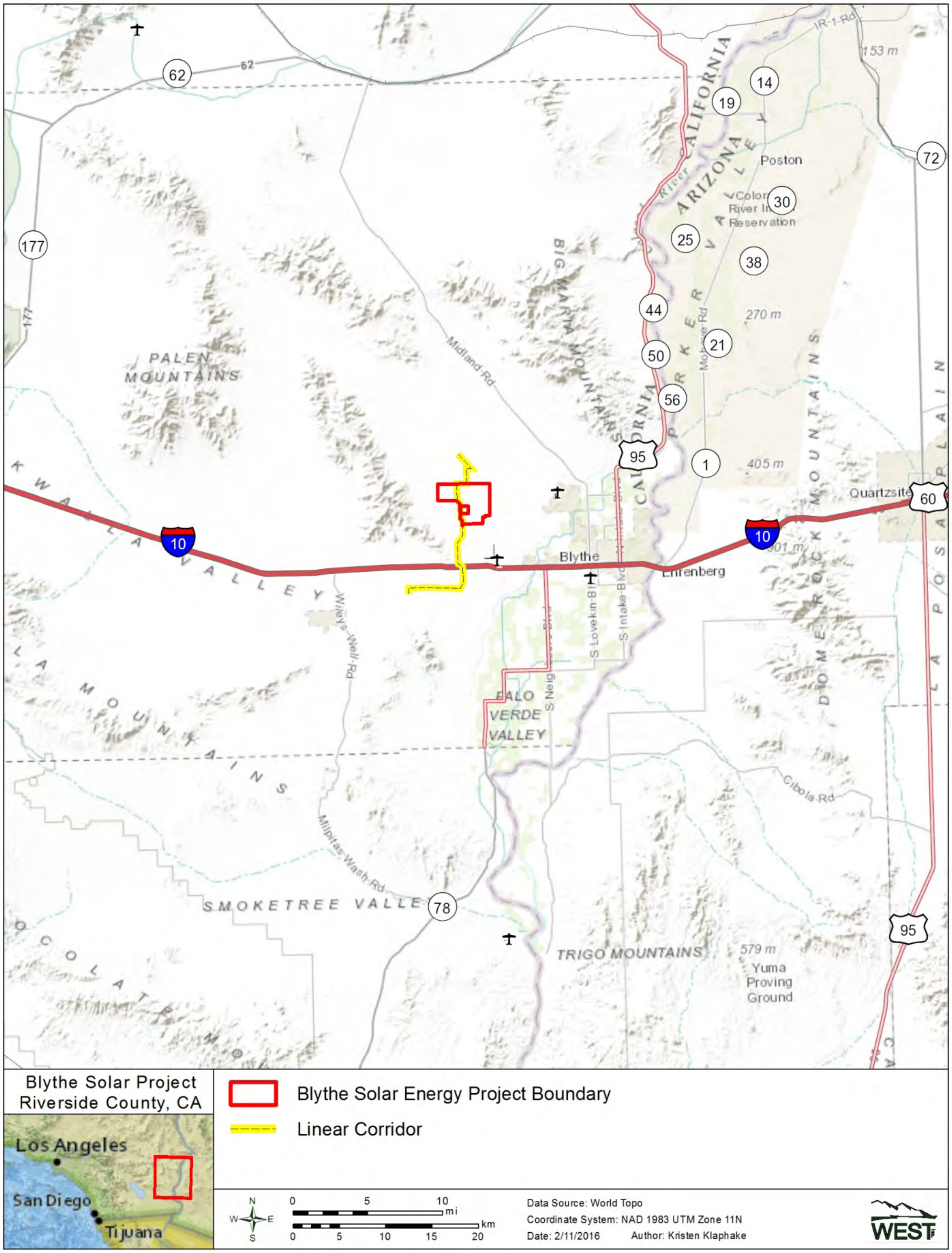

Figure 1.1 Location of the Blythe Solar Power Project, Riverside County, California.

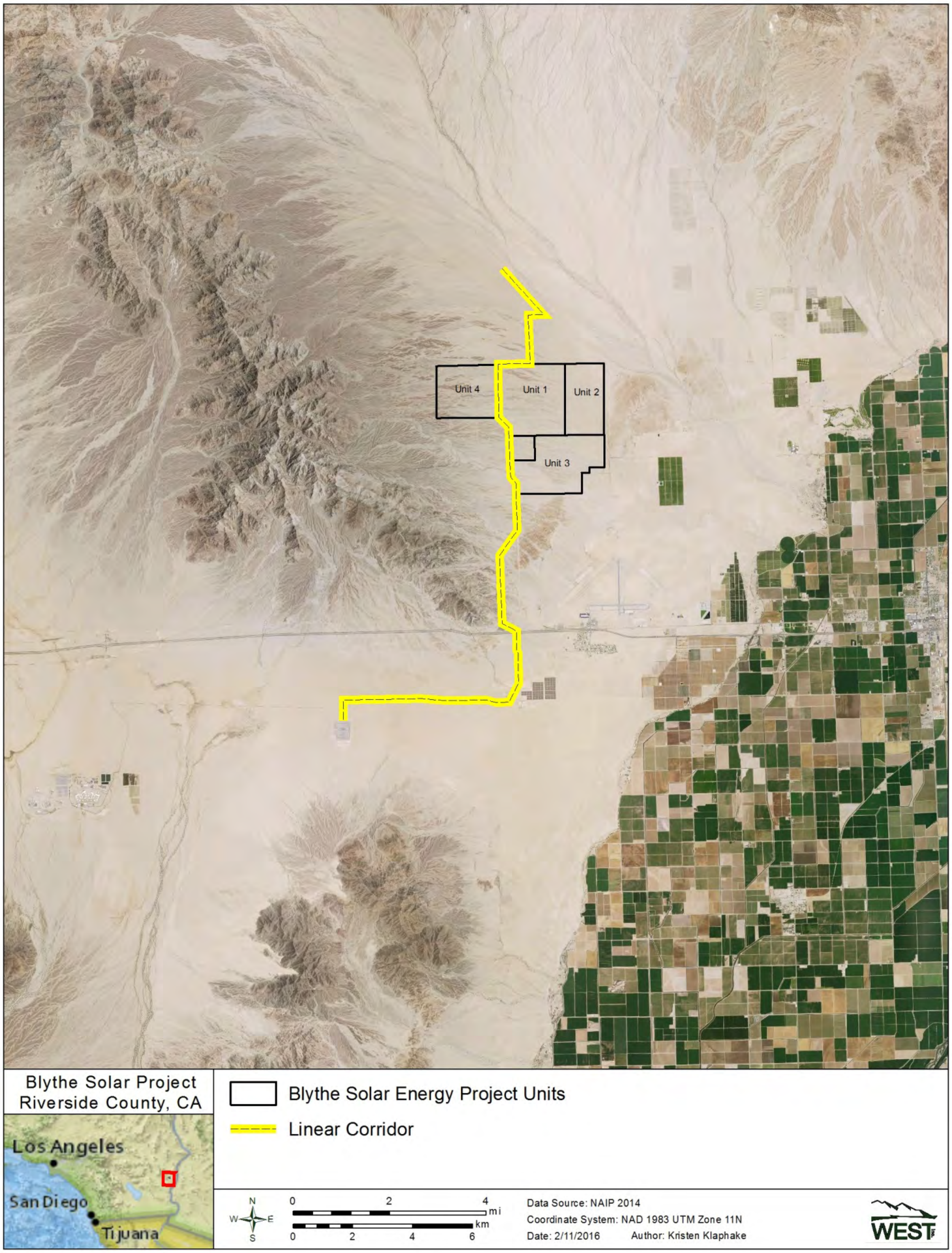

Figure 1.2 Features of the Blythe Solar Power Project, Riverside County, California.

The Project will contain all facilities that create a footprint in and around the field of solar panels (solar PV modules), including facilities such as:

- The solar field (consisting of four solar power plants identified as Unit 1, 2, 3, and 4);
- One switchyard; and
- Other site improvements, such as a temporary laydown area, perimeter and access roads, fencing, water treatment, two groundwater wells, lighting, and evaporation ponds (if necessary).
- Approximately 14.5 miles (23.3 km) of double-circuit, overhead 230-kilovolt (kV) generation tie line (gen-tie). The corridor will be shared with the gen-tie for the MSEP and most of the gen-tie line itself will be shared.
- Two telecommunications lines (primary and redundant);
- A new Southern California Edison (SCE)-owned and operated distribution line; and
- A main access road, also shared with MSEP.

The BSPP will include the four Units, plus the Linear Facilities, and will be constructed in four phases (Figure 1.2). Phase 1 is expected to consist of Unit 1, which is 110-MW capacity, plus the Linear Facilities. The Linear Facilities will extend from the Solar Plant Site and include the main access road, shared gen-tie line, switchyard, telecommunication lines, and distribution line (previously installed for the MSEP). Phase 2 consists of Unit 2, which is anticipated to be 125 MW. Phases 3 and 4 are forthcoming, but have not yet been through final design. The Solar Plant Site will be fenced with chain-link security fence with desert tortoise (*Gopherus agassizii*) fencing along the bottom. Water runoff will continue to follow the natural drainage patterns across the Solar Plant Site; there will be no drainage channels routing water around the Project.

The configuration of the Units is presented in Figure 1.2. Construction of the Units will be sequential, starting with Unit 1. Each Unit will be considered complete when all of the PV blocks (arrays in different configurations) are operational and producing power into the electrical grid and commercial operation delivery (COD) has occurred. Although the acreage of each block will depend on the PV system (i.e., panel material, mounting equipment), spacing, and other design criteria subject to change during detailed engineering, each full-size block will be a maximum of 4 MW and is expected to cover approximately three ha (seven acres).

The solar PV modules convert solar energy into direct current electricity. Different materials display different electricity generation efficiencies; higher efficiency panels produce more electricity per given area, but cost more per panel area. NextEra Blythe Solar is considering the installation of solar PV panels made of Hanwha polycrystalline. By design, the solar PV panels absorb sunlight to generate electrical output and, therefore, are manufactured with anti-reflective glass to maximize the electrical output capacity. All types of PV panels are designed to minimize reflection.

PV modules will be mounted together in different configurations or blocks, depending on the mounting equipment selected. NextEra Blythe Solar has selected a ganged tracking modular system. The angle of the panel of a tracking system varies throughout the day and will be oriented on a north-south axis. Each tracking assembly consists of one or two steel torque tubes, supported by posts, on which rests the frames for the PV modules. Each tracker holds 80 to 126 PV modules mounted on this metal framework structure; the wide range is due to the variation in panel size.

For future Phases 3 and 4, two netted 6-acre (2.4 ha) evaporation ponds totaling up to 4.9 hectares (12 acres) may be required, depending on the water quality and the need for an on-site water treatment system. If required, the evaporation ponds will be located within the water treatment area in the Solar Plant Site. This document assumes that the evaporation ponds will be constructed, operated, maintained, and ultimately decommissioned as part of the Project. Data obtained from the monitoring of the netted evaporation ponds at the Genesis Solar Energy Project (GSEP) or other solar facilities will be used to help elucidate whether netting or some other deterrent is warranted at the BSPP to minimize bird and bat fatalities.

The BSPP 230-kV gen-tie will be shared with the pre-existing MSEP gen-tie and will extend south from the Solar Plant Site and continue to the Colorado River Substation (CRS) south of I-10. The majority of the gen-tie and associated maintenance road south of I-10 will be adjacent to existing transmission lines; the gen-tie north and immediately south of I-10 will be located where there currently are no poles or roads. NextEra Blythe Solar proposes to use concrete or non-reflective steel, self-weathering monopoles and/or H-frames. The gen-tie support towers are expected to be approximately 24.4 – 36.6 meters (m; 80 – 120 feet [ft]) tall, depending on the location and local terrain. The final transmission tower design will be determined during the final engineering of the proposed interconnection.

1.2 BBCS Purpose

The US Fish and Wildlife Service (USFWS) and the California Department of Fish and Wildlife (CDFW; formerly the California Department of Fish and Game [CDFG]) currently recommend the development of a project-specific BBCS, formerly called an ABPP, for certain renewable energy projects that may impact bird and bat resources. This BBCS applies to Units 1, 2, 3, and 4 of the Project but will be updated, as needed, in the event that differences associated with future phases of the project warrant revisions.

The purpose of this BBCS is to:

- Describe baseline conditions for bird and bat species present within the Project site, including results of site-specific surveys;
- Specify conservation measures that will be employed to avoid, minimize, and/or mitigate any potential adverse effects to these species;
- Describe the incidental monitoring and reporting that is taking place during construction; and
- Provide details for post-construction monitoring and reporting.

1.3 Regulatory Setting

Several federal and state laws and regulations, including National Environmental Policy Act (NEPA), the Endangered Species Act (ESA), the Migratory Bird Treaty Act (MBTA), Bald and Golden Eagle Protection Act (BGEPA), BLM Sensitive Species, and CDFG Codes, provide the foundation for the development of this BBCS. This document represents a comprehensive plan to meet the requirements of these regulatory mechanisms as they apply to birds and bats in the Project area.

1.3.1 National Environmental Policy Act

Under NEPA (42 United States Code [USC] §§ 4321-4370h), federal agencies are required to prepare an Environmental Impact Statement (EIS) for any major federal action significantly affecting the quality of the human environment. The environmental impacts of the Project have been addressed by the Plan Amendment/FEIS (PA/FEIS; BLM 2014). This BBCS corresponds to design features for ecological resources specified in previous licensing documents, which are associated with reducing potential impacts to bird and bat species.

1.3.2 Endangered Species Act

Certain species at risk of extinction, including many birds and bats, are protected under the federal ESA of 1973, as amended. The ESA defines and lists species as “endangered” and “threatened” and provides regulatory protection for the listed species. The federal ESA provides a program for conservation and recovery of threatened and endangered species. Section 7(a)(2) directs all federal agencies to insure that any action they authorize, fund, or carry-out does not jeopardize the continued existence of an endangered or threatened species or designated or proposed critical habitat (collectively, referred to as protected resources).

1.3.3 Migratory Bird Treaty Act

The MBTA (16 USC §§ 703, *et seq*.), passed by the US Congress and signed into law in 1918, makes it unlawful to “pursue, hunt, take, capture or kill; attempt to take capture or kill; possess; offer to or sell, barter, purchase, or deliver; or cause to be shipped, exported, imported, transported, or received any native migratory bird, part, nest, egg, or product.” The MBTA, enforced by the USFWS, protects all MBTA-listed migratory birds within the United States. In the continental US, native non-covered species generally belong to the Order Galliformes. Common non-native species not protected by the MBTA include rock pigeon (*Columba livia*), Eurasian collared-doves (*Streptopelia decaocto*), European starling (*Sturnus vulgaris*), and house sparrow (*Passer domesticus;* USFWS 2005). Although permits may be obtained to collect MBTA-listed birds for scientific purposes or to destroy depredating migratory birds, the MBTA does not provide any permit mechanism authorizing the incidental take of migratory birds in connection with otherwise lawful activities. Nevertheless, federal agencies such as the BLM have been directed to evaluate the effects of its actions on migratory birds, with an emphasis on species of concern (per Executive Order 13186).

1.3.4 Bald and Golden Eagle Protection Act

The BGEPA (16 USC §§ 668-668d) prohibits the take, defined as to “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb,” of any bald eagle (*Haliaeetus leucocephalus*) or golden eagle (*Aquila chrysaetos*). Through recent regulation (50 Code of

Federal Regulations [CFR] § 22.26; USFWS 2009), the USFWS can authorize take of bald and golden eagles when the take is associated with, but not the purpose of, an otherwise lawful activity and cannot practicably be avoided. The USFWS has issued Eagle Conservation Plan Guidance (USFWS 2013) for land-based wind energy projects to help project proponents avoid unanticipated take of bald and golden eagles and comply with the BGEPA. Although the guidelines were developed for land- based wind energy projects, certain components of eagle surveys and monitoring are applicable to other renewable energy projects, including PV solar plants, and have been incorporated into this BBCS.

1.3.5 BLM Sensitive Species

The BLM Sensitive Species are species designated by the State Director and includes only those species that are not already federal or state listed, proposed, or candidate species due to potential endangerment. BLM's policy is to "ensure that actions authorized, funded, or carried out do not contribute to the need to list any of these species as threatened or endangered."

1.3.6 California Endangered Species Act

The California Endangered Species Act (CESA; CDFG Code Sections [§§] 2050 - 2097) protects and preserves species designated by the Fish and Game Commission as either threatened or endangered in the state of California. These protected resources include those native species of fishes, amphibians, reptiles, birds, mammals, invertebrates, and plants, and their habitats, that are threatened with extinction, as well as those experiencing a significant decline which, if not halted, would lead to a threatened or endangered designation. The CESA also allows for take that is incidental to otherwise lawful development projects.

1.3.7 California Department of Fish and Game Codes

<u>CDFG Code Section 2050-2085 (threatened or endangered species)</u> – These codes encompass the applicable declarations and definitions of the CESA.

<u>CDFG Code Sections 3503 and 3503.5 (protection of birds and raptors)</u> – These codes state that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird (§ 3503) and birds of prey (§ 3503.5), except as otherwise provided by this code or any regulation made pursuant thereto.

<u>CDFG Code Sections 3511, 4700, 5050, and 5515 (fully protected species)</u> – These state laws classify and prohibit the take of "fully protected" bird, mammal, amphibian/reptile, and fish species in California.

<u>CDFG Code Section 3513 (migratory birds)</u> – This code prohibits any take or possession of birds that are designated by the MBTA as migratory non-game birds except as allowed by federal rules and regulations promulgated pursuant to the MBTA.

<u>CDFG Code Sections 4150 (mammals)</u> – This code defines all mammals that naturally occur in California as non-game mammals, with exceptions for those defined as game mammals, fully protected mammals, or fur-bearing mammals. Non-game mammals or parts thereof may not be taken or possessed except as otherwise provided by this code or any regulation made pursuant thereto.

1.4 NextEra Blythe Solar Corporate Policy

NextEra Blythe Solar is dedicated to making environmental compliance and conservation an integral part of the company's core values. NextEra Blythe Solar, as a wholly owned subsidiary of NextEra Energy Resources, LLC, fully embraces the NextEra Energy "Environmental Commitment." This commitment establishes a core environmental policy as part of the company's Code of Business Conduct and Ethics. NextEra Blythe Solar's intent is to conduct its business in an environmentally responsible manner. Accordingly, NextEra Blythe Solar strives to comply with the spirit and intent, as well as the letter, of environmental laws, regulations, and standards; incorporate environmental protection and stewardship as an integral part of the design, construction, operation, and maintenance of its facilities; encourage the wise use of energy to minimize the impact on the environment; communicate effectively on environmental issues; conduct periodic self-evaluations, and report performance.

2.0 PRE-CONSTRUCTION CONSERVATION MEASURES

2.1 Environmental Setting

Vegetation communities in the Project area include Sonoran creosote bush (*Larrea tridentata*) scrub with vegetated ephemeral swales and several west-to-east draining ephemeral washes containing desert dry wash woodland. Common shrubs throughout the area include creosote bush, white burr-sage (*Ambrosia dumosa)*, and big galleta grass (*Hilaria rigida*) in swales and runnels. Within the Sonoran creosote bush scrub community, there are broad expanses of desert pavement, a distinctive but largely unvegetated habitat. South of I-10 the gen-tie line crosses stabilized and partially stabilized desert dunes, although no dunes or sand fields occur in the Project area.

The Project is located in an area that naturally lacks habitat features that would be very attractive to birds and bats. There are no perennial water bodies, cliffs, known major migration corridors, or dense vegetation within the Project, nor does it contain any of the key habitats (i.e., wetlands or riparian thickets) identified within the Lower Colorado River Valley Important Bird Area (National Audubon Society 2014) that is located near the City of Blythe's agricultural areas and the Colorado River. Additionally, the results of biological surveys show that mean use of the Project by bird species is low and that use by roosting bats is low (EDAW AECOM 2009; Tetra Tech, Inc. [Tetra Tech] 2014c). The closest large bodies of water that could be considered major bird attractants are the Colorado River (19.3 km [12.0 miles] to the east of the Project), the Salton Sea (88.5 [55.0 miles] southwest of the Project), and Lake Havasu (88.5 km to the northeast of the Project). Because of this, and because the Project is located within the Pacific Flyway, migrating birds will pass over the Project and vicinity during the spring and fall. The Pacific Flyway refers to a general migratory front that includes states west of the Rocky Mountains. Stopover areas listed above are crucial to successful migration; however, birds may occur throughout the region depending on resource availability and weather conditions (Newton 2010).

2.2 Pre-Siting Data Collection

In an effort to place the Project infrastructure in locations that would result in the least risk to populations of birds and bats, data on site characteristics and wildlife occurrence was collected and evaluated.

2.2.1 Avian Studies

To understand baseline conditions of avian use at the BSPP and support Project planning decisions, various desktop and field surveys were conducted at the Project site and surrounding area. These surveys included comprehensive special-status species surveys, including avian point count surveys, burrowing owl (*Athene cunicularia*) and golden eagle nest surveys (EDAW AECOM 2009; AECOM 2010; Wildlife Research Institute [WRI] 2010, 2011a, 2011b). In fall 2013 and winter 2013/2014, additional avian field surveys were initiated to gather more baseline data to support this BBCS (Tetra Tech 2014a, 2014c). These field surveys included point count surveys, migration surveys, and radar monitoring surveys. Survey methods were reviewed by and discussed with the BLM, CEC, USFWS, and CDFW prior to implementation of surveys. Collectively, these surveys are summarized below; details of the surveys can be found in the respective technical reports (EDAW AECOM 2009; AECOM 2010; WRI 2010, 2011a, 2011b; Tetra Tech 2014a, 2014c). Special-status bird species with the potential to occur within the Project area are identified in Table 2.1.

2.2.2 Spring Avian Point Count Surveys

EDAW AECOM initially conducted avian point count surveys in the spring of 2009 to determine avian use of the Project Area (EDAW AECOM 2009). The point-count surveys were conducted from 88 locations, one day per week for four consecutive weeks. Specific point-count locations were chosen to sample all major vegetation communities in the Project area (Figure 2.1). Each 10-minute (min) point count had a 100-m (328-ft) radius and was conducted between just before sunrise and three hours after sunrise.

- A total of 29 species were observed.
- The most common species observed were loggerhead shrike (*Lanius ludovicianus*), black-tailed gnatcatcher (*Polioptila melanura*), ash-throated flycatcher (*Myiarchus cinerascens*), tree swallow (*Tachycineta bicolor*), and barn swallow (*Hirundo rustica*).
- No raptors were observed.
- No ESA-listed threatened or endangered species were detected; however, biologists observed one CDFW Species of Special Concern, the loggerhead shrike.

Table 2.1 Special-status species with the potential to occur within the Blythe Solar Power Project, Riverside County, California.*

Common Name	Scientific Name	Resident Classification[1]	BSPP[2]	BCC[3]	USFWS Status[4]	CDFW Status[5]	BLM Status[6]
bald eagle	*Haliaeetus leucocephalus*	Winter	No	Yes	Delisted 2007; BGEPA	Endangered	Sensitive
Bell's vireo	*Vireo bellii*	Summer	No	Yes	Endangered (*pusillus* ssp.)	Endangered (*arizonae* and *pusillus* ssp.)	Sensitive (*arizonae* ssp.)
Bendire's thrasher	*Toxostoma bendirei*	Summer	No	Yes	–	SSC	Sensitive
black-chinned sparrow	*Spizella atrogularis*	Rare	No	Yes	–	–	–
black rail	*Laterallus jamaicensis*	Year-round	No	Yes	–	Threatened (*coturniculus* ssp.)	Sensitive (*coturniculus* ssp.)
black skimmer	*Rynchops niger*	Summer	No	Yes	–	SSC	–
Brewer's sparrow	*Spizella breweri*	Winter	Yes	Yes	-	-	-
burrowing owl	*Athene cunicularia*	Summer	Yes	Yes	–	SSC	Sensitive
Costa's hummingbird	*Calypte costae*	Summer	Yes	No	–	–	–
crissal thrasher	*Toxostoma crissale*	Year-round	No	No	–	SSC	–
elf owl	*Micrathene whitneyi*	Summer	No	Yes	–	Endangered	Sensitive
ferruginous hawk	*Buteo regalis*	Winter	No	Yes	–	–	–
Gila woodpecker	*Melanerpes uropygialis*	Year-round	No	Yes	–	Endangered	Sensitive
gilded flicker	*Colaptes chrysoides*	Year-round	No	Yes	–	Endangered	Sensitive
golden eagle	*Aquila chrysaetos*	Winter	Yes	Yes	BGEPA	Fully Protected	Sensitive
gray vireo	*Vireo vicinior*	Rare	No	Yes	–	SSC	Sensitive
greater sandhill crane	*Grus canadensis*	Migrant	Yes	No	–	Threatened (*tabida* ssp.)	Sensitive
gull-billed tern	*Sterna nilotica*	Summer	No	Yes	–	SSC	–
Lawrence's goldfinch	*Carduelis lawrencei*	Winter	No	Yes	–	–	–
least bittern	*Ixobrychus exilis*	Winter	No	Yes	–	SSC	–
Le Conte's thrasher	*Toxostoma lecontei*	Year-round	Yes	Yes	–	SSC	–
loggerhead shrike	*Lanius ludovicianus*	Year-round	Yes	No	–	SSC	–
long-billed curlew	*Numenius americanus*	Winter	No	Yes	–	SSC	–
Lucy's warbler	*Vermivora luciae*	Summer	No	Yes	–	SSC	Sensitive
marbled godwit	*Limosa fedoa*	Rare	No	No	–	–	–
mountain plover	*Charadrius montanus*	Winter	No	Yes	–	SSC	Sensitive
northern harrier	*Circus cyaneus*	Winter	Yes	No	–	SSC	–

Table 2.1 Special-status species with the potential to occur within the Blythe Solar Power Project, Riverside County, California.*

Common Name	Scientific Name	Resident Classification[1]	BSPP[2]	BCC[3]	USFWS Status[4]	CDFW Status[5]	BLM Status[6]
peregrine falcon	*Falco peregrinus*	Migrant, Winter	No	Yes	Delisted 1999	Fully Protected (*anatum* ssp.)	–
prairie falcon	*Falco mexicanus*	Year-round	Yes	Yes	–	–	–
red knot	*Calidris canutus*	Migrant	No	No	–	–	–
rufous-winged sparrow	*Aimophila carpalis*	Rare	No	No	–	–	–
short-eared owl	*Asio flammeus*	Rare	No	No	–	SSC	–
Swainson's hawk	*Buteo swainsoni*	Migrant	Yes	Yes	–	Threatened	Sensitive
western snowy plover	*Charadrius nivosus*	Rare	No	Yes	Threatened (*nivosus* ssp.)	SSC	–
whimbrel	*Numenius phaeopus*	Migrant	No	No	–	–	–
yellow-billed cuckoo	*Coccyzus americanus*	Summer	No	Yes	Threatened (*occidentalis* ssp.)	Endangered	Sensitive
yellow-breasted chat	*Icteria virens*	Summer, Migrant	No	No	–	SSC	–
yellow warbler	*Dendroica petechia*	Winter	No	Yes	–	SSC (*sonorana* ssp.)	–

1. Resident classification taken from Sibley 2000.
2. Blythe Solar Power Project, Riverside County, California. Yes = observed within Project during comprehensive field surveys, including point count and migration surveys; No = not observed during surveys.
3. US Fish and Wildlife Birds of Conservation Concern, Bird Conservation Region 33 (CDFW 2015)
4. Designated by USFWS as Threatened, Endangered or Candidate species under the Endangered Species Act (ESA); yellow-billed cuckoo refers to the federal-listed western United States Distinct Population Segment, the status of the yellow-billed cuckoo was recently changed to Threatened (USFWS 2014); (–) indicates species is not listed, ssp.= subspecies. All species are protected under the MBTA.
5. Designated by the CDFW as Threatened, Endangered, or Species of Special Concern (SSC) under the California Endangered Species Act (CESA) of 1984 (CDFW 2014; 2015); (–) indicates species is not state-listed, ssp.= subspecies.
6. Designated by the BLM as a sensitive species (CDFW 2015); (–) indicates species is not listed by the BLM, ssp. = subspecies.

* List primarily derived from BCC list at USFWS request and is not necessarily inclusive of all state-listed birds that could occur within the area.

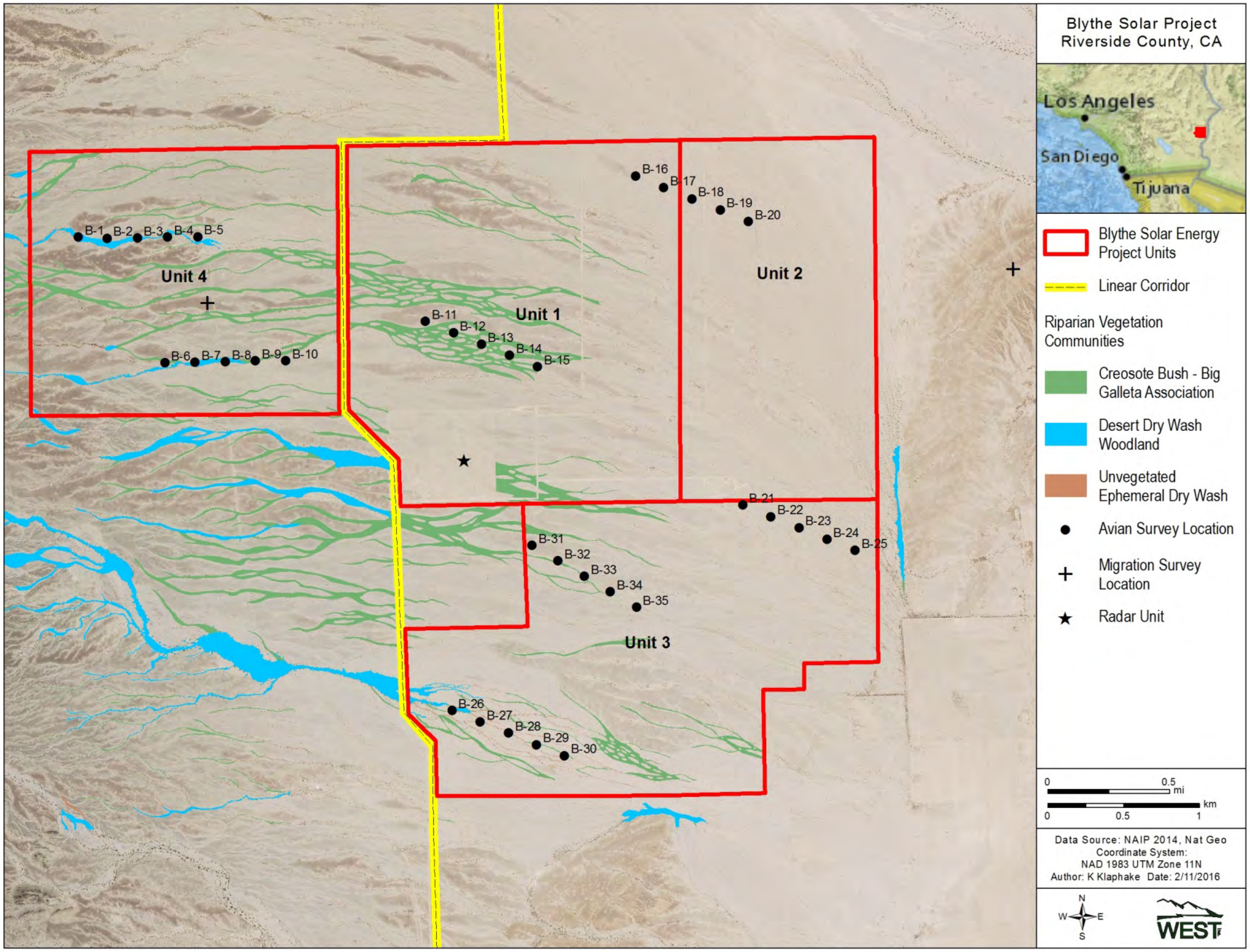

Figure 2.1 Avian survey (point count), migration survey, and radar locations at the Blythe Solar Power Project, Riverside County, California.

2.2.3 Fall and Winter Avian Point Count Surveys

Tetra Tech conducted bi-weekly avian point-count surveys within the Project from August 26 through November 26, 2013 (fall survey period), and from December 18, 2013, to March 26, 2014 (winter survey period). The point counts were conducted at 35 locations comprising seven transects of five points each (Figure 2.1). Points were spaced 200 m (656 ft) apart and each point had a 100-m survey radius. Each point count was conducted for 10 min.

- A total of 665 bird observations from 47 species, including 63 bird observations that could not be identified to species, were recorded.
- Fall survey mean use by non-raptors was 0.83 birds/10-min survey. Among non-raptor species groups, mean use was highest for songbirds (0.76 birds/10-min survey). The songbirds with the highest mean use included the horned lark (*Eremophila alpestris* [0.22 birds/10-min survey]), sagebrush sparrow (*Artemisiospiza nevadensis* [0.14 birds/10-min survey]), and black-tailed gnatcatcher (0.09 birds/10-min survey).
- Raptors and vultures were infrequently observed during the fall point-count surveys. Overall mean use for raptors was 0.01 birds/10-min survey as only four individual raptor observations were recorded during the surveys. Raptor and vulture species detected during the point counts included turkey vulture (*Cathartes aura* [two observations]), sharp-shinned hawk (*Accipiter striatus* [one individual]), and prairie falcon (*Falco mexicanus* [one individual]).
- Winter survey mean use by non-raptors was 0.36 birds/10-min survey. Among non-raptor species groups, mean use was highest for songbirds (0.34 birds/10-min survey). The songbirds with the highest mean use included sagebrush sparrow (0.04 birds/10-min survey, observed in 3.6% of all surveys), horned lark (0.04 birds/10-min survey, observed in 3.5% of all surveys), and unknown passerine (0.05 birds/10-min survey).
- Raptors and vultures were infrequently observed during the winter point-count surveys. Overall mean use for raptors and vultures was 0.01 birds/10-min survey as only five observations were recorded during the surveys. Raptor and vulture species detected during the point counts included turkey vulture (two observations), American kestrel (two; *Falco sparverius*), and red-tailed hawk (one; *Buteo jamaicensis*).
- No federally-listed threatened or endangered species were detected. Two state and/or BLM special-status species were detected during the surveys: greater sandhill crane (*Grus canadensis*; listed as state threatened and BLM Sensitive) and loggerhead shrike (a CDFW Species of Special Concern [SSC] and USFWS Bird of Conservation Concern [BCC]; Figure 2.2).

No bald or golden eagles were observed during point-count surveys.

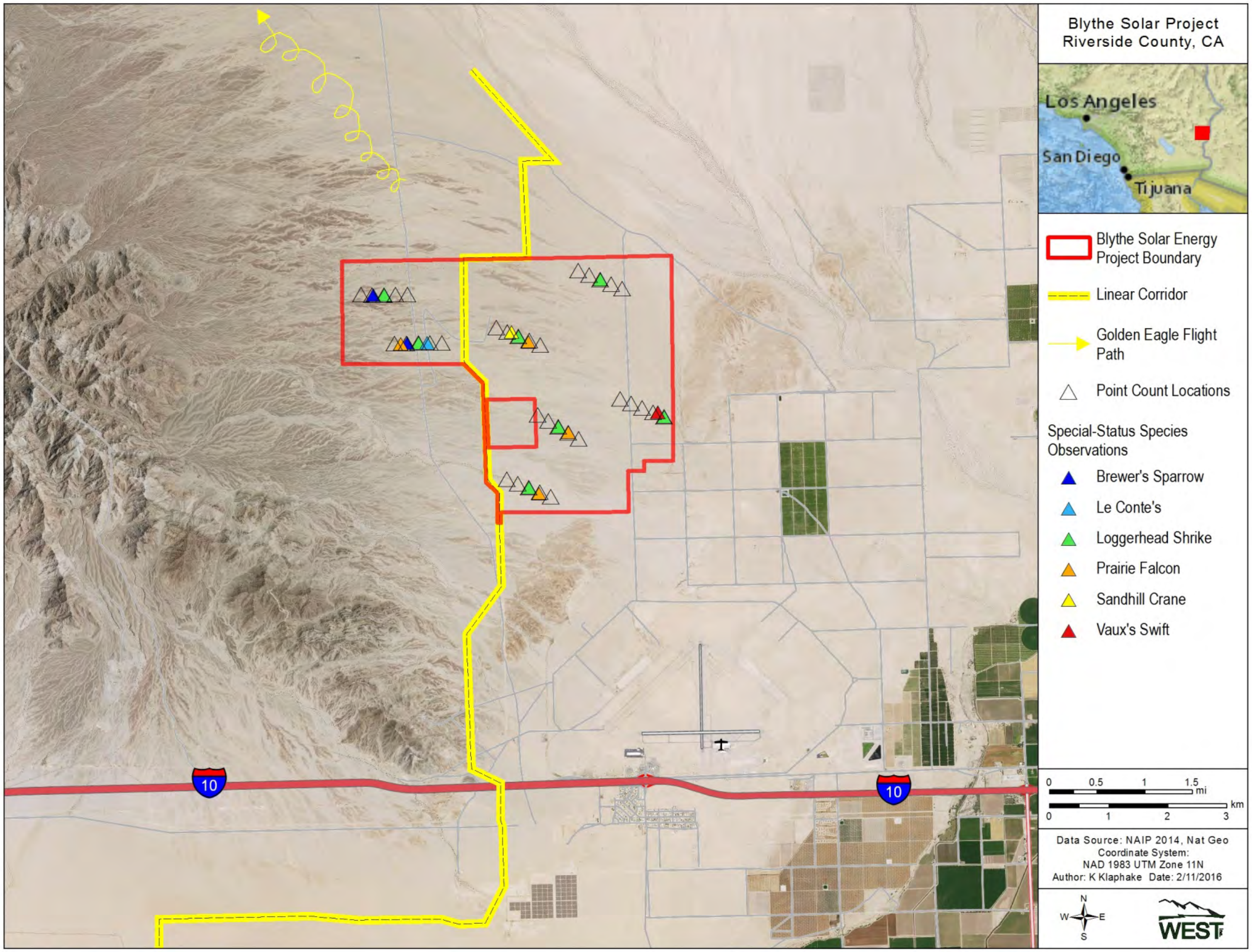

Figure 2.2 Special-status species observed during bird surveys at the Blythe Solar Power Project, Riverside County, California.

The species observed during Project point-count surveys were compared to the Breeding Bird Survey (BBS) data (Sauer et al. 2012) that were collected over a period of nine years in Riverside County (Table 2.2). The southern end of the 51.5-km (32.0-mile) Blythe BBS survey route (BBS Route 90) is located approximately 8.0 km (5.0 miles) east of the Project and stretches north from this point for 8.9 km (5.5 miles) before it turns northwest and travels parallel to McCoy Wash along Midland Road. It terminates north of the Project on the other side of the Little Maria Mountains. Of the 55 species detected during BBS surveys, 31 were detected during point-count surveys for the Project. Of the five species with the highest relative abundance during BBS surveys (red-winged blackbird [*Agelaius phoeniceus*], house sparrow, mourning dove [*Zenaida macroura*], European starling, yellow-headed blackbird [*Xanthocephalus xanthocepha*]), two species (red-winged blackbird and mourning dove) were detected during Tetra Tech point count surveys. Approximately 8.0 km of the Blythe BBS survey route are located within irrigated agricultural fields with scattered buildings that are not representative of landcover found in the BSPP. Common species recorded during the BBS surveys in the agricultural areas are not always reflective of species that use habitats found within the BSPP.

Table 2.2 Relative abundance recorded during Breeding Bird Surveys conducted along the Blythe Survey Route During 1989-1998, Riverside County, California

Common Name	Scientific Name	Relative Abundance[1]	Observed During BSPP Surveys?[2]
Abert's towhee	*Pipilo abert*	0.67	No
American coot	*Fulica americana*	0.67	No
American kestrel	*Falco sparverius*	0.33	Yes
ash-throated flycatcher	*Myiarchus cinerascens*	9.00	Yes
barn swallow	*Hirundo rustica*	3.83	Yes
black-chinned hummingbird	*Archilochus alexandri*	0.33	No
black-tailed gnatcatcher	*Polioptila melanura*	5.50	Yes
black-throated sparrow	*Amphispiza bilineata*	7.50	Yes
brown-headed cowbird	*Molothrus ater*	1.50	No
Bullock's oriole	*Icterus bullockii*	1.83	No
burrowing owl	*Athene cunicularia*	3.17	No
cactus wren	*Campylorhynchus brunneicap*	2.00	Yes
cliff swallow	*Petrochelidon pyrrhonota*	2.83	Yes
common ground-dove	*Columbina passerina*	0.83	No
common moorhen	*Gallinula chloropus*	0.33	No
common raven	*Corvus corax*	0.33	Yes
common yellowthroat	*Geothlypis trichas*	1.50	No
Costa's hummingbird	*Calypte costae*	1.33	Yes
crissal thrasher	*Toxostoma crissale*	0.17	No
European starling	*Sturnus vulgaris*	27.67	No
Gambel's quail	*Callipepla gambelii*	16.50	Yes
great blue heron	*Ardea herodias*	0.33	No
greater roadrunner	*Geococcyx californianus*	2.67	Yes
great-tailed grackle	*Quiscalus mexicanus*	9.00	No
horned lark	*Eremophila alpestris*	2.17	Yes
house finch	*Carpodacus mexicanus*	7.33	Yes
house sparrow	*Passer domesticus*	68.50	No
killdeer	*Charadrius vociferus*	1.00	No
ladder-backed woodpecker	*Picoides scalaris*	0.33	Yes

Table 2.2 Relative abundance recorded during Breeding Bird Surveys conducted along the Blythe Survey Route During 1989-1998, Riverside County, California

Common Name	Scientific Name	Relative Abundance[1]	Observed During BSPP Surveys?[2]
lark sparrow	*Chondestes grammacus*	0.67	Yes
Le Conte's thrasher	*Toxostoma lecontei*	0.50	No
lesser goldfinch	*Carduelis psaltria*	4.83	No
lesser nighthawk	*Chordeiles acutipennis*	0.17	Yes
loggerhead shrike	*Lanius ludovicianus*	7.17	Yes
mourning dove	*Zenaida macroura*	47.17	Yes
northern mockingbird	*Mimus polyglottos*	5.83	Yes
northern rough-winged swallow	*Stelgidopteryx serripennis*	10.50	Yes
phainopepla	*Phainopepla nitens*	1.17	No
pied-billed grebe	*Podilymbus podiceps*	0.17	No
prairie falcon	*Falco mexicanus*	0.17	Yes
red-tailed hawk	*Buteo jamaicensis*	0.83	Yes
red-winged blackbird	*Agelaius phoeniceus*	195.67	Yes
rock pigeon	*Columba livia*	2.83	No
rock wren	*Salpinctes obsoletus*	0.17	Yes
sage sparrow	*Amphispiza belli*	0.17	Yes
Say's phoebe	*Sayornis saya*	1.67	Yes
Swainson's hawk	*Buteo swainsoni*	0.17	No
turkey vulture	*Cathartes aura*	4.00	Yes
verdin	*Auriparus flaviceps*	16.00	Yes
western kingbird	*Tyrannus verticalis*	13.50	Yes
western meadowlark	*Sturnella neglecta*	1.50	Yes
western wood-pewee	*Contopus sordidulus*	0.83	No
white-throated swift	*Aeronautes saxatalis*	0.83	No
white-winged dove	*Zenaida asiatica*	14.83	Yes
yellow-headed blackbird	*Xanthocephalus xanthocepha*	23.50	No

1. Relative abundance should be interpreted as an index and not as a measure of mean use (e.g., number of individuals observed/time period; Sauer et al. 2012). Counts were summed across 10-stop segments to calculate a total count per route per species. Counts were then averaged across years then divided by the number of survey years in the analysis period.
2. Species observed during point count surveys conducted at BSPP in 2009 and 2014.

2.2.4 Golden Eagle Nest Surveys

Helicopter surveys for golden eagles and their nests were conducted in spring 2010 and 2011 by WRI following USFWS protocols (Pagel et al. 2010). The 2010 surveys were conducted on March 25-26 and April 2-3, and a second survey was conducted on May 14, to revisit active or potentially active territories that were identified in the initial surveys (WRI 2010). In 2011, the MSEP conducted nest surveys of the area, and the survey area overlapped the BSPP. The initial survey was conducted on March 23 and 24 and the second survey was conducted on May 5, 6, and 7 (WRI 2011a, 2011b). All wildlife observations, including of other raptors, were recorded during surveys. No golden eagle eggs or nestlings were detected at any of the nests within or outside the 16.1-km (10-mile) search radius around the Project during either year of the aerial surveys.

2010 Nest Surveys

The spring 2010 helicopter surveys detected one inactive golden eagle nest approximately 4.8 kilometers (3.0 miles) from the BSPP (Figure 2.3).

No golden or bald eagles were observed.

2011 Nest Surveys

The 2011 nest survey detected three inactive golden eagle nests within the survey area (Figure 2.3). These inactive nests were 5.5 km (3.4 miles) west-southwest, 6.7 km (4.2 miles) northwest, and 14.2 km (8.8 miles) northwest from the Solar Plant Site boundary. An additional 12 inactive golden eagle nests were detected outside the 10-mile search radius, at distances of 16.2 – 32.6 km (10.1 – 20.3 miles) from the Project.

No golden or bald eagles were observed.

2.2.5 Burrowing Owl Surveys

To assess the presence of burrowing owls in the Project area, surveys were conducted in 2009 and 2010 according to the California Burrowing Owl Consortium Guidelines (CBOC 1993) and included three survey phases, each following the previous survey type, based on the latter's results. Phase I Habitat Assessment surveys determined if burrowing owl habitat was present in the Project. Phase II surveys were conducted to determine the location of burrowing owl burrows in the Project. Based on habitat and owls identified during Phase I and II surveys, Phase III surveys were conducted to determine how the Project is used by burrowing owls. Details regarding the methods used for these surveys can be found in EDAW AECOM (2009) and AECOM (2010); a summary of the results is provided below and in Figure 2.4.

During the Phase I survey biologists identified suitable burrowing owl habitat throughout the Project and surrounding area. Two burrowing owls were observed during 2009 surveys. Five burrowing owls were observed during 2010 surveys.

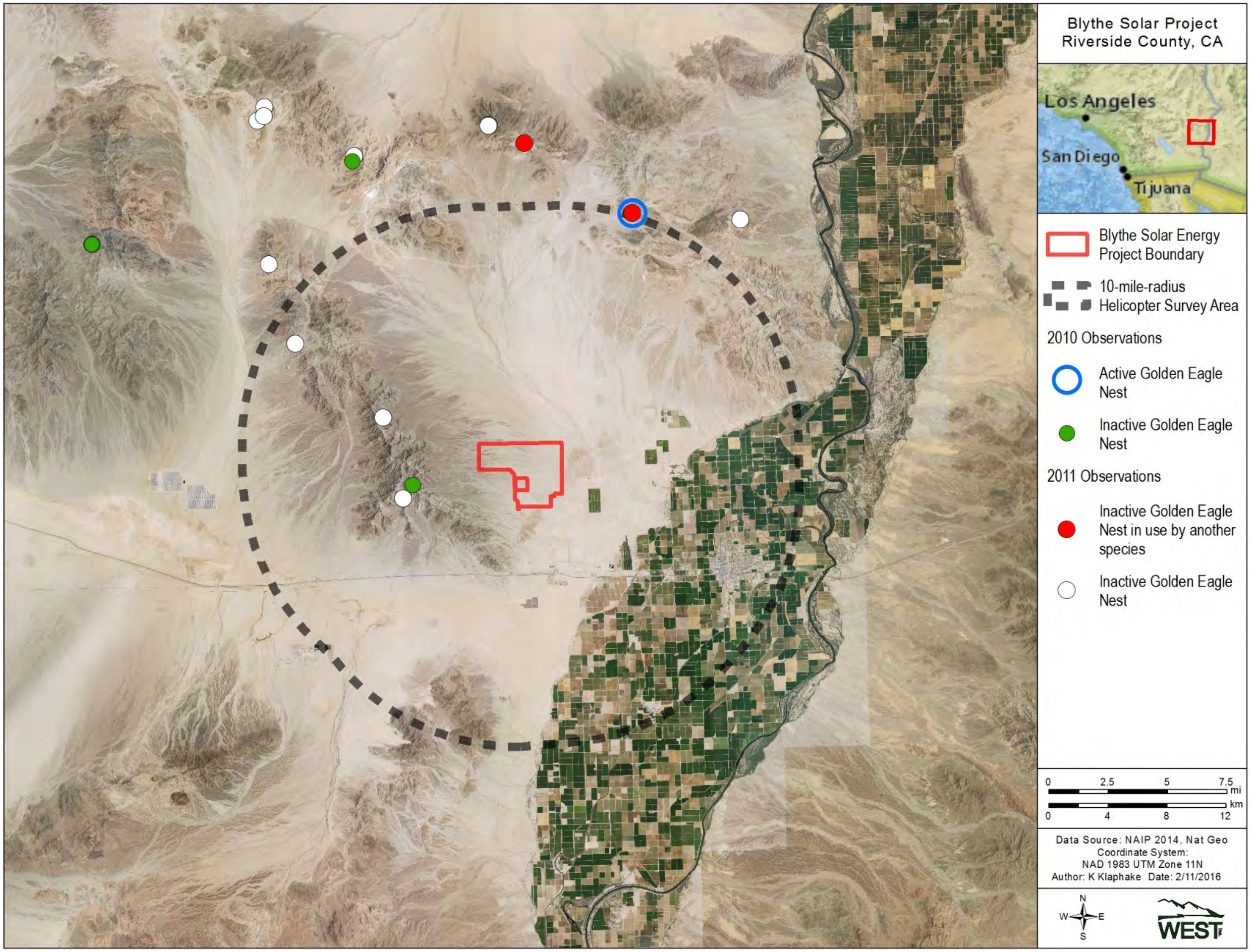

Figure 2.3 Golden eagle nests observed during aerial surveys in 2010 and 2011 for the Blythe Solar Power Project, Riverside County, California.

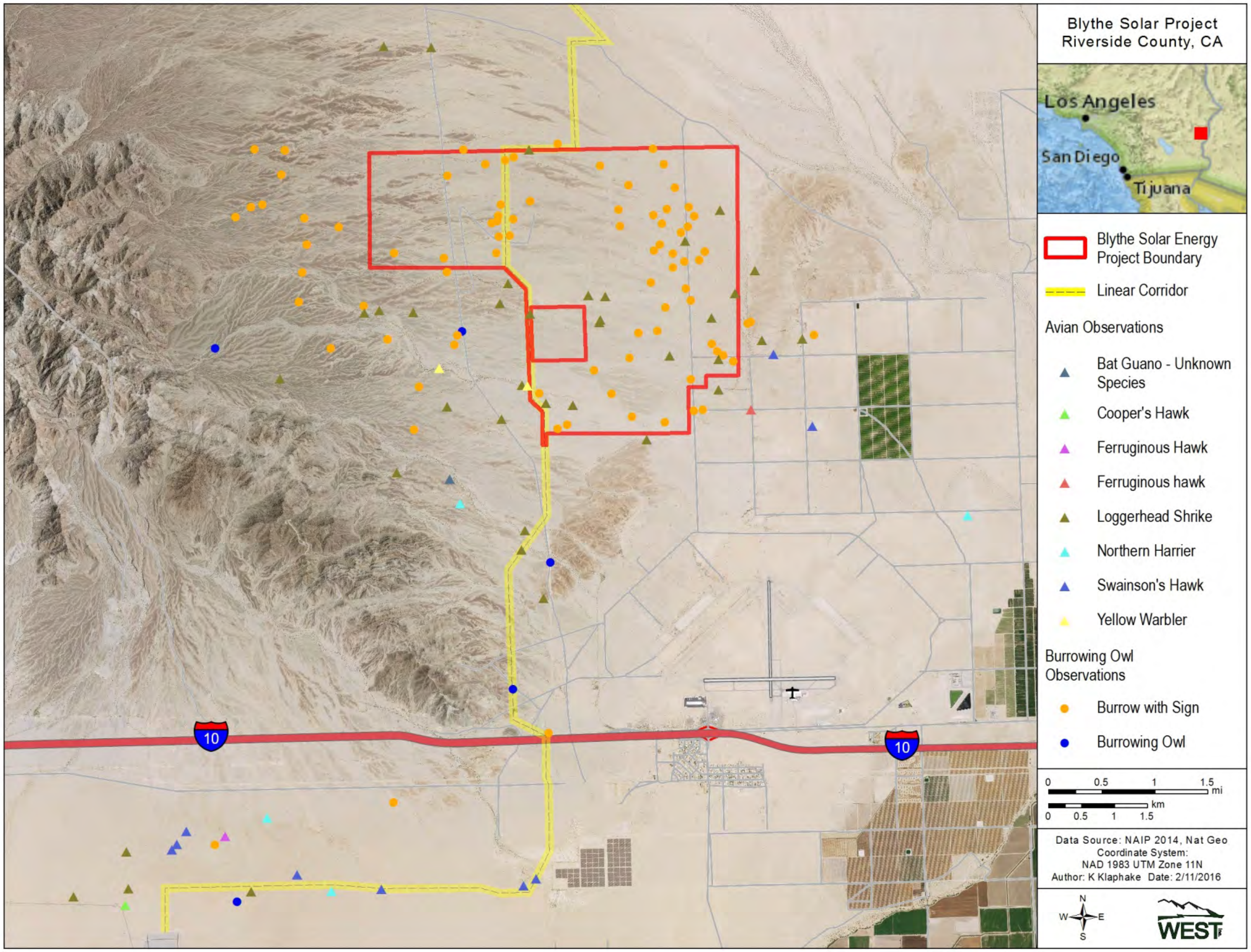

Figure 2.4 Special-status bird and bat observations at the Blythe Solar Power Project, Riverside County, California.

2.2.6 Migration Surveys

Tetra Tech conducted migration surveys from August 20 through December 3, 2013, to record migrating birds flying over the Project or surrounding area. Biologists conducted surveys from two survey locations that provided a broad view of the Project area (Figure 2.1). The eastern migration point was located outside of the Project boundary on an elevated pebble terrace that provided a wide viewshed of the surrounding land in all directions, including the eastern half of the Project. The western migration point was located closer to the McCoy Mountains and provided a viewshed of the western half of the Project. Migration surveys were conducted three days per week. Each point was surveyed three days per week for four hours each day in two blocks (one point was surveyed in the morning and the other in the afternoon, timed to incorporate dawn and dusk); the total weekly survey time between the two points was 24 hours. During surveys, biologists recorded the species, number of birds, time observed, flight height, age class, direction traveled, and type of detection (visual or auditory). Data sheets designed by the Hawk Migration Association of North America (HMANA) were used to record hourly passage of migrating raptors and observations of large, non-raptors (large birds), such as waterfowl, were recorded on a similarly formatted data sheet designed by Tetra Tech. Observations of any golden eagles were recorded on an eagle-specific data form that included flight path information. Results of the migration surveys are summarized below (see Tetra Tech 2014c for detailed survey methods and results).

- A total of 1,579 raptor and vulture observations representing 12 identified species, and five raptor observations that could not be identified to species, were recorded during the fall 2013 migration surveys. The most commonly-recorded raptor and vulture species were turkey vulture (1,460 observations), red-tailed hawk (56 observations), northern harrier (*Circus cyaneus*; 18 observations), and American kestrel (17 observations).
- The passage rate (birds observed per hour) for all raptors and vultures combined was 4.11 birds/hour. Turkey vultures had the highest passage rate among raptors and vultures (3.80 birds/hour). Passage rates for all other raptor species were less than 0.16 birds/hour.
- A total of 198 large bird observations, representing five identified species, as well as 40 observations of unidentified large birds, were recorded during the fall migration surveys. Large bird species detected during the migration surveys were the common raven (*Corvus corax*; 80 observations), snow goose (*Chen caerulescens*; 37 observations), sandhill crane (20 observations), lesser nighthawk (*Chordeiles acutipennis*; 18 observations), Canada goose (*Branta canadensis*, three observations), unidentified shorebird (37 observations), unidentified duck (two observations), and unidentified gull (one observation).
- The overall passage rate for all large birds combined was 0.52 birds/hour. Common raven had the highest passage rate among large birds (0.21 birds/hour). The passage rates for all other large bird species was equal to or less than 0.10 birds/hour.

- No ESA-listed threatened or endangered species were detected during fall 2013 migration surveys; however, biologists observed six other special-status species during these surveys including one observation of golden eagle (BGEPA, USFWS BCC, Fully Protected, and BLM Sensitive Species), three of Swainson's hawk (*Buteo swainsoni*; state threatened, USFWS BCC, and BLM Sensitive Species), 20 of sandhill crane (state threatened and BLM Sensitive Species), 18 of northern harrier (CDFW SSC), 11 prairie falcons (USFWS BCC), and one of ferruginous hawk (*B. regalis*; USFWS BCC). Each of the special-status species observed during the migration surveys had a passage rate of less than 0.06 birds/hour.
- The single golden eagle observation recoded during the migration surveys consisted of an adult eagle observed on August 20 (Figure 2.2). The golden eagle was observed circle soaring in a northwesterly direction from the center of the Project area.

2.2.7 Radar Surveys

Tetra Tech deployed one portable MERLIN Avian Radar System (model XS2530e; system) using X-band and S-band radar to determine bird movements and passage rates of migrants near the Project (Figure 2.1). The system was deployed on August 29 through December 14, 2013. The system was a self-contained, trailer-mounted, ornithological radar system developed and manufactured by DeTect, Inc. (Panama City, Florida) specifically for bird detection and tracking. The system was located in a previously cleared area within the Project boundary. The following is a summary of the results of the radar survey (see Tetra Tech 2014a, 2014c for detailed methods and results):

- The mean nightly passage rate was 82.0 biological targets per km per hour (t/km/hr), with a range from 3.2 to 276.9 t/km/hr. Peak nighttime activity was recorded on August 30, 2013. This relatively low nighttime passage rate is not indicative of a nocturnal migration corridor.
- The mean daily passage rate for the survey period was 62.1 t/km/hr, with a range of 1.2 to 866.7 t/km/hr. Peak daytime activity was recorded on August 31, 2013.
- Flight direction demonstrated that movements over the Project area were generally toward the south or southeast, depending on the time of day.
- Most activity at the Project was below 1,000 m (3,280 ft), and the vast majority of the targets tracked below 1,000 m were classified as small targets. Medium sized targets occurred primarily in the upper reaches of the aerosphere above 1,000 m. Most of the targets moving above 1,000 m at the Project were classified as medium-, large-, and flock-sized targets.

2.3 Bat Studies

Of the 47 bat species in the United States, 21 potentially occur within the Project based on known distribution ranges and habitat requirements (Table 2.3, Bat Conservation International [BCI] 2014). None of the 21 bat species with potential to occur in the Project have state or federal regulatory protection. However, 13 bat species are considered SSC by the CDFW or are considered BLM Sensitive Species, indicating these species have experienced population declines or have limited distribution making them vulnerable to extinction.

Table 2.3 Bat species potentially occurring within the Blythe Solar Power Project, Riverside County, California.

Common Name	Scientific Name	USFWS Status[1]	BLM Status[2]	CDFW Status[3]	Western Bat Working Group Priority Level[4]
Arizona bat	*Myotis occultus*	–	–	SSC	Medium
big brown bat	*Eptesicus fuscus*	–	–	–	Low
big free-tailed bat	*Nyctinomops macrotis*	–	–	SSC	Medium
California leaf-nosed bat	*Macrotus californicus*	–	Sensitive	SSC	High
California bat	*Myotis californicus*	–	–	–	Low
canyon bat*	*Pipistrellus hesperus*	–	–	–	Low
dark-nosed small-footed bat	*Myotis melanorhinus*	–	Sensitive	–	Medium
fringed bat	*Myotis thysandodes*	–	Sensitive	–	High
hoary bat	*Lasiurus cinereus*	–	–	–	Medium
little brown bat	*Myotis lucifugus*	–	–	–	Medium
long-legged bat	*Myotis volans*	–	–	–	High
Mexican free-tailed bat	*Tadarida brasiliensis*	–	–	–	Low
Mexican long-tongued bat	*Choeronycteris mexicana*	–	–	SSC	High
pallid bat	*Antrozous pallidus*	–	Sensitive	SSC	High
pocketed free-tailed bat	*Nyctinomops femorosaccus*	–	-–	SSC	Medium
southwestern cave bat	*Myotis velifer brevis*	–	Sensitive	SSC	Medium
spotted bat	*Euderma maculatum*	–	Sensitive	SSC	High
Townsend’s big-eared bat	*Corynorhinus townsendii*	–	Sensitive	CT	High
western mastiff bat	*Eumops perotis californicus*	–	Sensitive	SSC	High
western small-footed bat	*Myotis ciliolabrum*	–	Sensitive	–	Medium
Yuma bat	*Myotis yumanensis yumanensis*	–	Sensitive	–	Low

1. US Fish and Wildlife Service Threatened, Endangered or Candidate species under the Endangered Species Act of 1973; (–) indicates species is not listed.
2. Bureau of Land Management Sensitive Species; (–) indicates species is not considered Sensitive (BLM 2010).
3. California Department of Fish and Wildlife; SSC = Species of Special Concern, CT = Candidate Threatened, (–) indicates species is not listed (CDFG 2014a).
4. Status derived from Western Bat Working Group Regional Priority Matrix Region 8; Low = Overall status of the species is believed to be secure, Medium = More information is needed to adequately assess species status, High = Species are imperiled or are at high risk of imperilment (Western Bat Working Group [WBWG] 2007).

* formerly western pipistrelle (*Pipistrellus hesperus)*

In spring 2009 and 2010 biologists searched for potential bat roosts and hibernacula such as abandoned mines and caves during comprehensive biological surveys (EDAW AECOM 2009, AECOM 2010). Surveys were conducted of an approximately 3,076-ha (7,600-acre) area that encompasses the Project plus Linear Facilities, using 10-m (32.8-ft) transects, (see AECOM 2010 for detailed survey area).

Bat guano of an unidentified bat species was observed at one location during the 2010 surveys (Figure 2.4). Bats of unidentified species were observed foraging onsite during spring 2009. Roosting habitat for pallid bats (*Antrozous pallidus*) was present in tree cavities in desert dry wash woodlands in the southeastern portion of the site (EDAW AECOM 2009).

3.0 CONSERVATION MEASURES

NextEra Blythe Solar will design the Project and implement avoidance and minimization measures in the construction and operations phases to avoid and minimize Project-related bird and bat injuries and fatalities. Implementation of several minimization measures is required to comply with the BLM and CEC requirements issued for the Project. To avoid duplication, specific plans pertaining to monitoring, management, and control of resources during construction and operations are referred to within this document.

3.1 Project Siting

3.1.1 Location

The Project is located within a Solar Energy Zone (SEZ), an area designated through the Solar Energy Development Programmatic Environmental Impact Statement (PEIS) process as being appropriate for large utility-scale solar development (see BLM 2012). As stated on the home page of the PEIS website, "A SEZ is defined by the BLM as an area well-suited for utility-scale production of solar energy where BLM will prioritize solar energy and associated transmission infrastructure development."

3.2 Facility Design

3.2.1 Utility Poles and Lines

In order to minimize impacts on birds, the utility lines have been designed to prevent bird injury and fatalities due to electrocution. Utility lines have been built following Avian Power Line Interaction Committee (APLIC) Guidelines (APLIC 2012) to minimize electrocution. The APLIC Guidelines include recommended distances that phase conductors should be separated as a minimum of 152 centimeters (cm; 60 inches), or the use of specifically designed avian protection materials in areas where this distance is not feasible (APLIC 2012). The 230-kV transmission line transformers are more than 152 cm, thus minimizing the risk for bird electrocution. The BSPP will use the SCE distribution line previously installed for the MSEP. The 6-mile (10-km) line is designed, owned, and operated by SCE. There are short sections (less than 300 ft [91 m]) owned by BSPP.

To further minimize impacts to birds, structures are monopole or dual-pole design versus lattice tower design to minimize perching and nesting opportunities, as well as reduce the likelihood of bird collisions.

3.2.2 Lighting

The Project will be designed to minimize lighting, as required by BIO-8. To the extent feasible, consistent with safety and security considerations, all permanent exterior lighting and all temporary construction lighting will be designed to minimize night-sky impacts to the extent practicable during construction and operations. Lighting for facilities will not exceed the minimum number of lights and brightness required for safety and security and will not cause excessive glare. Specific design features include the following:

- Low pressure sodium light sources will be used to reduce light pollution.
- Full cut-off luminaires will be used to minimize uplighting.
- Lights will be directed downward or toward the area to be illuminated.
- Light fixtures will not spill light beyond the Project boundary.
- Lights in highly illuminated areas that are not occupied on a continuous basis will have switches, timer switches, or motion detectors so that the lights operate only when the area is occupied.
- Where practicable, vehicle mounted lights will be used for night maintenance activities.
- Where practicable, consistent with safety and security, lighting will be kept off when not in use.

3.2.3 Evaporation Pond Netting and Flagging

If evaporation ponds are part of the final design for Units 3 or 4, prior to the discharge of any materials to the evaporation ponds, NextEra Blythe Solar will work with the BLM, CEC, USFWS, and CDFW to design an appropriate net to cover the ponds to exclude birds and other wildlife from drinking or landing on the water. Netting options will be evaluated prior to their use. The ponds will be designed such that the netting will not come into contact with the water. Approval by the CEC's Compliance Project Manager (CPM), in consultation with the BLM, CDFW and USFWS, will be obtained for netting. The ponds will also include a visual deterrent, such as flagging, in addition to the netting to dissuade wildlife from resting near these areas. Incidental and post-construction monitoring data gathered at evaporation ponds at the GSEP will be used to make decisions regarding the netting and monitoring at the BSPP.

3.3 General Avoidance Measures and Management Practices

NextEra Blythe Solar will implement several measures to reduce or avoid potential Project impacts on birds and other wildlife during construction and/or operations.

<u>Speed Limits</u>. To minimize the likelihood for vehicle strikes of wildlife during construction, and the occurrence of carcasses that may attract eagles, ravens, or other scavengers, a speed limit of 40 km per hour (kph; 25 miles per hour [mph]) has been established for travel on all dirt Project access roads. Speed limits on the paved main access road is 56 kph (35 mph) during desert tortoise active season (April through May or September through October; USFWS

2010a) and 72 kph (45 mph) outside desert tortoise active season during construction and operations. Signs are posted at appropriate locations.

Trash Abatement. During construction, all trash and food-related waste is contained in secure, closed lid (raven- and coyote- [*Canis latrans*] proof) containers to reduce the attractiveness of the site to opportunistic predators, such as common ravens and coyotes, and to prevent trash from being exposed or blown around the Project. During construction, all trash is removed at least once a week, or more often as needed if it attracts wildlife.

Minimize Disturbance Impacts. Equipment and vehicle travel is limited to existing roads or specific construction pathways during construction. Construction traffic, parking, and lay-down areas occur within previously disturbed lands to the extent feasible.

Worker Environmental Awareness Program (WEAP). A site-specific WEAP informs Project personnel about biological constraints of the Project. The WEAP is presented by a Project biologist and all Project personnel must attend the training prior to working on-site. The WEAP includes information regarding sensitive biological resources, restrictions, protection measures, individual responsibilities associated with the Project, and the consequences of non-compliance. Written material is provided to employees at orientation and participants sign an attendance sheet documenting their participation.

Minimize Standing Water. The minimal amount of water needed is applied to dirt roads and construction areas (trenches or spoil piles) for dust abatement to meet safety and air quality standards in an effort to prevent the formation of puddles, which could attract birds and other wildlife.

Dispose of Road-Killed Animals. During construction and operations, road killed animals or other carcasses detected by personnel on roads associated with the Project are reported and removed promptly. Appropriate permits are obtained prior to the removal of road kill.

Minimize Wildfire Potential. Fire prevention measures are implemented during construction and operations to minimize wildfire potential. Site personnel are required to abide by the Fire Safety Plan (as required by MM FIRE-1 and 4.9-4).

Weed Control. Minimization of the spread of weeds and introduction of new weed species is managed by implementing the Weed Management Plan (as required by MM VEG-9 and 4.4-3a).

Cleanup and Restoration. All unused material and equipment will be removed upon completion of construction and maintenance activities outside the permanently fenced site. A re-vegetation plan will be implemented to restore temporarily disturbed areas.

3.4 Other Avian-Specific Measures

Golden Eagle Monitoring. The potential impacts of the Project on golden eagles will be monitored through annual inventory surveys during construction within one mile of the Project. If surveys indicate that golden eagles are nesting within one mile (1.6 km) of the Project, NextEra Blythe Solar will produce and implement a Golden Eagle Monitoring and Management Plan.

Burrowing Owl Relocation and Mitigation. The potential impacts of the Project on burrowing owls will be minimized through the implementation of the Project's Burrowing Owl Relocation and Mitigation Plan (as required by BIO-18).

Nest Avoidance. For construction that occurs February 1 through July 31, NextEra Blythe Solar will conduct nest surveys prior to initiation of construction activities to locate nesting bird species, in accordance with BIO-16. If nesting birds are detected, biologists will implement the avoidance measures, as outlined below, and details of which can be found in the Nesting Bird Monitoring and Management Plan:

- If active nests or suspected active nests are discovered in the construction zone (or within 152 m [500 ft] of the construction zone), NextEra Blythe Solar will establish appropriate buffer distances, as determined by methods set forth in the Nesting Bird Management Plan.
- The Designated Biologist (DB) will monitor the nest until he or she determines that nestlings have fledged and dispersed; activities that might, in the opinion of the DB, disturb nesting activities, will be prohibited within the buffer zone until such determination is made.

Nest Management. Birds may utilize Project facilities for nesting. Any bird nests found will not be touched until the on-site Environmental Manager is consulted. If a nest is found, the on-site Environmental Manager will check the nest for activity. Nests that contain eggs or young are considered active and are protected for species listed under the MBTA. Therefore, active nests will be left in place. If the safety of the migratory birds, nest, or eggs is at risk or the migratory birds, nest, or eggs pose a threat to serious bodily injury or a risk to human life, including a threat of fire hazard, mechanical failure or power outage, NextEra Blythe Solar will consult with the CEC, BLM Authorized Officer (AO), CDFW, and USFWS. NextEra Blythe Solar will consult the CEC's CPM, BLM AO, CDFW, and USFWS if an active nest or a nest belonging to an eagle or threatened or endangered species is found. Nests that are confirmed to be inactive (i.e., do not contain eggs or young), do not belong to eagles or other threatened or endangered species, and will cause operational problems, will be removed.

Raven Monitoring, Management, and Control. The risk of attracting common ravens to the Project, which could result in increased predation pressures on prey species, will be controlled through implementation of the Common Raven Monitoring, Management, and Control Plan (Tetra Tech 2014b; as required by BIO-13).

Incidental Monitoring During Construction. During construction, onsite personnel will notify the DB when an injured or dead bird or bat is observed.

Standardized Reporting as Requested by USFWS. At the request of USFWS, NextEra Blythe Solar has obtained a Special Purpose Utility (SPUT) Permit and abides by the reporting requirements of the permit.

Ongoing Consultation with the Renewable Energy Action Team (REAT). NextEra Blythe Solar will consult with the REAT on the potential for avian injuries and fatalities, and will continue to do so throughout construction and operations. NextEra Blythe Solar will also work with USFWS Law Enforcement for bird carcass collection and shipment to the appropriate labs for analysis.

4.0 POST-CONSTRUCTION MONITORING

This section outlines a standardized approach to document known and projected bird and bat fatalities and injuries, and to estimate seasonal and annual post-construction fatality rates associated with Project features. Post-construction monitoring builds on standards and guidelines developed for the electric-utility and renewable-energy industries to quantify the risk of fatality and injury for birds and bats that may result from interactions with energy-related infrastructure (e.g., Anderson et al. 1999; APLIC 2005, 2006, 2012; CEC and CDFG 2007; USFWS 2010b, 2012). This section of the BBCS outlines a statistically sound spatial and temporal sampling design, including protocols for independently estimating and correcting for quarterly searcher-efficiency and seasonal (i.e., at least quarterly) scavenger (avian and mammalian) removal rates. It describes specific data to be collected during scheduled carcass searches, protocols for handling any dead or injured birds and bats that are found, and procedures for reporting incidents to relevant government agencies.

4.1 Goals and Objectives

Primary goals of the post-construction fatality monitoring program are to:

1. Estimate overall annual avian and bat fatality rate and species composition associated with the Project infrastructure. This estimate will include mortality associated with solar arrays, overhead lines including the gen-tie, perimeter fence, and other features of the Project that may result in injury and fatality.
2. Determine whether there are spatial and temporal/seasonal patterns of mortality associated with project infrastructure (e.g., different fatality rates near panels on the edge of the arrays versus the interior area of the arrays).
3. Provide information that will assist the BLM and CEC, in consultation with the USFWS and CDFW, in understanding which species and potentially which regional populations are at risk.
4. Collect data in such a way that the BLM and CEC, in consultation with the USFWS and CDFW, may make comparisons with other solar sites.

These goals are structured in a way that provide information on seasonal differences in fatality rates, and information about which taxonomic groups are most vulnerable. Fatality estimates will be adjusted to address carcass persistence and searcher efficiency as they change through seasons. Additionally, carcass persistence trials will inform search intervals.

Consistent with the above goals, the specific objectives of post-construction monitoring are as follows:

1. Conduct fatality searches for a minimum of two years according to a spatial and temporal sampling plan that provides representative and statistically sound coverage of the solar arrays, consistent with monitoring required of other industries. The need for additional monitoring beyond the second year will depend on an evaluation of the survey results from the first two years to determine if the goals of the monitoring program have been met (see Section 7.0, Technical Advisory Group). If other publically available data are available, they will be reviewed to support the discussion on additional monitoring. The need to extend the monitoring period will be determined by the BLM and CEC in consultation with the USFWS and CDFW. Implementation of any agency required pre-monitoring meetings, training, and searcher efficiency/carcass removal trials may delay the start of monitoring after the BBCS is deemed final. Upon agency approval of the BBCS, but no sooner than March 1, 2016, post-construction monitoring (as outlined in Section 4.0) will begin on all "blocks" that have been turned over from construction management to operations management and are transmitting power to the grid. Monitoring will commence on each subsequent block when it is turned over and transmitting power to the grid. The two-year minimum monitoring period for each block will start when monitoring starts on that block.
2. Conduct statistically sound, seasonal assessments to quantify and evaluate carcass persistence rates (i.e., carcass removal, destruction including dismemberment, or burial in sand due to scavengers, decay, or other abiotic [e.g., wind] or human-related [e.g., vehicle activity] factors) and support calculation of adjusted fatality rates that account for variation in carcass persistence by season and carcass type/size classes. These assessments will also be used to guide search intervals.
3. Use current, scientifically validated and accepted methods for calculating fatality rates adjusted for searcher-efficiency, carcass removal rates, and spatial and temporal sampling intensity. At present, the best methods are distance sampling combined with searcher efficiency and carcass persistence bias adjustments and a fatality estimator such as the Huso et al. (2010) estimators, but it should be noted that fatality estimation is an area of active research and 'best methods' are changing rapidly. Therefore, as data are collected, adaptive management of the study design and monitoring protocol may be necessary and will follow the process in Section 6.0.
4. Summarize the species composition of fatalities according to taxonomic family, and ecological guild (e.g., raptors, water-associated birds, passerines, etc.) to aid in understanding species or types at risk.

5. To the extent possible, summarize the composition of fatalities according to their likely propensity to collide with project components during the day versus during the night based on known migratory patterns for the particular species.
6. Aid in identifying potential fatality causes and correlates by including additional information that is readily available beyond that which is under the SPUT Permit, such as the weight of fresh whole birds, or summaries of preceding weather conditions which would have made migration likely (e.g., low pressure systems moving cross-continent to the north of the project area, followed by periods of high pressure systems).
7. Data summaries, and accompanying raw data, and any Geographic Information System (GIS) shapefiles will be reported to the BLM and CEC with each seasonal report.

4.2 Monitoring Methods

A monitoring program will be implemented for at least two years post-construction as specified below. Survey results and analysis will inform adaptive management decisions regarding any additional appropriate and practicable Bird and Bat Conservation Measures (BBCM) to avoid, minimize, and/or mitigate for observed impacts.

4.2.1 Post-Construction Monitoring of Solar Arrays

The fundamental characteristics of a sampling program designed to produce valid estimates of fatality rates for a solar farm (including the number of arrays to be searched, the search interval, the seasonal extent of coverage, and the number of years of sampling) are determined based on several factors. These factors include the questions of interest, the species of interest (e.g., resident, migratory, and/or wintering species) in the Project area, desired precision, best estimates of carcass-removal rates, searcher efficiency, the Project size and layout, and other relevant environmental (i.e., seasonal patterns), landscape, and habitat characteristics.

The following hierarchical terminology is useful for describing the spatial and temporal sampling design used to monitor solar panels:

1) <u>Panel Cartridge</u>: An engineered assembly of solar panels installed as a single unit (approximately 1.9 x 1.0 m [78.4 x 39.4 inches]).
2) <u>Row:</u> A collection of panel cartridges arrayed side-by-side on a common, linear support structure (approximately 95 m (303 ft).
3) <u>Sub-array:</u> A collection of approximately 34 rows of trackers that represent one-sixth of a typical array; dimensions (approximately 175 x 95 m [574 x 303 ft]) are mostly uniform within arrays, but may vary slightly among arrays and array-types (see below). In most cases, sub-arrays comprise structurally continuous rows surrounded by an unpaved road.

4) Array: A collection of 184 rows of trackers, encompassing 1.5 - 10 ha (4 – 25 acres), depending on array type (i.e., 35 total arrays in Unit 1 of the solar farm). There are two types of arrays at BSPP and dimensions and spacing of rows vary slightly between them: A-type and California Investment Tax Credit (CITC)-type. A-type arrays consist exclusively of panels with anti-reflective coating, and approximately 95% of the solar field will be composed of A-type arrays. The other 5% of the solar field will be CITC-type, which are made of tempered glass.

5) Block: Collections of commonly energized arrays (three blocks in Unit 1, and four blocks in Unit 2) each approximately 297 x 320 m [975 x 1,050 ft]).

4.2.2 Survey Strategy

Sampling strategies used in carcass searches have typically involved transect sampling, whereby searchers walk or drive along pre-defined transects and search for carcasses in a swath where width depends on visibility, target taxa, and other factors. The layout of PV facilities presents problems for a transect-sampling approach because rows of panels are close together (i.e., less than five m [16 ft] at the Project). Because the panels track the sun, a searcher walking or driving a transect between two rows can only effectively search one side of the transect (a 2.5-m [8.2-ft] swath) in the morning, and the other side is obscured by the edge of a PV cartridge; the other side of the transect would need to be searched in the evening when the panels were in a different position. However, traveling perpendicular to panel rows along the edges of the rows allows observers to see a greater distance of the ground beneath the panels. Surveyors will drive the lines in vehicles. Discussions with the BLM and USFWS that presented driving as the primary survey method occurred. All parties agreed this method was acceptable and that searcher efficiency trials would be conducted and monitored to identify potential issues. Other accommodations may be required to enable completion of surveys during high temperatures, such as shifting surveys to dawn and dusk.

The layout of PV facilities is well-suited to a distance-sampling approach. Distance sampling involves searching a transect line and assumes that searcher efficiency decreases (possibly dramatically) as a function of distance from the observer, and is ideally suited to situations in which animals (or carcasses) are sparsely distributed across a landscape (Buckland et al. 1993). The landscape at the Project is flat and relatively clear of vegetation, which should support a distance sampling design.

Distance sampling adjusts carcass counts for variable searcher efficiency by calculating the *effective* searcher efficiency along a transect. Effective searcher efficiency is the average probability of detection in the searched area, derived from the detection function. As a highly simplified example, if a searcher walks a 10-m (33-ft) long transect line and detects 90% of all carcasses within 10-m of the line, and 60% of carcasses that are 10 to 30 m (33 to 99 ft) from the line, then the effective searcher efficiency between zero and 10 m would be 0.9 and the effective searcher efficiency between 10 and 30 m would be 0.6. For the total 10 by 30-m area, the effective searcher efficiency would be $\frac{0.9+0.6}{100\,m^2+200\,m^2}=0.5$. In practice, searcher efficiency is modeled as a continuous function of distance, and the detection function can be estimated from the carcass data or a bias trial. The searcher efficiency bias trials can be used to augment or replace carcass data for the detection function. An advantage to the use of data from bias trials is that the assumption that carcasses are randomly distributed within the search area (typical of most distance sampling designs) becomes unnecessary. An advantage to a data-driven detection function is that it is not necessary to specify a transect width: the detection function includes information about the distance at which searcher efficiency drops to zero. The detection function is used to determine the overall probability of detection as well as to inform the approximate effective view shed of non-zero detection probability for observers.

An alternative survey strategy may be used if conditions at the Project are not conducive to distance sampling. The alternative survey strategy will entail walking parallel to rows of panels, searching the ground between and beneath panels.

4.2.3 Spatial Sampling Design

The sampling design is intended to follow the USFWS Land-Based Wind Energy Guidelines (USFWS 2012), which states that "the carcass searching protocol should be adequate to answer applicable Tier 4 questions at an appropriate level of precision to make general conclusions about the project, *and is not intended to provide highly precise measurements of fatalities*" (p. 45; emphasis added). Under the proposed sampling plan, precision is expected to vary based on carcass detectability: less precision is expected for estimates of small-bird fatality compared to estimates of large-bird fatality. However, monitoring programs at two other PV solar facilities (CVSR and Topaz) suggest that the level of impact for small birds due to PV was not very extensive, and was similar in composition and rates to what was found on control plots for passerines.

The sampling design is based on a statistical precision analysis using data from CVSR, as well as a simulation-based analysis that was informed by searcher efficiency and carcass removal rates in the Mojave Desert region (Appendix A). Sampling effort that includes 20% of the solar arrays is expected to produce a reasonable coefficient of variation (CV = 100% * standard deviation/mean) (~20%) if fatality rates are greater than 1.0 fatality/MW/year, and the search interval is at most 21 days. This level of precision is generally considered adequate for answering the primary questions of interest in fatality monitoring studies (Strickland et al. 2011).

Based on the simulation analyses, data from CVSR, consultation with relevant permitting and wildlife agencies, and consideration of the characteristics of this particular Project, sampling will encompass approximately 40% of the completed solar arrays as summarized in Table 4.1.

Table 4.1 Solar array sampling area characteristics.

Total fenced area (Units 1 and 2)	543 ha
Unit 1	258 ha (approximately 186 sub-arrays)
Unit 2	285 ha (approximately 186 sub-arrays)
Proportion sampled	40% ± 2% of each array type
Sampling unit	~1.4-ha spatial equivalent of 1 sub-array
Number of sampling units (each) Units 1 and 2	Approximately 50
Migration season search interval (March 1 thru May	7 days unless adjusted by BLM, CEC, and

31, September 1 thru October 31)	wildlife agencies based on results carcass persistence trials
Non-migration season search interval (June 1 thru August 31, November 1 through Feb 28/29)	21 days unless adjusted by BLM, CEC, and wildlife agencies based on results of carcass persistence trials
Anticipated surveys per year	Approximately 31 surveys
Duration of sampling	Minimum 2 years

Because both the layout of the solar arrays and the landscape of the BSPP (i.e., mostly flat and free of vegetation) are largely uniform, a relatively simple random sampling design is likely to be adequate for sampling the arrays. However, in the absence of data, a spatially balanced sampling design will be used. Samples will be selected in a stratified random design to ensure a spatially balanced sampling design and an approximately 40% sample of each type of array (Type A or CITC). Because spatially balanced designs ensure that sample effort is distributed over the whole study area, they help to ensure that spatially organized trends in mortality–should they exist–can be extracted from the data. The drivers of spatial variation in avian activity may be important to the statistical sampling design if avian use patterns affect the distribution of mortalities on the project site. As an example, factors that may affect avian use patterns include: 1) habitat variation around the Project site; 2) the possibility that distinct movement corridors variably concentrate birds over certain areas of the Project site (e.g., migrating or commuting water-associated birds); or 3) use of distribution lines (and other transmission line infrastructure) as roosting sites. Distribution lines within the solar field may also pose a collision risk to birds. To achieve spatially balanced sampling, the site will be divided into 7 approximately equal-sized sampling areas and sampling will be stratified among those areas.

The sampling units for the surveys consist of areas equivalent in size to four sub-arrays (approximately 190-m x 350-m [608-ft x 1,120-ft]; Figure 4.1, 4.2, 4.3). Within sampling areas, individual sampling units will be randomly selected to compose a 40% sample (± 2%).

Sampling units will be surveyed from the outer edges of sub-arrays (collections of continuous solar panel rows) and scan between each row for fatalities, with each side-specific survey covering at least half the width of the sampling unit, depending on the length of the row (Figures 4.1, 4.2, 4.3). Observers will drive along east-west roads that bisect sampling units and scan left (out of the driver's window), and then turn around at either an inverter or main road where space allows. The observer will look left on the return trip, searching the opposite side of the unit. However, alternatively, to potentially reduce the risk of vehicle incidents, the observer may survey the unit from the south looking north, and then drive to the north side of the unit and survey looking south. Most sampling units consist of four sub-arrays, each forming a structurally continuous unit composed of approximately 68 panel rows that are approximately 190-m (608-ft) long. In these cases, two east-west routes will comprise the sampling-unit survey, with each route involving scanning across the entire length of a single subarray row (95-m) (Figure 4.1). For a few other sampling units with different layouts at BSPP, the analysis will need to take into account the potentially different row lengths and sample unit widths (i.e., different number of rows). Distance sampling and resulting data will be used to calculate detectability curves to calculate the average detection probabilities, and taking into account the potential for different detection curves depending on the direction of the survey view shed.

The perimeter-only survey design reflects two concerns:

1. Minimizing movement between rows of solar panels. Because the area between electrified panel rows is an area of elevated risk, best practices dictate that personnel do not enter elevated risk zones unnecessarily; and
2. Achieving an effective balance between logistic efficiency and sampling rigor given the constraints of transect spacing due to the width of panel rows.

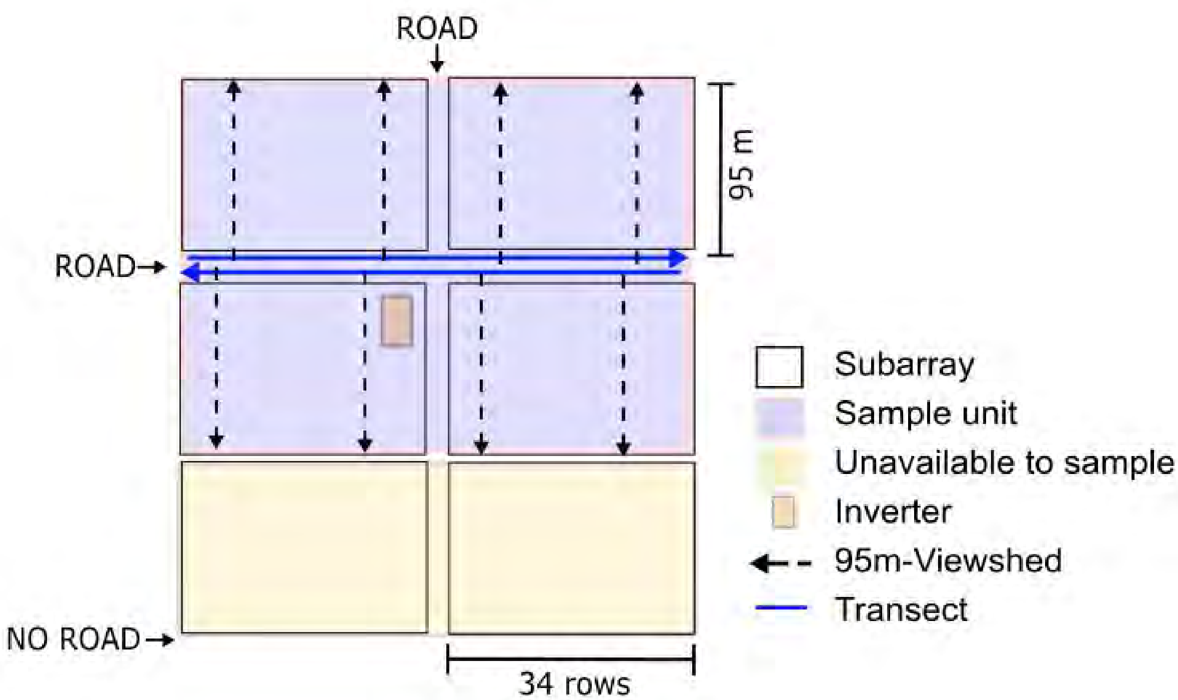

Figure 4.1 Illustration of a typical sampling unit and perimeter survey with travel routes and search areas ('observation perspectives').

Figure 4.2 Blythe Unit 1 Sample Unit Selection Overview

Figure 4.3 Blythe Unit 2 Sample Unit Selection Overview

Not being able to detect most small-sized to many medium-sized carcasses over a substantial portion of the solar facility would comprise a problematic bias if the probability of carcass occurrence was non-random within arrays (i.e., within sample units). In other words, the bias would create a problem for achieving representative sampling if the probability of mortality due to panel collisions varied in some predictable fashion relative to the distance from array edges, or if there was a tendency for fatalities to be clustered in the interior of the panel areas. Whether or not such conditions may apply to this facility is currently unknown; however, initial post-construction monitoring at another large PV solar facility in central California has not demonstrated any particular spatial bias in the distribution of fatalities documented there (H.T. Harvey and Associates 2014).

On this basis, fatality sampling will proceed using distance-sampling survey techniques and analytical methods, which include estimating and accounting for distance-related variation in the probability of detection based on the carcass data and bias trial data. In addition, searcher-efficiency trials that are tailored to include evaluating the influence of distance on the probability of detection will be conducted to ensure that searcher efficiency can be calculated.

If the alternative survey strategy is used, groups of panel rows will be chosen as sample units using a randomized sampling design, and will be searched by observers that walk down the rows included in each sample unit.

4.2.4 Temporal Sampling Design

The appropriate frequency of fatality surveys depends on the species of interest and average carcass persistence times (Smallwood 2007, Strickland et al. 2011, USFWS 2012). Large raptors tend to persist and remain detectable for extended periods (weeks to months) due to low scavenging rates and relatively slow decay rates. If only large species were of interest, extended search intervals of 30-45 days might be appropriate; however, smaller birds and bats typically disappear at much faster rates, so shorter search intervals are required to ensure effective documentation of fatality rates among these species.

Publicly-available data from three wind energy studies in the nearby Mojave Desert region of California and western Arizona provide additional, relevant insight (Chatfield et al. 2009, 2010; Thompson and Bay 2012). These studies recorded average persistence times of 17.5-46.8 days for large birds (average 29.0 days, median 22.6 days) and from 5.6-17.4 days (average 9.9 days, median 6.5 days) for small birds. If the median carcass-persistence time for small- and medium-sized birds and bats on the Project site is low, a 7-day search interval may be required to effectively document fatality rates for small birds and bats. If, however, median small-sized bird and bat carcass persistence rates are greater than seven days, then a longer search interval may be more appropriate.

Based on these considerations and preliminary data, and based on the simulation analyses discussed previously, the search interval for fatality monitoring will be variable depending on season (Table 4.1). Searches will be conducted every seven days during standard spring and fall migration periods (March 1 – May 31, and September 1 – October 31, respectively), and every 21 days during summer and winter (June 1 – August 31, and November 1 – February 28/29, respectively). After the first six months of fatality monitoring and concurrent carcass removal trials (see below) have been conducted, the search interval may be adjusted based on estimates of carcass persistence. Some migration for some species may occur outside these periods and this will be considered when evaluating the data regarding timing of mortality for species found as fatalities.

Adjusting fatality counts for carcass removal works best when the search interval remains constant through time (Huso 2010); however, within survey periods, season-specific estimates of carcass persistence can be calculated and incorporated in the overall estimation process when variable search intervals are used in different seasons (Shoenfeld 2004, Huso 2010, Huso et al. 2012; and other estimators all have facility to accommodate season-specific estimates). In addition, survey schedules will ensure that fatality surveys are evenly spaced in time to maximize detection of potential, unusual fatality events (Strickland et al. 2011). For these reasons, a standard schedule for completing the surveys has been developed, such that some surveys will occur during most weeks of the year and all sampling units are surveyed on a regular schedule, as dictated by the season.

Survey blocks will also be added over the first year of monitoring in parallel with actual block turnover dates. Monitoring at each block will begin within approximately two weeks of when that block is considered completed, energized, and turned over to operations. A tentative turnover schedule has been developed and will be tracked to ensure the monitoring schedule follows the proposed schedule.

4.2.5 Survey and Data Collection Protocols

Fatality surveys will be conducted with the observers striving for a consistent pace/speed and approach, and a uniform search effort throughout the search. Searchers will use binoculars at their discretion to survey for carcasses between each row of panels. The Project has rigorous safety protocols in place that address heat and other safety issues. When a potential carcass is detected, the observer will immediately proceed down the row to confirm the detection and, if valid, fully document and bag it according to standard protocols (see below). Depending on the size and nature of the carcass, the observer will either immediately collect the carcass (smaller, easily collected and transported packages) or flag it for pick-up once the sampling-unit survey is completed (larger, messier, or otherwise complicated collections) or to identify it to species. All carcasses will be stored in freezers on-site until the BLM, CEC, and USFWS determine the ultimate disposition.

All bird and bat injuries and fatalities discovered during, or incidental to, the standard carcass surveys will be documented according to the requirements and standards reflected in the USFWS Avian Injury and Mortality Reporting Form. The form is a reporting requirement of the USFWS SPUT Permit issued to the Project to authorize the handling of dead or injured birds. In addition, finds will be classified as a fatality according to standards commonly applied in California (Altamont Pass Avian Monitoring Team 2007, CEC and CDFG 2007). For detections that only include feathers, to be classified as a fatality, each find must include a feather spot of at least five tail feathers or two primary flight feathers within five m or less of each other, or a total of 10 feathers. Searchers will make their best attempt to classify feather spots by bird size according to the sizes or identifying features of the feathers. A separate fatality estimate will be made for feather spots for which size classification is impossible. Digital photographs will be taken to document all incidents in situ with a minimum 12 megapixel camera, showing the dorsal, ventral, and head area. When possible, plausible cause of death will be indicated on data sheets based on evidence (such as blood or fecal smears on solar panels, burns that may indicate electrocution, or blunt trauma that may indicate collisions). All carcasses will be examined and where possible cause of death will be recorded (e.g., burns may indicate electrocution, and blunt trauma may indicate collisions). An avian biologist will make decisions on likely cause of death and this will be reviewed by the biologist overseeing the program. If a clear cause of death is not apparent, this will also be noted.

All fatalities will be assigned to a size class, a taxonomic family, and an ecological guild and weight categories (e.g., 0-100 grams; 101-999 grams; and 1,000+ grams). Species will also be classified as resident, overwintering, or whether they are diurnal or nocturnal migrants (or both). It is necessary to know size classes to appropriately correct for searcher efficiency and scavenging, and data about taxonomic family, ecological guild, and time of day when the species are typically active are relevant to the specific USFWS and project goals of the post-construction monitoring plan (Plan).

To ensure accurate documentation of the fatality locations, the observer will record the array number, Global Positioning System (GPS) coordinates in latitude/longitude of the carcass location using a handheld device accurate to ± 3.0 to 4.0 m (9.8 to 13.1 ft), and a measurement of the distance from the fatality location to the end of the panel row from which the carcass was detected. When an observer proceeds down panel rows to confirm and document detected fatalities, they may detect other fatalities that they did not observe based on the perimeter-only survey. Including such detections in the fatality estimate will bias estimation of fatality density based on application of standard distance-sampling analytical methodology. Therefore, all such supplementary detections will be classified as “incidental” finds (discussed further below). Carcasses that are found within standardized search areas but incidental to the distance sampling searches can be used as an additional validation of the detection functions; the detection function specifies the distribution of found carcasses, but it also specifies the distribution of missed carcasses, and incidentals should follow the latter distribution.

Data records for each survey will also include: 1) full first and last names of all relevant surveyors in case of future questions; 2) start and stop times for each individual sampling-unit survey; 3) a description of the weather conditions during each search; 4) a standardized description of the current habitat and visibility classes represented within each sampling unit; and 5) a description of any search-area access issues, if relevant. Data collected will also include all appropriate fields contained in the SPUT Permit.

All personnel involved in implementing this Plan will be included as sub-permittees under the Project’s USFWS SPUT Permit, issued either to the Project or a consultant authorized by the

Project. If the CDFW does not consider coverage under the USFWS SPUT Permit sufficient, all personnel implementing this Plan will also be covered under any applicable CDFW Scientific Collecting Permit, if provided, and issued either to the Project or its consultant. Ideally, the relevant state and federal permits will allow fatalities discovered during the study to be removed from the field, stored on-site in a freezer, and used in searcher-efficiency and carcass-removal bias trials. Necessary exceptions will apply to all special-status species (see below). Otherwise, surveyors will place all discovered carcasses or body parts that are not of a special-status species and are not part of an ongoing bias trial in plastic zipper storage bags, clearly label each bag with the incident number, and deliver the bags for storage in the designated freezer at the Project facility.

4.2.6 Fence Line Monitoring

The inside of the perimeter fence is subject to inspections approximately once every seven days during spring and fall migration, and approximately once every 21 days during winter and summer periods with intervals adjusted as necessary based on carcass persistence trials. A searcher will drive areas accessible by vehicle close to the inner perimeter of the fence, scanning for fatalities within an approximate 6-m (20-ft) strip transect centered on the fence. There are some environmentally sensitive areas along the fence with access restrictions. These areas will not be sampled as long as the restrictions are in place. Travel speed will be no greater than five mph (eight kph) while searching to ensure quality detection and safety. Personnel conducting fence checks will document bird and bat injuries and fatalities discovered along the inner fence line. The entire northern perimeter fence at BSPP comprises the entire southern perimeter fence of the pre-existing MSEP; thus, carcasses located along the north side of this shared section of fence will be available for detection and documentation during post-construction monitoring of the MSEP perimeter fence, and carcasses located along the south side of this section of fence will be available for detection and documentation during post-construction monitoring of the BSPP fence. Injuries and fatalities along the fence line will be documented in the same manner as used for those discovered during the array carcass surveys, and will be reported to the USFWS and CDFW as part of the same overall reporting process. Searcher efficiency trials will be conducted along the inside of the fence. Carcass removal trials conducted at solar arrays will include areas near the inside of the fence as well.

4.2.7 Power Line Monitoring

Power lines are built to APLIC Guidelines (2005, 2006, 2012); however, there is still a collision risk for birds. Because the gen-tie line is shared with MSEP for most of the length of the line, except where the Blythe line splits off entering the Blythe substation and where it enters SCE's Colorado River Substation (CRS), the following monitoring scheme will apply for both BSPP and MSEP. The gen-tie will be broken up into 500 m segments, and every other segment will be sampled. Sampled segments will also be split between the two projects, such that every other sample segment will be designated to BSPP (i.e, sample segments 1, 5, 9 will be MSEP and sample segments 3, 7, 11 will be BSPP). Some segments may be eliminated from consideration for sampling if they cannot be easily reached by a vehicle (e.g. too sandy). If a segment that was selected is inaccessible, a new unit will be selected to be sampled in its place. A 25% sample (for each project; 50% total) of the gen-tie will be monitored every seven days during spring and fall migration, and approximately every 21 days during summer and winter, with intervals adjusted as necessary based on the carcass persistence trials. Searchers will drive or walk 25% of the gen-tie during each visit, scanning for birds within 15 m (about 50 ft) from the line. Injuries and fatalities along the gen-tie will be documented in the same manner as used for those discovered during the array carcass surveys, and will be reported to the USFWS and CDFW as part of the same overall reporting process. Assuming the same methods are used for fatality searches and bias trials along the sample of the gen-tie monitored under the MSEP BBCS, then data from the two samples will be combined to produce one fatality estimate for the entirety of the shared line. The combined estimate will be provided in both BSPP and MSEP seasonal and annual reports.

Some overhead electrical feeder and distribution power lines are co-located within the solar arrays and these co-located power lines may be searched as part of the regular monitoring schedule at arrays. Fatalities that are determined to have been caused by the power lines (as determined by the nature of injuries) will be reported as such to the USFWS and CDFW as part of the same overall reporting process and included in overall fatality estimates.

4.2.8 Clearance Surveys

A one-time clearance survey will be conducted within 2-weeks of when blocks are considered completed, energized, and turned over to operations. The purpose of this survey will be to clear the survey area of any accumulated carcasses that may be present. The sequence of clearance surveys will mirror the schedule for the first official survey to ensure that the interval between the clearance survey and the first standard survey is the same for all sampling units. This is necessary to ensure that carcasses detected during the first round of surveys represent only fatalities that occurred during a preceding interval equivalent to the search interval that will apply afterward. Carcasses that are missed during the clearance survey may cause an upward (conservative) bias in the fatality estimate. Additionally, some estimators (such as the Huso estimator described above) become biased if carcasses that are not detected during a trial are still available during subsequent trials. This “bleed through” effect can be ameliorated by including only fresh carcasses in the fatality estimate, where “fresh” means a carcass that has arrived since the previous search. Carcasses that cannot reliably be aged (probably most carcasses) will be assumed to be fresh; this will cause an upward (conservative) bias in the fatality estimate.

4.3 Bird Rescue

Searchers will record any injured or rescued birds or bats located during surveys. Birds will be assessed by a qualified biologist to determine if it is appropriate to transport the individual to the nearest permitted rehabilitation facility for proper care, or to release them. Injured raptors will be handled only by experienced personnel and will be taken only to rehabilitation facilities that are permitted to handle raptors; this provision is particularly important for eagles. From the Project site, the closest rehabilitation facilities capable of handling all avian species are:

- Coachella Valley Wild Bird Center, 46500 Van Buren, Indio, California, 92201; Phone: 760-347-2647; Contact: Linda York, Executive Director; Hours of Operation: 9:00am-12:00pm, seven days a week. http://coachellavalleywildbirdcenter.org/
- The Living Desert Zoo & Gardens, 47900 Portola Avenue, Palm Desert, California, 92260; Phone: 760-346-5694 x8 x1; Contact: Sheila Lindquist, North American Manager; Hours of operation: 8:00am-1:30pm (June-September), 9:00am-5:00pm (October-May), seven days a week (closed Christmas Day). http://www.livingdesert.org/animals/wildlife-rehabilitation/
- Hope Wildlife Rescue, 18950 Consul Avenue, Corona, California 92881; Phone: 951-279-3232; Contact: Bill Anderson or Cyndi Floreno.
- All God's Creatures Wildlife Rescue & Rehabilitation, Chino Hills, California, Phone: 909-393-1590; Contact: Lori Bayour; http://www.allgodscreatures.net/index.html; no address available, contact by phone.
- International Bird Rescue, Los Angeles Center, San Pedro, California, 90731; Phone: 310-514-2573; Hours: 8:00 am - 5:00 pm. International Bird Rescue specializes in waterbird rescue.
- Almquist Tracks and Tails, 632 Riviera Dr., Blythe, California 92225; (760) 552-3239.
- A list of wildlife rehabilitators maintained by the CDFW: http://www.dfg.ca.gov/wildlife/WIL/rehab/facilities.html
- The California Council for Wildlife Rehabilitators: http://www.ccwr.org/resources/rehabilitation-facilities-region-6.html

If stranded, but apparently uninjured, water-associated birds are discovered at any time during surveys, the searcher will take immediate steps to notify an on-call biologist, and assist with efforts to secure the bird and have it transferred as expediently as possible to Lake Tamarisk for release into the water. If a qualified biologist is not available, all stranded birds (injured or apparently uninjured) should be immediately taken to a rehabilitator for evaluation. Injured or exhausted water-associated birds should be taken to International Bird Rescue, which specializes in the care and rehabilitation of water-associated birds. If a mass event involving many such birds is observed, the searcher, if not an approved biologist, will immediately notify the on-call biologist or other biological personnel working on the site and request their assistance identifying injured versus non-injured birds and transporting injured birds to the nearest rehabilitation facility. International Bird Rescue can also assist with mass stranding events. Rehabilitation facilities would be compensated by Blythe Solar for the costs associated with each bird put under their care.

If a searcher discovers a dead individual of a species that is fully protected by the state or federally or state-listed as threatened or endangered, and for which handling is not specifically authorized under the applicable salvage permits, he/she will collect data and photos as for any other fatality, but then flag the carcass to mark its location, cover it with a bucket or another way to secure its location, and leave it in place. If it has been confirmed as a federally listed species under the ESA, the searcher will immediately call a USFWS Office of Law Enforcement special agent to determine the appropriate follow-up action. All such injury and fatality incidents must be reported to the CEC Compliance Project Manager.

4.4 Searcher Efficiency Trials

Estimating searcher-efficiency (distance-related detection functions) is a standard component of the distance-sampling approach. Moreover, because estimating detection functions is applied to all survey data and can be organized to variably adjust in relation to covariates of interest (e.g., season, habitat, and carcass size classes), application of this approach will account for typical factors of interest for fatality studies (CEC and CDFG 2007, Huso 2010, Korner-Nievergelt et al. 2011, USFWS 2012, Smallwood 2013). In this case, independent searcher-efficiency trials per season will be conducted to help assess and adjust for potential spatial bias in the distribution of fatalities among arrays. Separate trials will be conducted to assess detection probability associated with fence and gen-tie searches.

The desert landscape in which this Project is located generally changes little with the seasons, save for brief periods following winter and spring rains when floods may occur and blooming plants may flourish. A recent meta-analysis involving data from more than 70 wind-energy projects suggested that including habitat visibility class as a predictive variable generally eliminated any otherwise apparent seasonal effects on searcher efficiency (Smallwood 2013). Nevertheless, the supplementary searcher efficiency trials for this Project will be repeated seasonally (winter, spring, summer, and fall) and trials will be organized so that all search personnel participate in bias trials. Placement of trial specimens will be timed to limit the number of trial carcasses placed on the landscape at any one time (minimizing the chance of artificially attracting scavengers or, conversely, scavenger swamping; Smallwood 2007). This approach will also ensure that any new surveyors that join the crew participate in searcher efficiency trials. The trials will also be managed to ensure effective quantification of searcher efficiency in relation to predefined habitat visibility classes (low, medium, and high, if relevant), size classes of birds (small, medium, and large), and detection distance.

The bias-trial sample sizes required to produce precise, adjusted fatality estimates are not well established, in part because needs may vary substantially depending on actual project-specific searcher efficiency, carcass removal, and fatality rates. However, using searcher-efficiency trials to help evaluate the efficacy of perimeter-only surveys and the distance-sampling approach used in this investigation will require larger sample sizes to produce a sampling design that effectively accounts for distance as a key covariate of interest. In addition, if growth of new ruderal vegetation, or substrate heterogeneity caused by flood events, is sufficient to create a new visibility class under the arrays, the specimen numbers would need to increase to effectively account for this factor. It will also be necessary to ensure that the estimates of searcher efficiency encompass variation among multiple surveyors. The influence of individual surveyors will not be accounted for in a formal, statistical sense by including “surveyor” as a covariate in the estimation model; however, all surveyors will be tested similarly. Each surveyor will be exposed to multiple test specimens of each size class, and at similar repeated levels if testing in different habitat visibility classes is required. A minimum of 25 carcass samples per small size class, 15 for medium, and 10 for large is anticipated within the solar array per season, while 15 small, 10 medium, and 10 large carcasses are anticipated along the fence line and gen-tie sampling areas per season (pooled between sites given the gen-tie is shared between them). Searcher efficiency will be summarized for each individual searcher, but to avoid needlessly inflating the variance of the estimate, individual searcher effects will not be included in the fatality estimation model.

Besides representing birds of different sizes, another important factor to consider in searcher-efficiency and carcass-removal trials is the bird species to use as trial specimens. Ideally, all carcasses used for both searcher-efficiency and carcass-removal trials should reflect the range of species likely to be encountered as fatalities in the Project area (CEC and CDFG 2007). Because obtaining sufficient samples of “natural” carcasses often is difficult, researchers frequently resort to using readily available, non-native surrogate species in bias trials; however, this practice may result in biased results when compared to studies that use only “natural” specimens (Smallwood 2007). For all bias trials, this program will maximize use of representative native or naturalized species authorized by permits, either found during the study or gathered elsewhere, as needed, and from diverse sources where possible, but all trial carcasses will be obtained and deployed in a manner that are consistent with applicable regulatory requirements.

Another factor that influences carcass detectability is how fresh and intact the carcass is (Smallwood 2007, 2013). If multiple pieces of a depredated or scavenged carcass are scattered over a modest area, in some cases the fatality may be more easily detected; however, detectability generally decreases when only remnants of a carcass are present, or when the carcass is aged and degraded. Nevertheless, in contrast to wind energy projects, there is little expectation that this Project will cause injuries and fatalities that result in dismembered carcasses, so this factor is not expected to influence searcher efficiency bias or carcass removal rates (Smallwood 2013). Therefore, bias trials conducted in this study will involve primarily intact carcasses. The searcher-efficiency trial specimens may range from freshly thawed to partially decayed (i.e., selected, subject to availability, to mimic the range of carcass decay that typically accrues over 7-day periods).

A field supervisor or other technician not involved in the standard surveys will place the trial specimens and will recover any specimens missed by the surveyors. All trial specimens will be placed according to a sampling plan that randomly allocates carcasses of different sizes among survey plots and survey days within the assessment areas, but is stratified to ensure equitable representation of different surveyors, and fence line versus solar arrays versus gen-tie versus seasons. To minimize the possibility of unnecessarily attracting scavengers or, conversely, contributing to scavenger swamping, which could affect ongoing carcass-removal trials (Smallwood 2007, Smallwood et al. 2010), placement of searcher-efficiency trial specimens will be distributed throughout the year (appropriately organized to provide season-specific estimates with adequate samples to provide a robust estimate of searcher efficiency), with few specimens placed at any one time. Carcasses will be placed carefully to minimize disturbance of substrates that may bias carcass detection. Sample size and frequency of trials in the second year may be reduced if the Technical Advisory Group (TAG also referred to as Technical Advisory Committee, or TAC, in the Conditions of Certification) deems the action appropriate (see Section 7.0).

All trial specimens will be inconspicuously marked with a piece of black electrical tape wrapped around one leg, in a manner that allows the surveyor to readily distinguish trial specimens from new fatalities, but without rendering the specimen unnaturally conspicuous (Smallwood 2007, USFWS 2012). To ensure a degree of "natural" placement, carcasses need to be represented by placing them between rows of panels, under panels, near I-beams supporting the panels, or in the open. Therefore, carcasses will be tossed towards the designated, randomly chosen placement spot from a distance of three to six m (10 to 20 ft). Documentation of each location will include GPS coordinates, notes about the substrate and carcass placement, and a digital photo of the placement location.

Surveyors will have only one opportunity to discover placed specimens. Any missed specimens will be recovered as quickly as possible after surveys have been completed in a given area, and after the surveyor(s) have become aware of the trial through discovery of one or more specimens. Some researchers have argued for leaving missed specimens in place to enable possible discovery in a subsequent survey and thereby mimic the natural situation in which "bleed-through" is possible (e.g., Smallwood 2013, Warren-Hicks et al. 2013; discussed further below). Although this approach may have merit in some situations, its potential value for this Project is offset by the need to avoid attracting ravens because they may prey on desert tortoises living in the area (Tetra Tech 2014b).

4.5 Carcass Persistence Trials

The degree to which carcasses persist on the landscape depends on a variety of factors reflecting seasonal variation in landscape/climatic conditions and the scavenger community. The composition and activity patterns of the scavenger community often vary seasonally as birds migrate, new juvenile birds and mammals join the local population, and mammalian scavengers variably hibernate or estivate. Seasonally variable climatic conditions also may contribute to variation in carcass decay and removal rates due to variation in temperatures, solar insolation, wind patterns, and the frequency of flooding events. Therefore, to ensure accurate treatment of this bias factor, carcass-persistence rates will be assessed on a quarterly or at least semi-annual basis during the first year that fatality surveys are conducted (CEC and CDFG 2007, USFWS 2012, Smallwood 2013), and during the second year as needed. Pending the results of the spring trials, consideration should be given by the TAG for reducing the overall trial numbers by potentially pooling data across the BBSP and MSEP projects. Given these two projects are adjacent to each other, we expect similar scavenger densities and therefore, similar carcass removal rates through time at the sites. It is also imperative that carcass-persistence trials effectively account for the influence of carcass type/size, given that persistence times may vary widely depending on the species and size class involved (Smallwood 2013).

To quantify carcass persistence, 30 small, 20 medium, and 10 large carcasses will be randomly placed and monitored within the solar arrays (including the fence line), and 25 small, 15 medium, and 10 large along 50% of the gen-tie each season (pooled between sites given the gen-tie is shared between them). A minimum of 15% of the carcasses in the solar arrays will be monitored, using motion-triggered, digital trail cameras (e.g., see Smallwood et al. 2010) while the remaining will be visited on foot; carcasses will be monitored for 30 days or until the carcass has deteriorated to a point where it would no longer qualify as a documentable fatality. For carcasses not set up with cameras, the carcass will be visited once a day for the first four days, and then every three to five days until the end of the 30-day trial is reached. Fake cameras or cameras without bias trial carcasses will also be placed to avoid training ravens to recognize cameras as “feeding stations”. Periodic ground-based checking of carcasses also will occur to guard against misleading indicators of carcass removal, such as wind blowing the carcass out of the camera’s field of view. To minimize potential bias caused by scavenger swamping (Smallwood 2007, Smallwood et al. 2010), carcass-persistence specimens will be distributed across the entire BSPP, not just in areas subject to standard surveys, and new specimens will be placed every two to three weeks in small numbers. Sample size and frequency of trials in the second year may be reduced and/or data may be pooled with MSEP’s data if the TAG deems such actions appropriate.

Trial specimens will include only intact, fresh (i.e., estimated to be no more than one or two days old and not noticeably desiccated) bird carcasses that are either discovered during the study or are acquired from other sources after having been frozen immediately following death. If permits allow, preference will be to use carcasses of species that occur in the area. Surrogates (such as upland game birds and waterfowl) that are similar in size and appearance to species that occur in the area, will be obtained from commercial sources and used if necessary to meet the required sample sizes. However, domestic waterfowl or upland game birds that are white or brightly colored (e.g., male ring-necked pheasants [*Phasianus colchicus*]) will not be used. Scavenging rates for some surrogates (e.g. medium to large sized game birds that are used to represent raptors) may be artificially high (Smallwood 2007, 2013) and may lead to conservative fatality estimates (i.e., an overestimate) for some taxa/bird types.

To reduce possible biases related to leaving scent traces or visual cues that may unnecessarily alert potential scavengers, all carcasses used in carcass-persistence trials will be handled with latex gloves, and handling time will be minimized. All trial specimens will be inconspicuously marked with fingernail polish on the bill and legs to distinguish them from both unmarked fatalities and searcher-efficiency trial specimens.

Upon conclusion of the relevant monitoring period, each trial specimen will be classified into one of the following categories:

- **Intact**: Whole and un-scavenged other than by insects;
- **Scavenged/depredated**: Carcass present but incomplete, dismembered, or flesh removed;

- **Feather spot**: Carcass scavenged and removed, but sufficient feathers remain to qualify as a fatality, as defined above; or
- **Removed**: Not enough remains to be considered a fatality during standard surveys, as defined above.

4.6 Estimating Adjusted Fatality Rates

The sampling design will enable calculation of fatality estimates adjusted for searcher-efficiency, carcass-removal rates, and proportion of area sampled. The adjustment for searcher efficiency will occur by virtue of applying standard methods for analyzing detection data collected using distance-sampling methods, with the data partitioned by season and standardized carcass size classes.

The fatality estimates will be adjusted for variation in carcass persistence, by applying seasonal and carcass-size-specific correction factors to the fatality estimates that have been adjusted for distance-related variation in the probability of detection.

The analytical approach used to calculate adjusted fatality estimates will be similar to that applied in cases where the fatality estimates are derived from strip transects. For illustrative purposes, we summarize here the basic formulation of the Huso estimator, the first part of which pertains to fatality estimation for different strata, or groups. Essentially, the smallest group for which fatalities are estimated can be considered a stratum, with stratum *k* representing, for example, a set of similarly sized birds within a defined habitat visibility class. Note that strata should be defined to ensure minimum variance in detection probabilities within individual strata, whereas probabilities may vary considerably among strata (e.g., for small versus large birds, or in habitats of low versus high visibility). Depending on the circumstances, there can be strata based on species groups, size classes, seasons, habitats, and/or infrastructure types (also could conceivably model distance categories as another covariate).

For a particular stratum *k* for a given survey plot and search interval, fatality can be estimated as:

$$\hat{F}_k = \frac{c_k}{g_k},$$

where c_k is the number of observed carcasses and g_k is the probability of detecting a carcass. The detection probability *g* typically is the product of three variables: the probability of a carcass persisting (*r*), the probability of a carcass being observed given that it persists (*p*), and the effective proportion of the interval sampled (*v*):

$$\hat{g} = \hat{p} * \hat{r} * \hat{v}.$$

The probability of a carcass being observed given that it persists (i.e., searcher efficiency) is estimated as:

$$\hat{p} = \frac{number\_observed}{number\_available},$$

with data for calculating this metric derived from searcher-efficiency trials where known numbers of carcasses are distributed over the search area and carcass detection rates are quantified.

The probability of a carcass persisting is estimated as:

$$\hat{r} = \frac{\bar{t}(1 - e^{-I/\bar{t}})}{I},$$

where $\bar{t}$ is the estimated mean carcass persistence time and ***I*** is estimated as:

$$I = \min(I_a, \tilde{I}),$$

where I_a is the minimum actual time between searches and $\tilde{I}$ is the effective search interval, defined as:

$$\tilde{I} = -\log(0.01) \cdot \bar{t}.$$

The effective proportion of the interval sampled is estimated as:

$$\hat{v} = \min(1, \tilde{I} / I_a).$$

For this investigation, the formulation for calculating $\hat{F}_j$ would differ from that outlined above, in that "c_k" would represent the estimated number of fatalities already adjusted for searcher efficiency, based on application of distance-sampling methodology, and then g_k would represent the product of only the estimated carcass persistence (*r*) and the effective proportion of the interval sampled (*v*). With this modification, the rest of the formulation would be similar.

For a given plot in search interval *j*, the adjusted total number of fatalities is calculated as:

$$\hat{F}_j = \sum_{k=1}^{K} \hat{F}_{jk},$$

where $\hat{F}_{jk}$ is the estimated number of fatalities within stratum *k* of search interval *j*.

Finally, the estimate of Project-wide total fatalities during a given search interval is estimated as:

$$\hat{F} = \frac{1}{a} \times \left(\sum_{i=1}^{n} \frac{1}{\pi_i} \sum_{j=1}^{J} \hat{F}_{ij} \right),$$

where $\hat{F}_{ij}$ is the number of fatalities on plot *i* in search interval *j*, *a* is the proportion of area that was searched and π_i represents a modified weight associated with an unequal probability sample (Huso 2010), and is the product of the probability of selecting plot *i* and the proportion of fatalities contained in plot *i*. The total number of search intervals is *J*, assuming that there is the same number of search intervals for each plot. In practice, one need not assume that *J* is constant, but presenting it this way simplifies the notation.

Adjusted fatality estimates for the BSPP will be expressed per unit area (e.g., acres or arrays) per year.

4.7 Incidental Fatality Documentation

Once post-construction fatality monitoring begins, all subsequent bird and bat injuries and fatalities detected incidentally to the standardized post-construction monitoring program will be classified as “incidental finds,” documented using similar procedures as are used for specimens discovered during the standardized surveys, and integrated with records from the standardized surveys for summary reporting and evaluation purposes. Incidental finds that occur outside of standard search areas will not be included in calculations of adjusted post-construction fatality estimates, but will be summarized within seasonal and annual reports (discussed below).

From a statistical standpoint, a bias will occur if carcasses that are found in standard search areas, but not during standardized surveys, are recorded and removed prior to the next search of that array. Per USFWS direction, and to be consistent with the Common Raven Management and Control Plan (Tetra Tech 2014b), these carcasses will be reported directly to an authorized biologist. These incidental finds will be documented using the same procedures as those discovered during standardized surveys. Data from incidental finds within standardized search areas will be included in analyses to estimate mortality within the solar arrays to be conservative. Appropriate caveats can be included within the seasonal and annual reports to document the potential magnitude of any biases created by recovering these carcasses.

4.8 MINIMUM CREDENTIALS OF MONITORING PERSONNEL AND TRAINING

The fatality monitoring program will be overseen by an Avian Biologist approved by the BLM and CEC in consultation with wildlife agencies that has demonstrated the ability to accurately identify the species of birds and bats potentially impacted by the project. Additional biologists will be approved by the BLM and CEC in consultation with the wildlife agencies for the purpose of accurately identifying species of birds and bats potentially impacted by the project. The approved biologists will assist with fatality monitoring and will be available to respond to incidents at the Project that require expert assistance (e.g. uncertain species identification, possible listed species, or injuries) within 24 hours. In addition, a biologist (with a minimum of a Bachelor's of Science in wildlife sciences) will be on-site during days of standardized monitoring.

Monitoring personnel may include solar facility staff. Monitors will be trained in distance-sampling search methodology, correct identification and documentation of carcasses, implementation of carcass removal trials, and notification of a rehabilitation center in the event of injured birds or bats. Only staff/technicians that are listed under the SPUT Permit will be allowed to handle carcasses. Accurate identification of rare, special status species will be emphasized during training. All surveyors will have photo cards to classify specimens and will take photographs of all finds. All data collection will be standardized and the approved Avian Biologist will decide which to report as survey observations; however, all observations that were not conclusive will be reported.

The trainer, curriculum, and training materials for training of non-biologist personnel in monitoring methods will be approved by the BLM and CEC in consultation with the wildlife agencies and will be conducted by the approved Avian Biologist prior to initiation of the study. Training materials may be augmented by wildlife agency input. Components of the training program will include:

- A classroom-based portion with lecture and handout materials, and photographic or specimen-based (if available) species identification;
- A field-based portion that allows trainees the opportunity to practice and receive feedback on conducting carcass searches and trials, identification of species, completing data forms, and following protocols for assessing and assisting injured birds and bats;
- Assessment of learning outcomes for each participant; and
- A training log to be updated with each trainee's name and contact information upon successful completion of the course.

The Avian Biologist that will conduct the training will, minimally, have a Master's degree in biological sciences, zoology, botany, ecology, or a related field, and at least one year of field experience with avian or bat research or monitoring in the region. All reference material should be maintained and provided to the agencies in the event that there are questions about species identification.

5.0 REPORTING

5.1 Reporting During Construction

The Project will report all documented bird and bat injuries and fatalities to the BLM, CEC, CDFW and USFWS using the required Avian Injury and Mortality Reporting Form that is a reporting requirement of the USFWS SPUT Permit issued to the Project to authorize the handling of dead or injured birds. SPUT Permit reporting will be submitted monthly or in accordance with the terms of the permit. Similar reporting to the CDFW will be accomplished as a condition of any relevant Scientific Collecting Permit that the CDFW may issue to authorize the handling of dead or injured birds under state law.

5.2 Reporting During Operations

All injury and fatality incidents discovered outside of the standardized carcass surveys will be documented in the same manner as used for those discovered during the carcass surveys, and will be reported to the USFWS and CDFW as part of the SPUT Permit process. Special status or listed species will also be handled in a way that is consistent with project-specific SPUT Permit conditions. Additionally, in accordance with the requirements of BIO-15, if a carcass or injured special status species is found at any time either by project operations or by post-construction monitoring personnel, the Designated Biologist or project owner will notify CPM, CDFW and USFWS within one working day.

5.2.1 Summary Reports

Seasonal electronic summaries of all biological monitoring activities will be submitted to the BLM, CEC, USFWS, and CDFW throughout the monitoring period. After the fourth quarter of each year of monitoring, a biologist representing the Project will assist the Project in preparing and submitting an annual report that summarizes dates, durations, and results of all fatality monitoring conducted to the BLM, CEC, CDFW, and USFWS. Each quarterly report will be a cumulative report for the year, leading up to the final annual report. During each monitoring year there will be three quarterly reports and one final annual report.

To address the specific objectives of the monitoring plan, summary reports will include overall fatality estimates with confidence intervals (CIs), and fatality estimates by season. In addition, to the extent possible, fatality rates will be estimated and reported for likely diurnal, and likely nocturnal species, and for ecological guilds of interest (e.g., raptors, water-associated birds, passerines). Summary reports will also include spatial analyses of the data that address whether fatalities are randomly distributed throughout the facility. All raw field notes, field data, photographs, and GIS data will be submitted to the agencies with the annual report.

6.0 TECHNICAL ADVISORY GROUP

A TAG will monitor Project activities, including fatality data, to provide recommendations to the BLM and CEC on the need for any adaptive management based on reported data. The TAG will consist of one member of the BLM, CEC, USFWS, and CDFW. Two additional non-voting members, representing NextEra Blythe Solar, would serve as members of the TAG. Person(s) with scientific expertise may be invited by TAG members, if deemed appropriate. In addition, representatives from the Project and the consultants involved in the conduct of the studies will typically be invited to attend and participate in TAG meetings. The TAG will provide advice and recommendations to the BLM and CEC on developing and implementing effective measures to monitor, avoid, minimize, and mitigate impacts to wildlife species and their habitats related to operations. The BLM and CEC will evaluate any recommendations of the TAG, including discussions with NextEra Blythe Solar concerning new measures or measures that are not completely detailed in this BBCS, requisite effectiveness monitoring, and make a decision on what measure(s) and monitoring to require for implementation.

A TAG Lead from the Project will be designated for the group whose duties will include disseminating Project data, including data on fatality events, attending meetings, reviewing of fatality data, and documenting adaptive management recommendations for the Project. The BLM and CEC will each provide one designated TAG Lead for the Project. The BLM and CEC TAG Leads will serve as TAG co-chairs, and it is the responsibility of each to coordinate meetings and involve all team members.

The guiding principles, duties, and responsibilities of the TAG include the following:

- The TAG is only an advisory group;
- Recommendations will be made based on best available science and existing approvals and permits to address specific issues resulting from the Project;
- Recommendations will generally be made by consensus. Where consensus cannot be reached, multiple recommendations will be put forth to the BLM and CEC for a final decision;
- Provide sufficient flexibility to adapt as more is learned about the Project as well as strategies to reduce avian impacts, if warranted;
- Review results of fatality monitoring;
- If the BLM and CEC determine, based on post-construction monitoring, that bird mortality caused by solar facilities is having potentially adverse impacts on special status bird populations, or is having any other CEQA significant impact (per Appendix G in CEQA Guidelines), the TAG may recommend adaptive management strategies such as installing additional bird flight diverters, alterations to Project components that have been identified as key mortality features, or implementing other appropriate actions to address the relevant findings based on the data.
- Review annual report on status of compliance with mitigation measures and permit conditions and provide recommendations to the BLM and CEC, as necessary.
- Evaluate effectiveness of implemented adaptive management strategies and provide the BLM and CEC with recommendations based on findings.

The TAG shall hold the first meeting prior to commencement of post-construction monitoring to review any final details of the monitoring plan. Subsequent meetings will be held following each monitoring season and after the end of each annual monitoring cycle. A conference call or web-based meeting will occur each quarter to review the quarterly report and take comments. Each agency will be limited to one designee to provide verbal or written comments at the quarterly meetings. The monitoring consultant will revise the report based on the comments and submit the report back to the CEC and BLM as final. A similar process will be used for the Annual

Report, but the CEC and BLM, in consultation with the USFWS and CDFW, will approve the report as final.

After the initial 3-month period, the TAG will review the findings for the first monitoring season to determine if adjustments to the monitoring frequency are warranted based on carcass persistence trial results. NextEra Blythe Solar and the agencies will also meet at the end of the second year of monitoring to determine if continued/focused monitoring is warranted. Continued/ focused monitoring may be warranted if data indicate that bird mortality caused by solar facilities is substantial and is having potential adverse impacts on special-status bird populations or there are other special circumstances. Such monitoring will be designed to address specific concerns that are identified after review of the data.

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Appendix A. Summary of Statistical Simulations for Experimental Design from California Valley Solar Ranch (CVSR)

Recent statistical power and precision analyses conducted for another solar project being built roughly 193 km (120 miles) north of the Project site provides some guidance for developing a spatial sampling regime (TerraStat Consulting Group 2013). These simulations were based on projected sampling across an entire 392-MW solar thermal facility, so the results may not accurately reflect the expectation at facilities of different sizes or where sampling is constrained to smaller portions of a large facility; nevertheless, the general guidance they provide is useful. The simulation analyses were parameterized based on several wind-energy studies conducted in the Mojave Desert, and incorporated one of several well-studied mathematical approaches for estimating fatality rates adjusted for proportion of area sampled, search interval, searcher efficiency, and carcass persistence (Shoenfeld 2004). The power analyses assessed the effect of varying the proportion of area sampled from 1% to 30%, using search intervals of seven, 21, and 25 days, and simulating four hypothetical mortality rates (0.5, 1.0, 5.0, and 10 fatalities/MW/year), assuming exponentially distributed carcass removal rates with means of 7.4 or 21.8 days and searcher efficiencies of 0.55 and 0.69 for small and large birds, respectively. The simulation results indicated that the 90% CI for the facility-wide fatality estimate narrowed as the survey area increased, as the search interval decreased, and as the simulated mortality rate increased. The CV ($100\% \times$) provides a way to evaluate the relative amount of imprecision in an estimate. The CV is useful because it doesn't depend on the size of the estimate and so can be compared between large and small estimates. Larger values of CV are associated with estimates that are less precise: a CV of 100% indicates an estimate with a standard deviation that is equal to the mean. At all of the simulated mortality rates, and based on a 21-day search interval, the CV for the fatality estimates approached an asymptote once the proportion of area searched reached about 20%. In addition, at the 20% sample level, the CV for the fatality estimates was less than 25% for mortality rates that exceeded 1.0 fatality/MW/year. This level of precision generally is considered adequate for answering the primary questions of interest in such fatality studies (Strickland et al. 2011), and is consistent with guidance from the USFWS Land-Based Wind Energy Guidelines (2012), which states that "the carcass searching protocol should be adequate to answer applicable Tier 4 questions at an appropriate level of precision to make *general* conclusions about the project*, and is not intended to provide highly precise measurements of fatalities*" (p. 45; emphasis added). At the lowest simulated mortality rate, with a 21-day search interval, the CV was above 50% at 20% of area sampled, which would be considered a marginal precision level for answering the questions of interest. From a practical standpoint, the importance of precision is diminished if impacts are low. For example, if the take estimate is 0.1 bird per year with 200% CV, this suggests a 90% CI of about (0, 0.4), or a range of less than half a bird per year. On the other hand, if the take estimate is 100 birds per year and the CV is 20%, the 90% CI is (61, 139), or a range of 78 birds per year.

At the lower simulated mortality rates, increasing the proportion of area sampled from 20% to 30% had less impact on the precision compared to decreasing the search interval from 21 days to seven days. For the two highest simulated mortality rates, however, varying the search interval had less effect on the precision of the adjusted fatality estimates, whether based on 20% or 30% of area sampled, with the CVs remaining between about 8% - 19%. At the 1.0 fatality/MW/year mortality rate with 20% of the area sampled, the CV increased from about 25% with a 7-day search interval to about 40% with a 21-day search interval. At the 0.5

fatalities/MW/year mortality rate with 20% of the area sampled, the relevant change in the CV was from 37% to 57%.

Analysis of data from the CVSR in San Luis Obispo County, California (H.T. Harvey and Associates 2014) corroborates the simulation results. The CVSR is a recently completed 250-MW facility comprising nine discrete photovoltaic solar arrays, which collectively cover approximately 642 ha (1,586 acres) of primarily degraded annual grassland. Beginning in fall 2012, 100% of two arrays were surveyed weekly for bird and bat fatalities using 50-ft (15-m) transects for large birds and 20-ft (6.1-m) transects for bats and small birds. A total of 175 avian fatalities were found during standardized surveys in the two arrays over 10 months. The Huso (2010) estimator was used to estimate the number of fatalities based on documented fatalities adjusted for searcher efficiency and carcass persistence.

Two methods were used to evaluate the potential effects of reduced search area on fatality estimates at CVSR. Spatial clustering of fatalities was evaluated using Global Moran's I index, which indicates whether objects are clumped, uniform, or random in their spatial distribution (ESRI ArcInfo 10.0, geographic statistical toolbox). Spatial clumping of fatalities within the individual arrays would introduce additional uncertainty into the fatality estimates if sampling covered considerably less than 100% of the survey area. The second method involved resampling the observed fatality data to generate distributions of fatality estimates that would have resulted from searching less than 100% of the study area. Sample sizes varied from one sample unit up to the total number of sample units in the study area (180). At CVSR, a sample unit was one "tracker unit," a group of 18 rows of solar panels covering approximately 0.34 ha (0.85 acres). For each sample size, 2,000 simulated datasets were generated from the original data. Then, for each simulated dataset, the total number of fatalities for the study area was calculated by scaling the sample count according to the proportion of area represented in the sample. This procedure resulted in a distribution of possible fatality estimates for each level of area sampled. Based on these distributions, means, 90% CIs, and CVs were calculated for each sample size to evaluate the effect of sampling variation on the magnitude and precision of the fatality estimates.

The geospatial analysis indicated that the distribution of fatalities in the two, 100% searched arrays did not differ significantly from a random distribution (H.T. Harvey and Associates 2014). Results of the resampling analysis indicated that the mean fatality estimates and the 90% CIs for those estimates stabilized at about 20% of area sampled (Figure 1). Examined in a different way, the results indicated that the CVs of the sample distributions declined with increasing sample size and that, again beyond about 20% of area sampled, further increases in area sampled resulted in only small increases in precision (Figure 2). Moreover, at the 20% sample level, the CV for the fatality estimates was well below 20%, which is a level of precision that is considered adequate for answering the primary questions of interest in such fatality studies (Strickland et al. 2011, USFWS 2012). With regard to applying these results to other sites, it is important to note that the results may be sensitive to: 1) the relative proportions of large and small birds represented in the fatality sample, which were combined for this analysis; 2) the number and distribution of fatalities across the site; and 3) the influence of variation in searcher efficiency and carcass persistence.

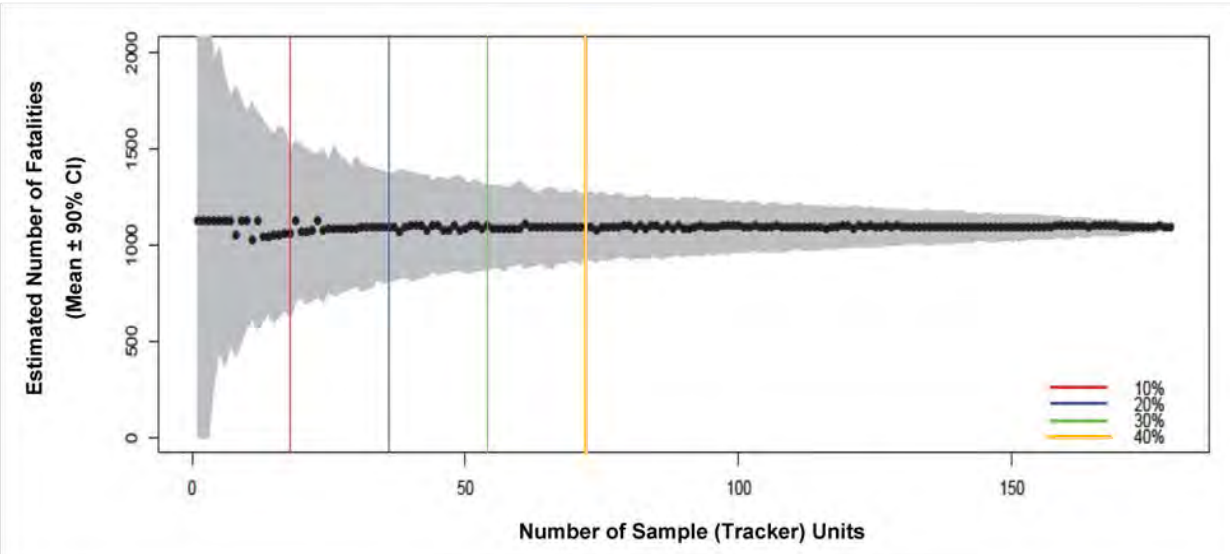

Figure 1. Resampling results from the California Valley Solar Ranch illustrating how the accuracy and precision of fatality estimates and varies with proportion of area sampled.

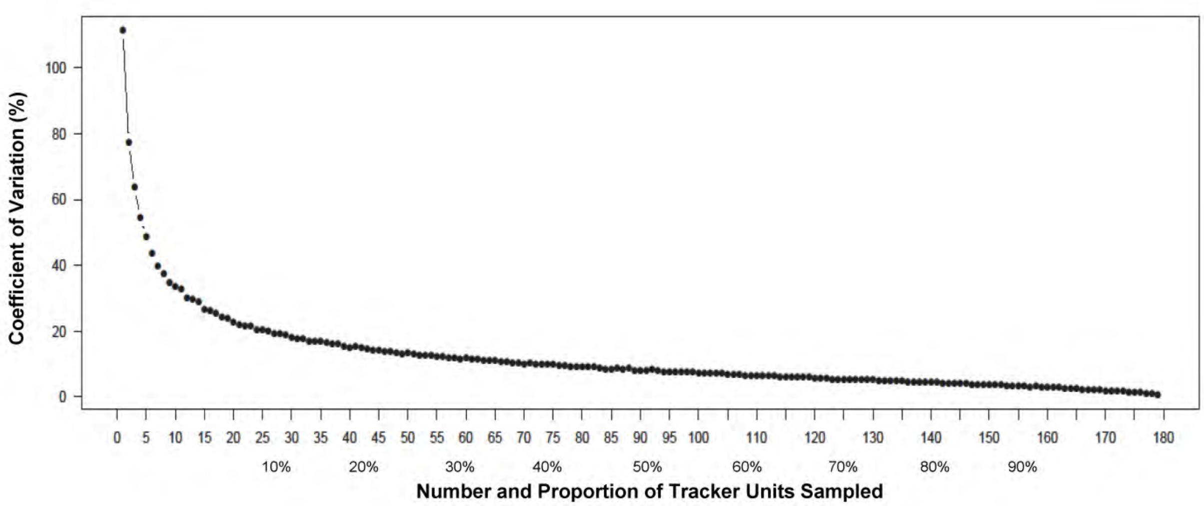

Figure 2. Resampling results from the California Valley Solar Ranch illustrating how the coefficient of variation for fatality estimates varies with proportion of area sampled.