U.S. Fish and Wildlife Service

Finding of No Significant Impact

for the Issuance of an Eagle Take Permit for California Flats Solar Project

California

Prepared by:
U.S. Fish and Wildlife Service, Pacific Southwest Region
Division of Migratory Bird Management
U.S. Department of the Interior
2800 Cottage Way, W-2606, Sacramento, CA 95825
Contact: Tracy Borneman, tracy_borneman@fws.gov, 916-414-6571

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Introduction

The U.S. Fish and Wildlife Service (Service) received an application from California Flats Solar, LLC (Applicant), an affiliate of Capital Dynamics, Inc., requesting eagle take coverage under the Bald and Golden Eagle Protection Act (Eagle Act) (16 U.S.C. §§ 668–668d and 50 Code of Federal Regulations [CFR] § 22.26) for incidental take of eagles at the California Flats Solar Project (Project). The Project is a 282.5-megawatt alternating current photovoltaic solar power facility on approximately 3,000 acres in unincorporated southeastern Monterey County, California that recently began full commercial operations in March 2019. The Applicant requested a 30-year incidental eagle take permit (permit) for the reoccurring loss of breeding productivity at two golden eagle (*Aquila chrysaetos*) territories in the vicinity of the Project due to disturbance from operational and maintenance activities at the facility and loss of habitat from land development by the Project. Issuance of a permit by the Service for take that is incidental to otherwise lawful activities under the Eagle Act constitutes a discretionary Federal action that is subject to the National Environmental Policy Act (NEPA; 42 United States Code [U.S.C.] §§ 4321–4347). In accordance with the NEPA, we prepared an Environmental Assessment (EA) analyzing the environmental consequences of issuing a permit for the take of golden eagles associated with the Project, as well as alternatives to this proposed action (Attachment 1). This EA assists the Service in ensuring compliance with the NEPA and in making a determination as to whether any "significant" impacts to the environment not previously analyzed under the Service's Programmatic Environmental Impact Statement for the Eagle Rule Revision, December 2016 (PEIS; USFWS 2016) could result from the analyzed actions, which would require preparation of an Environmental Impact Statement (EIS). "Significance" under NEPA is addressed by regulation 40 CFR § 1508.27, and requires short- and long-term consideration of both the context of a proposal and its intensity.

The Service's purpose in considering the proposed action of issuing an eagle incidental take permit is to fulfill our authority under the Eagle Act (16 U.S.C. §§ 668–668e) and its regulations (50 CFR § 22). Applicants whose otherwise lawful activities may result in take of eagles can apply for eagle incidental take permits so that their projects may proceed without potential violations of the Eagle Act. The Service may issue eagle take permits for eagle take that is associated with, but not the purpose of, an activity. Such permits can be issued by the Service when the take that is authorized is compatible with the Eagle Act preservation standard; it is necessary to protect an interest in a particular locality; and it is associated with, but not the purpose of, the activity; and it cannot be practicably avoided (50 CFR § 22 and 81 Federal Register [FR] 91494).

The need for this federal action is a decision on an eagle incidental take permit application from California Flats Solar, LLC that is in compliance with all applicable regulatory requirements set forth under the Eagle Act in 50 CFR § 22.

Proposed Action and Alternatives Considered

In the EA, the Service fully analyzed three potential courses of action, summarized below, to respond to the Applicant's request for an incidental eagle take permit.

Proposed Action

The Service proposed to issue a 30-year incidental eagle take permit, with associated conditions, to California Flats Solar, LLC for reoccurring loss of annual productivity from two golden eagle territories equating to 12.98 young fledged estimated lost from the eagle population. The permit would require implementation of all conservation measures and commitments described in the Eagle Management Plan (Appendix A of Attachment 1) the Applicant submitted with the permit application.

Alternative 1: No Action

Under the No-Action Alternative, the Service would take no further action on California Flats Solar, LLC's eagle take permit application.

Alternative 2: Issue permit without the additional mitigation of eagle habitat conservation

We would issue an incidental eagle take permit, as described in the Proposed Action, with all the same required conservation measures and mitigation except for one: the applicant would not provide the addition mitigation of implementing conservation measures to ensure the permanent preservation, management, and enhancement of golden eagle habitat within a 6,204-acre area located directly south of the Project. In all other ways, this alternative is the same as the Proposed Action.

Public Comment and Tribal Coordination

The Service published the draft EA on the Service's Pacific Southwest Region webpage[1] for a 30-day public comment period from August 29, 2019 to September 29, 2019. The Service received no comments on the draft EA.

To initiate consultation with Tribes regarding potential issuance of an eagle take permit, the Service sent letters to 16 federally-recognized tribal governments located within the vicinity of the

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[1] https://www.fws.gov/cno/conservation/MigratoryBirds/EaglePermits.html

Project. The Service received a written request, dated September 11, 2019, for Government to Government consultation in opposition to the proposed permit, as well as a 90-day extension to provide comments on the draft EA, from the Santa Ynez Band of Chumash Indians. After a phone call meeting with the Service on November 12, 2019 discussing details of the proposed permit, including the mitigation to fully offset the eagle take, the Santa Ynez Band of Chumash Indians concluded the Government to Government consultation and withdrew the Tribe's opposition to the permit and their request for a 90-day comment period extension in a letter dated November 12, 2019. Comments from Tribes were also encouraged and welcomed during the 30-day comment period on the EA. The Service received no comments on the draft EA from any Tribes.

Because no comments were received on the draft EA, only minor changes to enhance readability and clarity were made from the draft to final EA.

Selected Alternative

Based on review of the analyses detailed in the EA, the Service selected the Proposed Action of issuing a 30-year incidental eagle take permit to California Flats Solar, LLC for reoccurring loss of annual productivity from two golden eagle territories equating to 12.98 young fledged estimated lost from the eagle population with the requirement to implement all conservation measures and commitments described in the Applicant's Eagle Management Plan.

Take of golden eagles would occur in all alternatives, however the Proposed Action incorporates measures to avoid and minimize take of eagles, fully offsets the take with required compensatory mitigation, and includes long-term eagle monitoring, none of which would not occur under the No-Action Alternative. The Proposed Action also provides additional mitigation to implement conservation measures to maintain habitat for eagles on land south of the Project that would address concerns of cumulative effects detrimental to the local area population of eagles around the project, which is not addressed in Alternative 2.

The Proposed Action is consistent with the purpose and need for this Federal action and is in compliance with all statutory (16 U.S.C. §§ 668) and regulatory requirements (50 CFR § 22.26 and 50 CFR § 13.21), including the criteria codified for permit issuance (50 CFR § 22.26(f)).

Significance Criteria

Regulations of the NEPA define significance criteria for consideration by federal agencies (40 CFR § 1508.27). Below we examine these criteria for the selected Proposed Action.

Context

NEPA requires consideration of the significance of an action in several contexts, such as society as a whole (human, national), the affected region, the affected interests, and the locality.

Significance varies with the setting of the proposed action. For instance, in the case of a site-specific action, significance would usually depend on the effects in the locale rather than in the world as a whole. Both short- and long-term effects are relevant in accordance with 40 CFR 1508.27(a). For purposes of analyzing the Proposed Action, the appropriate context for potential impacts associated with the Proposed Action is local and regional, because the Proposed Action does not affect statewide or national resource values. The context of the Selected Alternative points to no significant environmental impact considering the following (as discussed in the EA):

- The Applicant will offset golden eagle take through compensatory mitigation. This will ensure that the impacts of issuing an eagle take permit on the local and regional golden eagle populations will be less than significant.
- Bald eagles and migratory birds may benefit from reduced electrocution risk due to the power pole retrofitting to be done for the eagle take permit.
- Authorizing incidental eagle take is not expected to have effects to species protected by the Endangered Species Act (ESA) at the Project facility. As described in the EA, the Service will evaluate the proposed mitigation site once the location is selected. The Service anticipates that adverse effects to species listed under the ESA would be avoidable, however if there is potential for impacts to species listed under the ESA, we would conduct an additional NEPA analysis.

Intensity

The term "intensity" refers to the severity of a proposed action's impact on the environment. In determining the intensity of an impact, the NEPA regulations direct federal agencies to consider ten specific factors, each of which is discussed below in relation to the Selected Alternative for the Project.

1)Impacts can be both beneficial and adverse and a significant effect may exist regardless of the perceived balance of effects.

While consideration of the intensity of Project impacts must include analysis of both beneficial and adverse effects, only a significant adverse effect triggers the need to prepare an EIS (40 CFR 1508.27). The potential beneficial effects and adverse impacts of the Proposed Action are discussed briefly below.

Beneficial Effects. As described in the EA, the Proposed Action includes power pole retrofitting as mitigation for take of eagles. Such retrofits are anticipated to protect eagles from electrocution. As the number of retrofits to be done for mitigation is calculated at a 1.2 to 1 ratio, these avoided eagle electrocutions will more than offset Project-related take of eagles, thereby benefiting the eagle population as a whole. Pole retrofits are also expected to benefit other raptors that may be susceptible to electrocution. Furthermore, the long-term monitoring of eagle territories will support the Service's understanding of impacts from solar facility operation and land development in eagle nesting habitat.

Adverse Effects. As described in the EA, under the Proposed Action the Applicant would implement conservation measures to avoid or minimize the risk to eagles. However, reoccurring loss of breeding productivity at two golden eagle territories in the vicinity of the Project may occur due to disturbance from operational and maintenance activities at the facility and loss of habitat from land development by the Project. Under the Proposed Action, these adverse impacts would be fully mitigated.

2) The degree to which the selected alternative will affect public health or safety.

The Proposed Action would include mitigating eagle take by retrofitting power poles to prevent eagle electrocutions. As eagle and other raptor electrocutions on power poles can start fires, decreasing eagle and other raptor electrocutions could benefit human safety by reducing fire risk.

3) Unique characteristics of the geographic area such as proximity to historic or cultural resources, park lands, prime farm lands, wetlands, wilderness, wild and scenic rivers, or ecologically critical areas.

The Service only evaluated whether or not to issue an eagle take permit to the Applicant at an operational solar facility, therefore only potential impacts to eagles and effects of eagle take on cultural practices were considered in the EA analyses. Thus, the Service concluded the Proposed Action of issuing an eagle take permit to an existing operational facility would not impact unique characteristics of the geographic area.

4) The degree to which the effects on the quality of the human environment are likely to be highly controversial.

No effects of the Proposed Action were identified as highly controversial. As a factor for determining within the meaning of 40 CFR 1508.27(b)(4) whether to prepare a detailed EIS, controversy is not equated with the existence of opposition to a use. The NEPA implementation regulations (43 CFR 46.30) define controversial as "circumstances where a substantial dispute exists as to the environmental consequences of the proposed action and does not refer to the existence of opposition to a proposed action, the effect of which is relatively undisputed." No comments were provided on the draft EA.

5) The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.

The Eagle Management Plan prepared by the Applicant provides information on the eagles in the Project vicinity, reducing uncertainty in understanding Project impacts to eagles. Golden eagle use of the Project area was assessed during pre-construction use surveys and nest surveys, with continued eagle nest surveys and monitoring (to various degrees), conducted annually from 2013 to 2018. This surveying and monitoring provides certainty in our assessment of the risk to eagles from the Project. Long-term monitoring required under the Proposed Action would also increase certainty in the risks to eagles.

6) The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration.

Issuance of an eagle take permit for the Project does not set precedent for, or automatically apply, to other eagle take permit applications the Service is reviewing or could review in the future. Each permit request will be evaluated on a case-by-case basis. Therefore, the Proposed Action does not establish precedents for future actions or represent a decision in principle about a future action. Moreover, this Project will not limit the Service's discretion when processing future eagle take permit applications under the Eagle Act's permitting regulations.

7) Whether the action is related to other actions with individually insignificant but cumulatively significant impacts--which include connected actions regardless of land ownership.

The EA analyzes cumulative effects on golden eagles as required by NEPA (40 CFR 1508.8) and the Eagle Act's permitting regulations (50 CFR 22). Under 50 CFR 22.26, when reviewing a permit application, the Service is required to evaluate and consider effects of take permits on eagle populations at three scales: (1) the eagle management unit/bird conservation region, (2) local area, and (3) Project area. Our evaluation also considers cumulative effects. We incorporated data provided by the Applicant, our own data on permitted take and other documented eagle mortalities, and additional available information on population-limiting effects, in determining cumulative impacts to golden eagles. Although the Service did find evidence for the potential for cumulative effects of eagle take at the Project and local scales, in the Proposed Action the Applicant would address this by implementing conservation measures, as additional mitigation, to ensure the permanent preservation, management, and enhancement of golden eagle habitat within a 6,204-acre area located directly south of the Project. Therefore, there are no significant adverse cumulative effects contributed under the Proposed Action.

8. The degree to which the action may adversely affect districts, sites, highways, structures, or other objects listed in or eligible for listing in the National Register of Historic Places or may cause loss or destruction of significant scientific, cultural, or historical resources.

Eagles and their feathers are revered and considered sacred in many Native American traditions. Operation of the Project, including the take of eagles, is not expected to interfere with cultural practices and ceremonies related to eagles or to affect Native Americans' ability to obtain or use eagle feathers. Moreover, eagle feathers that are found will be sent to our repository and, if in good condition, will be made available for these practices. Therefore, we do not anticipate any adverse effect on cultural practices.

9. The degree to which the action may adversely affect an endangered or threatened species or its habitat that has been determined to be critical under the Endangered Species Act of 1973, or the degree to which the action may adversely affect a species proposed to be listed as endangered or threatened or proposed critical habitat.

Because the golden eagle is not a federally listed species, issuance of an eagle take permit will not adversely affect an endangered or threatened species or its habitat. While retrofitting power poles will likely benefit other raptor species, none of these species is protected under the ESA. Because the Project is operational, construction-related impacts on federally listed species have already occurred and been mitigated.

10. Whether the action threatens a violation of federal, state, or local law requirements imposed for the protection of the environment.

The Proposed Action will not violate any federal, state, or local law.

Finding of No Significant Impact

The Service's Migratory Bird Program concludes from the analysis conducted in the EA and the information provided above that the Proposed Action would not trigger significant impacts on the environment based on criteria established by regulations, policy, and analysis. Analyses of impacts were conducted at the Project, local, and Regional scales, and direct, indirect, and cumulative effects were assessed. The selected Proposed Action, unlike the No Action Alternative and Alternative 2, is unlikely to have significant impacts on eagles because there is no unmitigated take of eagles, cumulative effects are addressed, and the Proposed Action meets the Eagle Act's preservation standard (16 U.S.C. §§ 668a, 50 CFR § 22.3) and all regulatory requirements (50 CFR § 22.26).

Based on the findings discussed herein, we conclude that the Proposed Action is not a major Federal action and will result in no significant impacts to the environment, individually or cumulatively with other actions in the general area. This determination is based on the rationale that the significance criteria, as defined by the CEQ (40 CFR § 1508.27) have not been met. "Significantly" as used in NEPA requires considerations of both context and intensity. No environmental effects meet the definition of significance in context or intensity as defined in 40 CFR § 1508.27. Therefore, preparation of an EIS to further analyze possible effects is not required pursuant to Section 102(2)(c) of NEPA, and our environmental review under NEPA is concluded with this finding of no significant impact.

Chief, Migratory Bird Program
Pacific Southwest Region
U.S. Fish and Wildlife Service

References

16 United States Code (U.S.C.) § 668. Title 16 - Conservation; Chapter 5a - Protection and Conservation of Wildlife; Subchapter II - Protection of Bald and Golden Eagles; Section (§) 668 - Bald and Golden Eagles. Available online: http://uscode.house.gov

40 Code of Federal Regulations (CFR) § 1508.27. Title 40 - Protection of Environment; Chapter V - Council on Environmental Quality; Part 1508 - Terminology and Index; Section (§) 1508.27 - Significantly. Available online: https://www.ecfr.gov

42 United States Code (U.S.C.) §§ 4321-4347. Title 42 - the Public Health and Welfare; Chapter 55 - National Environmental Policy; Subchapters I (Policies and Goals) and II (Council on Environmental Quality); Sections (§§) 4321-4347. Available online: http://uscode.house.gov

43 Code of Federal Regulations (CFR) 46. 2008. Title 43 - Public Lands: Interior; Part 46 - Implementation of the National Environmental Policy Act of 1969. 43 CFR 46. [73 Federal Register (FR) 61314, October 15, 2008, unless otherwise noted.]. Available online: http://www.gpo.gov/fdsys/pkg/ CFR-2011-title43-vol1/pdf/CFR-2011-title43-vol1-part46.pdf

50 Code of Federal Regulations (CFR) § 13.21. Title 50 - Wildlife and Fisheries; Chapter I - United States Fish and Wildlife Service, Department of the Interior; Subchapter B - Taking, Possession, Transportation, Sale, Purchase, Barter, Exportation, and Importation of Wildlife and Plants; Part 13 - General Permit Procedures; Section (§) 13.21 – Issuance of permits. Available online: https://www.ecfr.gov

50 Code of Federal Regulations (CFR) § 22. Title 50 - Wildlife and Fisheries; Chapter I - United States Fish and Wildlife Service, Department of the Interior; Subchapter B - Taking, Possession, Transportation, Sale, Purchase, Barter, Exportation, and Importation of Wildlife and Plants; Part 22 - Eagle Permits. Available online: https://www.ecfr.gov

81 Federal Register (FR) 91494. 2016. Eagle Permits; Revisions to Regulations for Eagle Incidental Take and Take of Eagle Nests. Vol. 81, No. 242. December 16, 2016. pp 91494-91554. Available online: https://www.federalregister.gov/

US Fish and Wildlife Service (USFWS). 2016. Programmatic Environmental Impact Statement for the Eagle Rule Revision. December 2016. Available online: https://www.fws.gov/migratorybirds/pdf/management/FINAL-PEIS-Permits-to-Incidentally-Take-Eagles.pdf

Attachment 1. Final Environmental Assessment for the Issuance of an Eagle Take Permit for California Flats Solar Project

U.S. Fish and Wildlife Service

Final Environmental Assessment

for the Issuance of an Eagle Take Permit for California Flats Solar Project

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California

Prepared by:

U.S. Fish and Wildlife Service, Pacific Southwest Region
Division of Migratory Bird Management
U.S. Department of the Interior
2800 Cottage Way, W-2606, Sacramento, CA 95825
Contact: Tracy Borneman, tracy_borneman@fws.gov, 916-414-6571

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Abbreviations

Applicant	California Flats Solar, LLC
BBCS	Bird and Bat Conservation Strategy
CFR	Code of Federal Regulations
EA	Environmental Assessment
Eagle Act	Bald and Golden Eagle Protection Act
EMP	Eagle Management Plan
EMU	Eagle Management Unit
ESA	Endangered Species Act
FR	Federal Register
LAP	Local Area Population
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
PEIS	Programmatic Environmental Impact Statement for the Eagle Rule Revision
Project	California Flats Solar Project
REA	Resource Equivalency Analysis
Service	United States Fish and Wildlife Service
U.S.C.	United States Code
USFWS	United States Fish and Wildlife Service

Introduction

This Environmental Assessment (EA) analyzes the environmental consequences, pursuant to the National Environmental Policy Act (NEPA; 42 United States Code [U.S.C.] §§ 4321–4347), of the U.S. Fish and Wildlife Service (Service) issuing an incidental eagle take permit (permit) for the take of golden eagles (*Aquila chrysaetos*) associated with the California Flats Solar Project (Project). The applicant for the permit, California Flats Solar, LLC (Applicant), an affiliate of Capital Dynamics, Inc., is requesting eagle take coverage under the Bald and Golden Eagle Protection Act (Eagle Act) (16 U.S.C. §§ 668–668d and 50 Code of Federal Regulations [CFR] § 22.26) for operational and maintenance activities associated with the Project. Issuance of an eagle incidental take permit by the Service for take that is incidental to otherwise lawful activities under the Eagle Act constitutes a discretionary Federal action that is subject to the NEPA. This EA assists the Service in ensuring compliance with the NEPA and in making a determination as to whether any "significant" impacts to the environment not previously analyzed under the Service's Programmatic Environmental Impact Statement for the Eagle Rule Revision, December 2016 (PEIS; USFWS 2016a) could result from the analyzed actions, which would require preparation of an Environmental Impact Statement. This EA evaluates the effects of the Service's proposed action to issue an eagle incidental take permit to the Applicant, as well as alternatives to this action.

The Eagle Act authorizes the Service to issue eagle take permits only when the take is compatible with the preservation of each eagle species (known as the Eagle Act's "preservation standard"), which is defined in regulations as "consistent with the goals of maintaining stable or increasing breeding populations in all eagle management units and the persistence of local populations throughout the geographic range of each species" (50 CFR § 22.3).

The Applicant has requested a 30-year incidental eagle take permit for the reoccurring loss of breeding productivity at two golden eagle territories in the vicinity of the Project due to disturbance from operational and maintenance activities at the facility and loss of habitat from land development by the Project. The Applicant's Eagle Management Plan (EMP; Appendix A) is the foundation of the permit application for the Project and details efforts made to avoid or minimize impacts to golden eagles and plans for compensatory mitigation to offset the potential take.

This EA evaluates whether issuance of the permit will have significant impacts on the existing human environment, beyond those previously analyzed in the PEIS. "Significance" under NEPA is addressed by regulation 40 CFR § 1508.27, and requires short- and long-term consideration of both the context of a proposal and its intensity.

This proposal conforms with, and carries out, the management approach analyzed in, and adopted subsequent to, the Service's PEIS. Accordingly, this EA tiers from the PEIS. Project-specific information not considered in the PEIS will be considered in this EA as described below.

Purpose and Need

The Service's purpose in considering the proposed action is to fulfill our authority under the Eagle Act (16 U.S.C. §§ 668–668e) and its regulations (50 CFR § 22). Applicants whose otherwise lawful activities may result in take of eagles can apply for eagle incidental take permits so that their projects may proceed without potential violations of the Eagle Act. The Service may issue eagle take permits for eagle take that is associated with, but not the purpose of, an activity. Such permits can be issued by the Service when the take that is authorized is compatible with the Eagle Act preservation standard; it is necessary to protect an interest in a particular locality; and it is associated with, but not the purpose of, the activity; and it cannot be practicably avoided (50 CFR § 22 and 81 Federal Register [FR] 91494).

The need for this federal action is a decision on an eagle incidental take permit application from California Flats Solar, LLC that is in compliance with all applicable regulatory requirements set forth under the Eagle Act in 50 CFR § 22.

Authorities

Service authorities are codified under multiple statutes that address management and conservation of natural resources from many perspectives, including, but not limited to the effects of land, water, and energy development on fish, wildlife, plants, and their habitats. This analysis is based on the Eagle Act (16 U.S.C. §§ 668–668e) and its regulations (50 CFR § 22). The PEIS has a full list of authorities that apply to this action (USFWS 2016a: Section 1.6, pages 7-12), which are incorporated by reference here.

Background

The Applicant has constructed a 282.5-megawatt alternating current photovoltaic solar power facility on approximately 3,000 acres in unincorporated southeastern Monterey County, California, with road access to the Project through the northeastern corner of San Luis Obispo County north of State Route 41 (Figure 1). The first phase of the Project was completed and began commercial operations in August 2017, and the second, and final, phase of the project began commercial operations in March 2019. The Project lies within the southern terminus of the Diablo mountain range with Cholame Valley to the west. The town of Parkfield and the city of Paso Robles lie approximately seven miles to the northwest and 25 miles to the southwest, respectively, from the project area. The region is sparsely populated and dominated by agriculture and ranching activities. The Project is located within a large cattle ranch, known as the "Jack Ranch", at elevations around 1,700 feet, with land use in the project footprint historically consisting of cattle grazing. The Project experiences substantial year-round sunlight, is located along an existing transmission line, and is part of a Competitive Renewable Energy Zone under California's Renewable Energy Transmission Initiative (County of Monterey 2014).

The landscape in the Project vicinity is dominated by gently rolling terrain and grasslands, surrounded by woodlands and shrublands where various trees, primarily oak trees, provide nest substrate suited to eagles and other raptors. Eagle use of the Project area was assessed prior to Project construction. Eagles were found to occupy the area year round, with confirmed nesting in multiple territories around the Project. Eagle nest surveys and monitoring has been conducted annually from 2013 to the present, however, monitoring effort and methods have varied. Information on eagles in the Project vicinity is elaborated on in the Affected Environment section below.

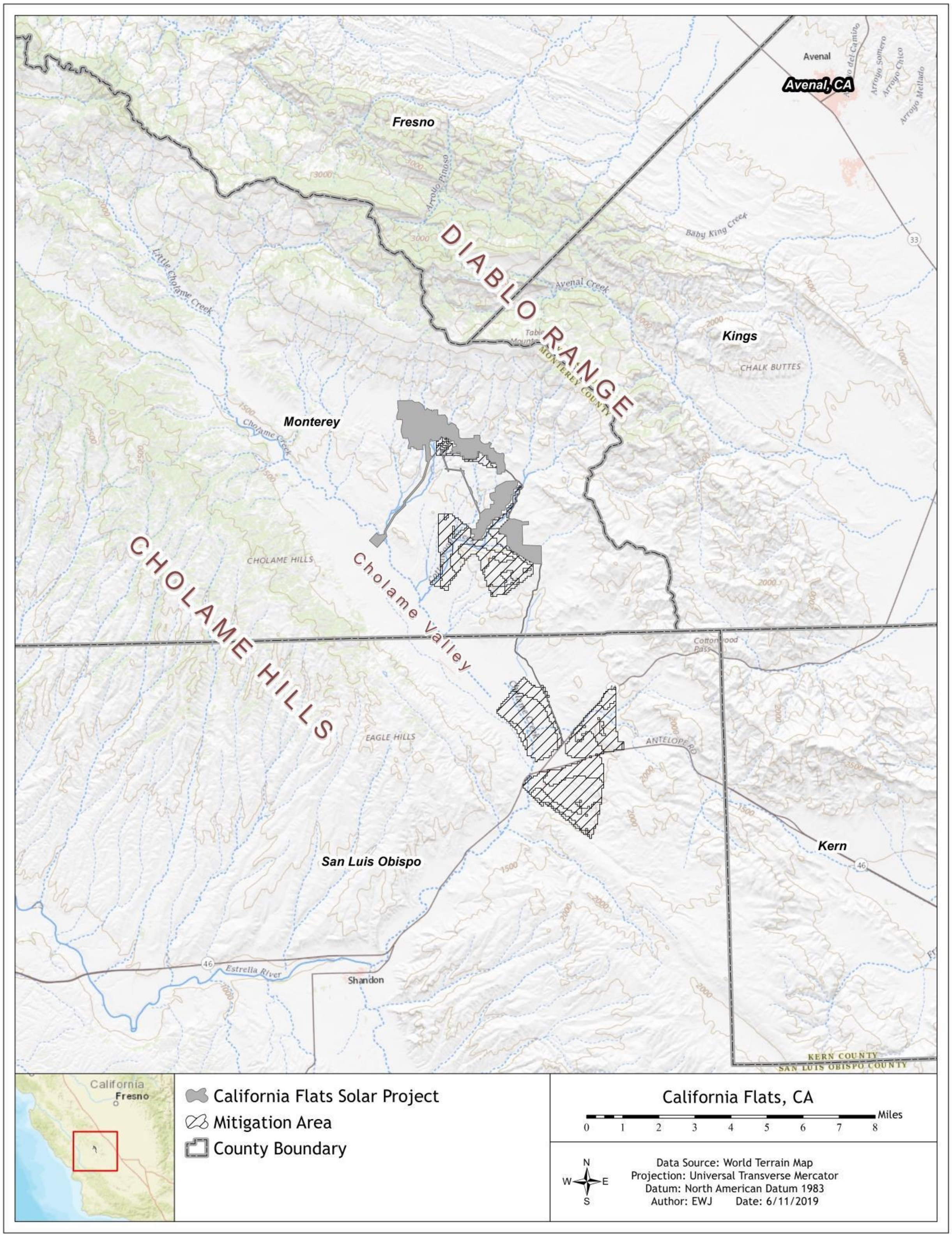

Figure 1. Vicinity map of the California Flats Solar Project.

Scoping, consultation and coordination

This EA incorporates by reference the scoping performed for the PEIS (USFWS 2016a: Chapter 6, page 175).

A draft of this EA, including the Applicant's EMP and other application materials, was made available to the public on the Service's Pacific Southwest Region webpage[1] for 30 days, from August 29, 2019 to September 30, 2019, to solicit public comments. The Service received no comments on the draft EA.

The Applicant worked closely with the Service throughout the development of the EMP in support of its application to avoid, minimize, and mitigate adverse effects on eagles.

Coordination with Tribal Governments

Tribal participation is an integral part of the NEPA and the National Historic Preservation Act (NHPA) process, as well as a key component of the Service's decision whether to issue an eagle take permit. The United States Army Corps of Engineers consulted with American Indian Tribes regarding construction of the Project as part of an analysis for NHPA compliance for their issuance of a Clean Water Act Section 404 permit. Cultural and religious concerns regarding eagles were analyzed in the PEIS, and tribal consultation already conducted for the PEIS is incorporated by reference into this EA. The PEIS identified tribal coordination as an important issue for subsequent analysis, given the cultural importance of eagles to the tribes. In accordance with Executive Order 13175, Consultation and Coordination with Tribal Governments (65 FR 67249), the NHPA Section 106 (36 CFR § 800) and the Service's Native American Policy, the Service consults with Native American tribal governments whenever our actions taken under the authority of the Eagle Act may affect tribal lands, resources, or the ability to self-govern. This coordination process is also intended to ensure compliance the American Indian Religious Freedom Act. To initiate consultation with Tribes regarding potential issuance of an eagle take permit, the Service sent letters to 16 federally-recognized tribal governments located within 109 miles (the natal dispersal distance of golden eagles thought to adequately define the local area population of the eagles) of the Project informing them of the received permit application and preparation of this EA and offering the opportunity for formal consultation regarding potential issuance of the permit. Comments from Tribes were also encouraged and welcomed during the 30-day public comment period on the EA. The Service received a written request, dated September 11, 2019, for Government to Government consultation in opposition to the proposed permit, as well as a 90-day extension to provide comments on the draft EA, from the Santa Ynez Band of Chumash Indians. Representatives of the Tribe and the Service communicated via phone on November 12, 2019 discussing details of the proposed permit, including avoidance and minimization measures, mitigation to fully offset the eagle take, and future monitoring of eagles in the vicinity of the Project. Based on the information discussed in that call, the Santa Ynez Band of Chumash Indians

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[1] https://www.fws.gov/cno/conservation/MigratoryBirds/EaglePermits.html

concluded the Government to Government consultation and withdrew the Tribe's opposition to the permit and their request for a 90-day comment period extension in a letter dated November 12, 2019. The Service received no comments on the draft EA from any Tribes.

Proposed Action and Alternatives

Proposed Action

We propose to issue a 30-year incidental eagle take permit, with associated conditions, to California Flats Solar, LLC for reoccurring loss of annual productivity from two golden eagle territories, as allowed by regulation ("Proposed Action"). The Service calculated the 80th quantile of the annual nesting-territory productivity (number of young fledged per occupied nesting territory) of golden eagles to be 0.59 (USFWS 2016b). We then debit that value for each year of the average generation time of the eagle species, which for golden eagles is 11 years (USFWS 2016b). Cumulatively, then, 6.49 young fledged per occupied nesting territory is debited from our take thresholds for reoccurring annual productivity loss of golden eagles. Therefore, for the proposed action of issuing an eagle take permit authorizing reoccurring loss of annual productivity from two golden eagle territories to this Project, 12.98 young fledged would be assumed to be lost from the eagle population.

The permit would require implementation of all conservation measures and commitments described in the EMP (Appendix A), summarized here and elaborated on throughout this EA:

Avoidance and Minimization Measures**:** The Applicant has described planned avoidance and minimization measures in their Low-Effect Habitat Conservation Plan (Althouse and Meade, Inc. 2016), their EMP (Appendix A) and their Bird and Bat Conservation Strategy (BBCS; Appendix B). These include several measures that should minimize impacts to golden eagles, including vehicle restrictions and speed limits; garbage abatement; limited rodenticide use; livestock carcass management; and employee awareness/training programs.

Compensatory Mitigation: The Applicant would provide compensatory mitigation to fully offset the reoccurring loss of productivity of two golden eagle territories (12.98 young fledged) during the 30-year permit term at a 1.2 to 1 ratio, as required in the Eagle Act regulations (81 FR 91494).

Additional Mitigation Measures: As part of the Applicant's mitigation strategy, the Applicant has agreed to implement conservation measures to ensure the permanent preservation, management, and enhancement of golden eagle habitat within a 6,204-acre area located directly south of the Project (Figure 1). These measures would maintain nesting and foraging habitat for golden eagles and help to increase overall golden eagle productivity rates. Grass will be managed at levels that support an abundance of eagle prey and rodenticide use will be prohibited as described in the Applicant's *Habitat Mitigation and Monitoring Plan* (California Flats Solar, LLC 2017b) and *Conservation Lands Grazing Management Plan* (California Flats Solar, LLC 2017a).

Monitoring: Per the Applicant's BBCS (Appendix B), eagle nest monitoring will be conducted the first two nesting seasons after commencement of operations and maintenance activities for the full 280-MW Project. The Applicant will also conduct monitoring of eagle nests near the Project in the year immediately prior to each 5-year review (i.e., years 4, 9, 14, 19, 24, and 29).

Adaptive Management: The Applicant would follow adaptive management measures described in the Applicant's EMP (Appendix A) and BBCS (Appendix B) and would work with the Service to review eagle monitoring data at five-year intervals.

Criteria for issuance of an eagle take permit are codified in 50 CFR § 22.26(f). California Flats Solar, LLC's application for an incidental eagle take permit meets all the regulatory issuance criteria and required determinations (50 CFR § 13.21 and 50 CFR § 22.26) for eagle take permits.

Alternative 1: No Action

Under the No-Action Alternative, the Service would take no further action on California Flats Solar, LLC's eagle take permit application. However, per regulations (50 CFR § 13.21), the Service must take action on the permit application, determining whether to deny or issue the permit. We consider this alternative because Service policy requires evaluation of a No-Action Alternative and it provides a clear comparison of any potential effects to the human environment from the Proposed Action.

The No-Action Alternative in this context analyzes predictable outcomes of the Service not issuing a permit. Under the No-Action Alternative, the Project would likely be operated without an eagle take permit being issued. Thus, for purposes of analyzing the No-Action Alternative, we assume that the Applicant will implement all measures required by other agencies and jurisdictions to conduct the activity at this site, as well as implementing measures contained in the Applicant's BBCS (Appendix B), but the conservation measures proposed in the eagle incidental take permit application package would not be required. The Project proponent may choose to implement some, none, or all of those conservation measures. Under this alternative, we assume that the Applicant will take some reasonable steps to avoid taking eagles, but the Project proponent will not be protected from enforcement for violating the Eagle Act should take of an eagle occur.

Alternative 2: Issue permit without the additional mitigation of eagle habitat conservation

We would issue an incidental eagle take permit, as described in the Proposed Action, with all the same required conservation measures and mitigation except for one: the applicant would not provide the addition mitigation of implementing conservation measures to ensure the permanent preservation, management, and enhancement of golden eagle habitat within a 6,204-acre area located directly south of the Project. In all other ways, this alternative is the same as the Proposed Action.

Other Alternatives Considered but Not Evaluated in this Environmental Assessment

The Service considered other alternatives based on communication with the Applicant but concluded that these alternatives did not meet the purpose and need underlying the action because they were not consistent with the Eagle Act and its regulations or did not adequately address the risk of take at the Project. Therefore, the Service did not assess the potential environmental impacts of those alternatives. Below is a summary of the alternatives considered but eliminated from further review.

Alternative 3: Deny Permit

Under this alternative, the Service would deny the permit application because the Applicant falls under one of the disqualifying factors and circumstances denoted in 50 CFR § 13.21, the application fails to meet all regulatory permit issuance criteria and required determinations listed in 50 CFR § 22.26.

Our permit issuance regulations at 50 CFR § 13.21(b) set forth a variety of circumstances that disqualify an applicant from obtaining a permit. None of the disqualifying factors or circumstances denoted in 50 CFR § 13.21 apply to California Flats Solar, LLC. We next considered whether the Applicant meets all issuance criteria for the type of permit being issued. For eagle incidental take permits, those issuance criteria are found in 50 CFR § 22.26(f). California Flats Solar, LLC's application meets all the regulatory issuance criteria and required determinations (50 CFR § 22.26) for eagle take permits.

When an applicant for an eagle incidental take permit is not disqualified under 50 CFR 13.21 and meets all the issuance criteria of 50 CFR § 22.26, denial of the permit is not a reasonable option. Therefore, this alternative—denial of the permit—was eliminated from further consideration.

Alternative 4: Issue Permit for Reoccurring Loss of Productivity at One Territory

The Applicant requested the Service consider the need for only authorizing take at a single golden eagle territory. However, the Service determined there was high enough risk to a second golden eagle territory as stated in the Proposed Action to necessitate take coverage for loss of productivity from two golden eagle pairs. Therefore, the alternative of only permitting for loss of productivity at one golden eagle territory was eliminated from further consideration.

Affected Environment

This section describes the current status of the environmental resources and values that may be affected by the proposed action and alternatives.

Golden Eagle

Golden eagle habitat in central California consists mainly of open grasslands and oak savanna interspersed with oak and shrub woodlands. The eagles in this area predominately nest in trees, utilizing nearby open areas for foraging on ground squirrels and jackrabbits. Golden eagle use of the Project area was assessed during pre-construction use surveys and nest surveys, with continued eagle nest surveys and monitoring (to various degrees), conducted annually from 2013 to 2018 (Appendix A). Golden eagle use was recorded during all seasons, but generally at higher rates during spring. Golden eagle nesting surveys conducted in 2013 identified at least 21, but possibly up to 33, golden eagle breeding territories within ten miles of the Project and potentially six golden eagle nests within one mile of the Project boundary (H.T. Harvey & Associates 2013). Continued monitoring indicated eight golden eagle nests within two miles of the Project, five of which were located within one mile of the Project (WEST 2014, WEST 2015, WEST 2017, WEST 2018; Appendix A, nests GE12A, GE13A, GE18A, GE19A, and GE20A; Figure 2). A sixth potential eagle nest located within one mile of the Project (H.T. Harvey & Associates 2013; Appendix A, nest GE28A; Figure 2) was never confirmed to be an eagle nest, was seen to be in disrepair in early surveys (WEST 2014), was absent during surveys in 2015 (WEST 2015), and has not been replaced as of present.

During construction of the Project, the Applicant applied for, and the Service issued, a permit for disturbance to nest GE19A in 2017 and permit for disturbance to nest GE13A in 2018 as construction activities occurred less than 1/2 mile from the nests. The loss of productivity due to disturbance at these nests was fully offset by compensatory mitigation.

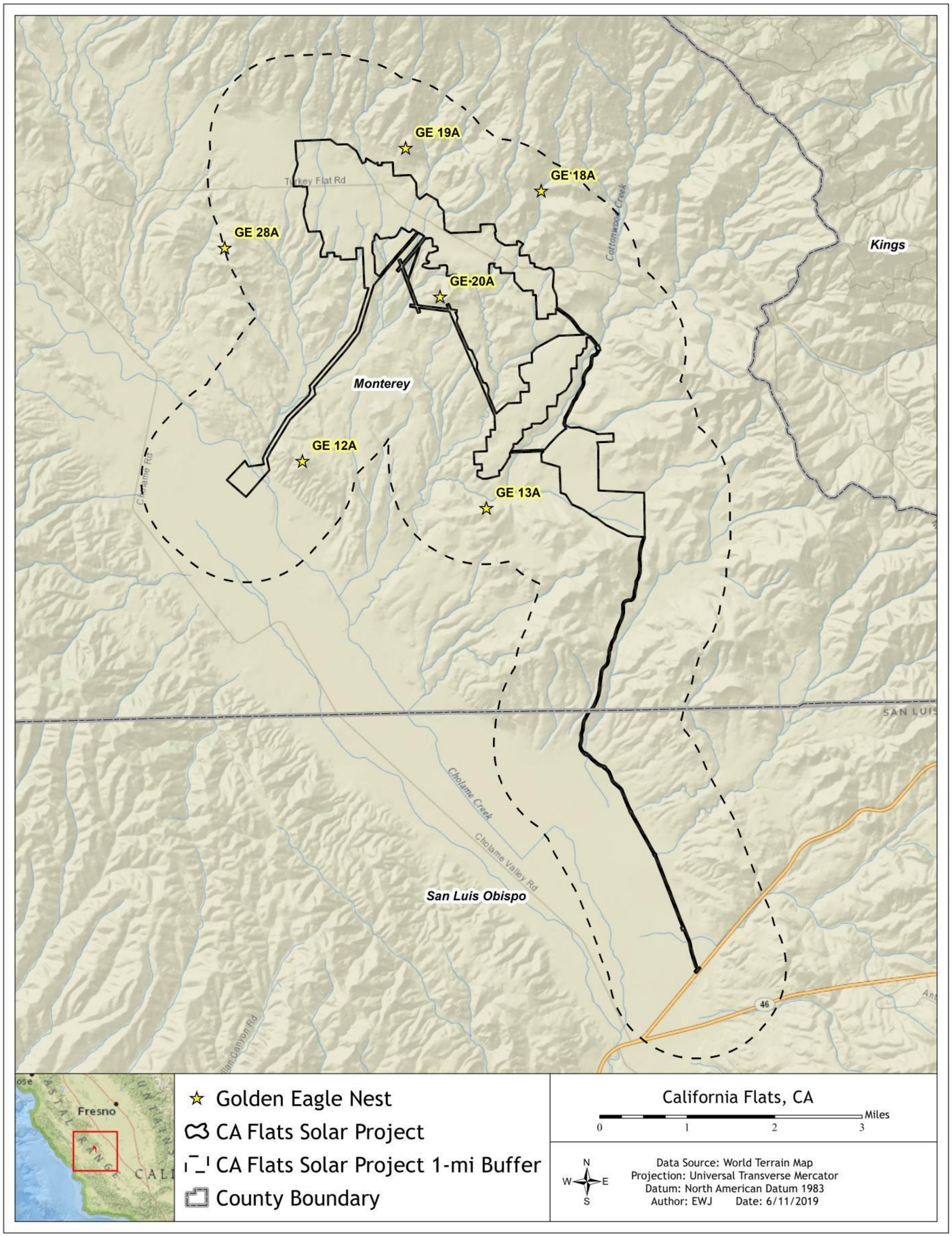

Figure 2. Golden eagle nests within one mile of the California Flats Solar Project.

Bald Eagles

Bald eagles (*Haliaeetus leucocephalus*) are known to occur in the region, but are not expected to be affected by operations and maintenance of the Project. Although bald eagles were observed during surveys surrounding the project, these observations were outside of the Project area (Mattson et al. 2015). Four bald eagle nests, thought to constitute three nesting territories, are known within ten miles of the Project (WEST 2015), however no bald eagle nests have been identified within two miles of the Project, therefore bald eagle disturbance and loss of bald eagle territories is not expected to result from land development and operations and maintenance of the Project.

Migratory Birds

Effects to migratory birds have been analyzed in the PEIS, and those analyses are incorporated by reference here. Avian species that may occur in the Project area are identified and described, along with conservation measures in the Project's BBCS (Appendix B).

Species Listed under the Endangered Species Act

Species listed under the Endangered Species Act of 1973, as amended (ESA; 16 U.S.C. §§ 1531-1544) are identified and described, along with conservation strategies in the Project's Low-Effect Habitat Conservation Plan (Althouse and Meade, Inc. 2016).

Although the Service's decision regarding an eagle take permit will not alter the physical footprint of the Project and therefore will not alter the Project impacts to federally threatened and endangered species in the Project area, under the Proposed Action, required compensatory mitigation in the form of retrofitting electric power poles to offset authorized take of golden eagles under an eagle take permit has the potential to cause effects to ESA-listed species in the area where retrofitting is completed.

Cultural and Socio-economic Interests

Bald and golden eagles are important symbols of U.S. history and sacred to many Native American cultures. Some Native American cultures utilize eagles, eagle feathers, and other eagle parts for religious practices and cultural ceremonies. Outside of rituals and practices, wild eagles as live beings are deeply important to many tribes (Lawrence 1990, as cited by USFWS 2016a). Numerous tribes confirmed the importance of wild eagles during scoping and tribal consultation for the PEIS. The Proposed Action or considered alternatives would not impact cultural or socioeconomic interests beyond the impacts already discussed in the PEIS. Therefore, cultural and socioeconomic interests will not be further analyzed in the EA.

Climate Change

Climate change was considered in the PEIS and is incorporated by reference here.

Environmental Consequences

This section summarizes the effects on the environment of implementing the proposed action or alternatives to the action. The discussion of overall effects to the environment of the eagle incidental take permit program is provided in the PEIS and is incorporated by reference here. This section of this EA analyzes only the effects that were not analyzed in the PEIS that may result from the issuance of an eagle incidental take permit for this specific project.

Proposed Action

In determining the significance of effects of the Project on eagles, we screened the proposed action of issuing a 30-year eagle take permit against the analysis provided in the PEIS and the Service's 2016 report, *Bald and Golden Eagles: Population demographics and estimation of sustainable take in the United States, 2016 update* (USFWS 2016b). We assessed Project effects to eagles at the project, local, and regional scales.

Golden Eagles

Direct and Indirect Effects

Five golden eagle nests (GE12A, GE13A, GE18A, GE19A, and GE20A; Figure 2; Appendix A), constituting five golden eagle territories, are located within one mile of the Project boundary (WEST 2014, WEST 2015, WEST 2017, WEST 2018) where the likelihood of disturbance from operations and maintenance activities at the Project and degradation and loss of foraging habitat from Project development is increased. Along with Project infrastructure covering foraging habitat, noise and the presence of humans and man-made infrastructure (such as that related to Project infrastructure, Project operations and maintenance vehicle traffic, ground disturbance associated with periodic maintenance activities such as occasional road repairs, and minor equipment staging that could be needed for module replacement) near an eagle nest may decrease foraging opportunities and efficiency, decrease the potential for territory occupancy, result in nest abandonment, or affect the likelihood of the eagles to successfully incubate or fledge young (Rosenfield et al. 2007, Scott 1985). The Project will not directly affect any eagle nesting trees.

Of the five golden eagle nests located within one mile of the Project boundary, we predict that effects to three will be minimal enough so as to not result in productivity or territory loss. Nest GE20A was infrequently occupied by eagles, had no nesting attempts, and the nest was in a state of disrepair during pre-construction and construction surveys from 2013-2018 (Appendix A). Nest GE12A lies within one mile of a utility corridor and historic ranch access road of the Project, but is over one mile away from the main facility perimeter. Nest 18A is 0.7 miles away from the Project boundary with terrain obscuring the view of and buffering noise from the Project.

The Service estimates that two golden eagle nesting territories (territories associated with nests GE13A and GE19A) are susceptible to continual loss of productivity and potential territory abandonment due to proximity of the Project and development of the Project on eagle foraging habitat. At an annual nesting-territory productivity (number of young fledged per occupied nesting territory) of 0.59 for golden eagles over the eleven year generation time of golden eagles (USFWS 2016b), the cumulative loss is estimated to be 6.49 young fledged per occupied nesting territory, or 12.98 young lost from two golden eagle territories.

The Proposed Action incorporates measures to minimize and avoid eagle take to the maximum degree practicable, as required by regulation. The proposed conservation measures are outlined in the Applicant's EMP (Appendix A) and BBCS (Appendix B) and include measures such as vehicle restrictions and speed limits, garbage abatement, limited rodenticide use, livestock carcass management, and employee awareness/training programs. Measures such as limiting non-routine operations and maintenance activities during the eagle breeding season around active nests not permitted for take, as well as use of biological monitors, if deemed necessary during the first two year of operations, to assess nesting eagles for signs of disturbance will also be used to avoid any additional take to eagles.

Along with implementing these minimization and avoidance measures, the Applicant would provide compensatory mitigation to offset the estimated take at a 1.2 to 1 ratio, as required in the Eagle Act regulations (81 FR 91494), by paying for retrofitting of electric power poles that are an electrocution risk to eagles. The 1.2 to 1 ratio for compensatory mitigation achieves a net benefit to golden eagle populations, ensuring that regional eagle populations are maintained consistent with the preservation standard of the Eagle Act despite indications of declines in golden eagle populations (USFWS 2016a). As this would fully offset the estimated take, as well as provide an additional net benefit to eagle populations, there would be no significant negative direct and indirect effects to eagle populations from issuing an eagle take permit under the Proposed Action.

The retrofitting of electric utility power poles can be used to offset authorized take of golden eagles. Electrocution from power poles is known to be a major cause of eagle mortality. Power poles can be retrofitted by verified methods (such as insulating or covering electrical components or modifying pole elements to increase the distance between electrical components) to reduce the risk of electrocution to eagles, with the maintenance and efficacy of retrofits confirmed through post-installation inspections and monitoring. The effects of retrofitting power poles has been quantified "per eagle", allowing use of a Resource Equivalency Analysis (REA) to calculate the number of power pole retrofits needed to offset the authorized take of golden eagles (USFWS 2013).

Utilizing the REA conducted for this Project and the 1.2 to 1 compensatory mitigation ratio required under the Eagle Act regulations, the Applicant would offset the take of 15.58 eagles (a 1.2 to 1 ratio of the estimated take of 12.98 eagles) at the Project by retrofitting 196-449 power poles (final pole number depends on the type and expected longevity of each retrofit) at an estimated cost of approximately $1,470,000. The Applicant would deposit funds estimated to cover the cost of the power pole retrofits into the Service's Pacific Southwest Region Bald and Golden Eagle Mitigation Account maintained by the National Fish and Wildlife Foundation (Appendix A). Deposited funds would then be used to pay a third party electric utility company to complete the required power pole retrofits.

Along with the benefit to eagles of reducing eagle mortalities by electrocution, retrofitting of power poles to prevent bird electrocutions also increases public safety by reducing the risk of wildfires. Bird electrocution events may ignite fires in the vegetation surrounding and below the site of electrocution, so decreasing electrocution risk also reduces the risk of fire.

Eagle Act regulations require compensatory mitigation to be sited in the same eagle management unit (EMU) in which the take occurs (50 CFR § 22.26(c)(1)(iii)(B)). The Service would coordinate with electric utility companies within the Pacific Flyway (the EMU within which this Project is located) to determine locations of power poles that are appropriate for retrofitting to prevent eagle electrocutions. The retrofits conducted as compensatory mitigation for the California Flats Solar, LLC's permit would not be duplicative of the utility company's other obligations to retrofit power poles, including addressing their own responsibilities to rectify eagle take caused by electrocutions and line collisions from their infrastructure. The site of power poles to be retrofitted within the Pacific Flyway has not yet been determined.

Under the Proposed Action, the Applicant would provide compensatory mitigation to fully offset the reoccurring loss of productivity of two golden eagle territories (12.98 young fledged) during the 30-year permit term at a 1.2 to 1 ratio. In addition, the 1.2 to 1 ratio also provides an additional net benefit to eagle populations. As the estimated take of golden eagles by this Project would be fully offset by compensatory mitigation provided by the Applicant, direct and indirect effects of issuance of an incidental eagle take permit on golden eagle populations would not be significant and are therefore compatible with the preservation of golden eagles.

Cumulative Effects

The purpose of this cumulative effects evaluation is to identify situations where the eagle take proposed under the Proposed Action combined with take from other present or foreseeable future actions and sources may be approaching levels that are biologically problematic. Effects of take may be cumulative at the project scale, at the local-area eagle population scale, and at the EMU scale.

At the project scale, the alteration of eagle habitat from Project development could cause eagle pair territory boundaries in the vicinity of the Project to shift, which could cause increased antagonistic interactions with surrounding eagle pairs, potentially creating a ripple-effect of impacts to eagles in areas surrounding the Project.

To ensure that eagle populations at the local scale are not depleted by cumulative take in the local area, the Service analyzed the amount of annual eagle take that can be authorized while still maintaining local area populations of eagles (USFWS 2016a). The local-area population (LAP) scale is defined for eagles as the median natal dispersal distance for the given species, which for golden eagles is a 109-mile radius (USFWS 2016a). The Service's analysis found that to maintain local area eagle populations, annual cumulative authorized take must not exceed five percent of a LAP unless the Service can demonstrate why allowing take to exceed that limit is still compatible with the preservation of eagles. The Service must also assess any available data to determine if there is any indication that unauthorized take (take that has not been permitted by the Service) in the LAP may exceed ten percent, as this is roughly the average background level of unpermitted take in local area populations of golden eagles (USFWS 2016a). The eagle incidental take permit regulations require the Service to conduct an individual LAP analysis for each permit application as part of our application review (50 CFR § 22.26(e)). We, therefore, considered cumulative effects to the eagle LAP surrounding the Project to evaluate whether the take to be authorized under this permit, together with other sources of permitted take and unpermitted eagle mortality, may be incompatible with the persistence of this LAP. We incorporated data provided by the Applicant, our data on other eagle take authorized and permitted by the Service, and other reliably documented unauthorized eagle mortalities to estimate cumulative impacts to the LAP. We conducted our LAP cumulative effects analysis as described in the Service's *Eagle Conservation Plan Guidance* (USFWS 2013).

Results from our LAP cumulative effects analysis are summarized in Appendix C. The LAP is estimated to be 245.98 eagles. The five percent benchmark for sustainable authorized take of the LAP is 12.3 eagles per year. Current authorized take in the LAP, which includes permitted take at three other projects, as well as the take estimated to occur at this Project, is 1.65 eagles or 0.67% per year. This is well below the five percent sustainable take benchmark determined by the Service to maintain the local area population of golden eagles. The Service does, however, have evidence that unauthorized take may exceed ten percent of the LAP. A summary of available data of unauthorized take is provided in Appendix C and suggests that unauthorized take of eagles in the LAP may be around 10.44% per year. Among other sources of unauthorized take, the Service is aware of several wind facilities in the vicinity of the LAP that are operational and likely to take eagles, but are not yet permitted for eagle take. Past take of eagles at these facilities is known to the Service and is included in the information analyzed as unauthorized eagle take. While additional future wind energy development and other activities may further increase eagle take in the LAP during the lifespan of this permit, the Service cannot reasonably predict the resulting impacts to eagles of such projects when important aspects, such as their size, location, configuration, and lifespan, are currently unknown. There is no reasonable basis to consider such speculative impacts in this EA.

As we have evidence that the unauthorized take in the LAP may be above the 10% average of unpermitted mortality of golden eagles, adding further permitted take could potentially cause declines in the local area population of golden eagles. However, our estimate of the unauthorized take in the Project LAP is not far above the average. Also, the cumulative permitted take is not only well below the 5% threshold, but is also below 1% of the LAP. Take at 1% of the LAP is the point at which the Service determined permitted take begins to be of concern (USFWS 2016a). Therefore, the potential for cumulative effects of take at the local scale exists, but is expected to be minimal.

To address potential cumulative impacts of take at the project and local scales, the Applicant has agreed to implement conservation measures to ensure the permanent preservation, management, and enhancement of golden eagle habitat within a 6,204-acre area located directly south of the

Project (Figure 1). This acreage has been encumbered with conservation easement deeds (one easement for land located in Monterey County and one easement for land located in San Luis Obispo County) to be managed in perpetuity for species conservation. Conservation management of the land is the responsibility of the land owner, Hearst Corporation, and conservation management and maintenance is funded by the Applicant (California Flats Solar, LLC 2017, California Flats Solar, LLC 2017b). The conservation measures implemented on the land would maintain nesting and foraging habitat for golden eagles in the LAP and help to increase overall golden eagle productivity rates. Grass will be managed at levels that support an abundance of eagle prey and rodenticide use will be prohibited as described in the Applicant's *Habitat Mitigation and Monitoring Plan* (California Flats Solar LLC 2017b) and *Conservation Lands Grazing Management Plan* (California Flats Solar LLC 2017a).

Finally, take of eagles also has the potential to affect the larger eagle population. Therefore, the Service defined regional EMUs and analyzed the cumulative effects of permitting take of golden eagles in combination with ongoing unauthorized sources of human-caused eagle mortality and other present or foreseeable future actions affecting golden eagle populations (USFWS 2016a). As part of the analysis, the Service determined sustainable limits to permitted take within each EMU. The take limit for all golden eagle EMUs was set to zero as golden eagle populations throughout the United States may be declining (USFWS 2016a). Therefore, any authorized take of golden eagles must be offset with compensatory mitigation at a mitigation ratio of 1.2 to 1 (81 FR 91494). The take that would be authorized under the Proposed Action would be offset by the compensatory mitigation that will be provided by the Applicant, as described above, so will not significantly impact the EMU eagle population. The avoidance and minimization measures that would be required under the permit, along with monitoring and adaptive management, are designed to further ensure that the permit is compatible with the preservation of the golden eagle at the regional EMU population scale.

As the estimated take of golden eagles by this Project, and the potential for the take to compound with other sources of eagle take to create cumulative effects, is either below Service-determined sustainable benchmarks or will be addressed by mitigation measures provided by the Applicant such as fully-offsetting compensatory mitigation and eagle habitat preservation, issuance of an incidental eagle take permit would cause no significant adverse cumulative effects on golden eagle populations and is compatible with the preservation of golden eagles.

Monitoring

Under the Proposed Action to issue an eagle take permit, monitoring of eagle nests and territories in the vicinity of the Project would occur. Initial monitoring would be conducted during each eagle breeding season for two years after Project operations have begun, determining occupancy of all eagle nesting territories within two miles of the Project footprint, as access allows (Appendix B). Additionally, monitoring to determine occupancy of all eagle nests and territories within two miles of the Project footprint, as access allows, would be conducted in the fourth year after issuance of the eagle take permit and every five years thereafter. Monitoring will be conducted by independent, third party monitors that report directly to the Service, as per regulatory requirements (50 CFR § 22.26(c)(7)(i)). The Service will review monitoring data at five year intervals, as per regulatory requirements (50 CFR § 22.26(c)(7)(iii)), to determine if eagles continue to occupy the area around the Project vicinity.

Adaptive Management

Under the Proposed Action, Service regulations (50 CFR § 22.26(c)(7)(iii)) would require the permittee to provide the Service with current site-specific eagle information every five years, which the Service would use to review permit compliance and to verify authorized take was not exceeded. As stated above, the permittee would be required to monitor all eagle nests and territories for occupancy within two miles of the Project footprint, as access allows, during the eagle breeding season of every year before the five-year reviews were conducted (i.e. the permittee would monitor during years 4, 9, 14, 19, and 24 after permit issuance). If monitoring results indicate that more than the two eagle pair nesting territories authorized for take under the Proposed Action are being affected by Project operations and maintenance activities, the Applicant shall work with the Service to revise the Project's EMP and implement additional measures to avoid and minimize impacts to additional eagle pairs and their nests.

Bald Eagles

Although take of bald eagles is not expected to occur at this project and take of bald eagles would not be permitted, bald eagles in the region may benefit from avoidance and minimization measures established to reduce the risk to golden eagles, as well as from compensatory mitigation actions provided to offset the take of golden eagles. No significant adverse effects are foreseen to bald eagles.

Migratory Birds

Project effects to migratory birds have been presented, along with conservation measures to address effects, in the Project's BBCS (Appendix B).

Issuance of an eagle take permit to the Project may also provide benefits to migratory birds. Power pole retrofits done as compensatory mitigation for the eagle take permit may minimize electrocution risk for raptors and other migratory birds, just as with eagles. Furthermore, the preservation, management, and enhancement of grassland habitats within a 6,204-acre area located directly south of the Project, which is included in the Applicant's mitigation strategy, may also result in benefits to migratory birds. Issuance of an incidental eagle take permit would cause no significant adverse effects to migratory bird populations.

Species Listed under the Endangered Species Act

The Applicant completed a Low-Effect Habitat Conservation Plan (Althouse and Meade, Inc. 2016), and the Service issued an Incidental Take Permit under Section 10(a)(1)(B) of the ESA (16 U.S.C. §§ 1531-1544) on July 10, 2017 addressing Project effects on threatened and endangered species listed under ESA. Although the Service's decision regarding an eagle take permit will not alter the physical footprint of the Project and therefore will not alter the Project impacts to federally threatened and endangered species in the Project area, under the Proposed Action, required compensatory mitigation in the form of retrofitting electric power poles (described above in environmental consequences to golden eagles section) to offset authorized take of golden eagles under an eagle take permit has the potential to cause effects to ESA-listed species. Section 7 of the ESA requires Federal agencies to consult to "insure that any action authorized, funded, or carried out" by them "is not likely to jeopardize the continued existence of any endangered species or threatened species or result in the destruction or adverse modification of [critical] habitat" (16 U.S.C. § 1536(a)(2)). As discussed above in the environmental consequences to golden eagles section of this document, the compensatory mitigation sites for retrofitting of power poles to offset any authorized eagle take under an eagle take permit have not yet been identified. Once the compensatory mitigation sites would be selected, the Service would conduct an internal Section 7 Consultation and further analyze and address potential effects to ESA-listed species at the location of the power poles that would be retrofitted. The Service anticipates that adverse effects to listed species would be avoidable by timing retrofits to avoid sensitive seasons, and/or through the use of other species-specific avoidance measures. However, if the determination of the Section 7 Consultation was that adverse effects were likely to occur to listed species, the Service would prepare additional NEPA documentation to supplement this EA.

Alternative 1: No Action

Golden Eagles

Even though we would take no action on the eagle take permit application under the No-Action Alternative, the Project has already been constructed and would likely operate without authorization for take of eagles. Should take of eagles occur under the No-Action Alternative, the Applicant would be in violation of the Eagle Act. Under this No-Action Alternative, although some eagle conservation measures and monitoring would occur at the Project as defined in the Project's BBCS (Appendix B), additional measures, monitoring, and adaptive management described in the EMP (Appendix A) and required under a permit would not be implemented to avoid or minimize risk to eagles. Therefore, the risk to eagles is expected to be higher under this alternative as compared to the Proposed Action. Furthermore, none of the impacts to golden eagles described above under the Proposed Action would be offset by compensatory mitigation if no action was taken on the application and an eagle take permit was not issued. Under this No-Action Alternative, direct impacts of the Project on the eagle population are anticipated to be unmitigated reoccurring loss of annual productivity from two golden eagle territories equating to 12.98 young fledged assumed to be lost from the eagle population.

This alternative does not meet the purpose and need for the action because, by regulation (50 CFR § 13.21), when in receipt of a completed application, the Service must either issue or deny a permit to the applicant. The No-Action Alternative also does not meet the purpose of and need for the action because it would result in the adverse, unmitigated effects to golden eagles described above, effects that are not compatible with the preservation of golden eagles.

Bald Eagles

The Applicant did not apply for take authorization for bald eagles, nor is take of bald eagles expected to occur at this Project. However, the No-Action Alternative would mean benefits that bald eagles might also incur from avoidance and minimization measures established under a golden eagle take permit to reduce the risk to golden eagles, as well as from compensatory mitigation actions provided to offset the take of golden eagles, would not occur.

Migratory Birds

Any incidental benefits to migratory birds from avoidance, minimization, and mitigations required under an eagle take permit would not be realized under the No-Action Alternative. The Applicant would implement conservation measures established in the Project's BBCS (Appendix B) regardless of whether or not an eagle take permit was issued.

Species Listed under the Endangered Species Act

The Applicant completed a Low-Effect Habitat Conservation Plan (Althouse and Meade, Inc. 2016), and the Service issued an Incidental Take Permit under Section 10(a)(1)(B) of the ESA (16 U.S.C. §§ 1531-1544) on July 10, 2017 addressing Project effects on threatened and endangered species listed under ESA. The Applicant would implement conservation measures established in the Project's Low-Effect Habitat Conservation Plan regardless of whether or not an eagle take permit was issued.

Alternative 2: Issue permit without additional mitigation of eagle habitat conservation

Environmental consequences of this alternative would be the same as the Proposed Action except that in this alternative conservation measures to maintain nesting and foraging habitat for golden eagles on land directly south of the Project would not occur. Therefore, in this alternative, the cumulative effects at the project and local scales described in the Proposed Action, i.e. increased antagonistic interactions between eagle pairs in the project vicinity and above average (greater than 10%) unauthorized take in the LAP, would not be addressed. Therefore these cumulative effects could cause unmitigated declines in the local eagle populations and would not be compatible with the preservation of eagles.

Comparison of Alternatives

The level of take is the same under all three alternatives. The only difference between the Proposed Action and Alternative 2 is the lack of additional mitigation to implement conservation measures to maintain habitat for eagles on land south of the Project. The primary differences between the Proposed Action and the No-Action Alternative are compensatory mitigation requirements to offset permitted take under the Proposed Action and the level of post-construction monitoring that would occur (Table 1). No compensatory mitigation would be required and decreased levels of nest monitoring would occur under the No-Action Alternative.

Unlike the No Action Alternative and Alternative 2, the Proposed Action is likely to have no significant impacts on eagles because there is no unmitigated take and the Proposed Action meets the Eagle Act's preservation standard (16 U.S.C. §§ 668a, 50 CFR § 22.3) and all regulatory requirements (50 CFR § 22.26).

Table 1. Comparison of the Proposed Action and other alternatives

	Proposed Action – Issue Permit	**Alternative 1: No Action**	**Alternative 2: Issue permit without eagle habitat conservation**
Eagle Take Levels	Reoccurring loss of annual productivity from two golden eagle territories, limited to the generation time of golden eagles (11 years), equating to 12.98 young fledged estimated lost from the eagle population	Reoccurring loss of annual productivity from two golden eagle territories, limited to the generation time of golden eagles (11 years), equating to 12.98 young fledged estimated lost from the eagle population	Reoccurring loss of annual productivity from two golden eagle territories, limited to the generation time of golden eagles (11 years), equating to 12.98 young fledged estimated lost from the eagle population
Avoidance and Minimization	Follows measures described in the Applicant's Bird and Bat Conservation Strategy and Eagle Management Plan.	Follows measures described in the Applicant's Bird and Bat Conservation Strategy.	Follows measures described in the Applicant's Bird and Bat Conservation Strategy and Eagle Management Plan.

	Proposed Action – Issue Permit	Alternative 1: No Action	Alternative 2: Issue permit without eagle habitat conservation
Compensatory Mitigation	Retrofitting power poles to offset the loss of 12.98 golden eagles over the 30-year permit term.	None	Retrofitting power poles to offset the loss of 12.98 golden eagles over the 30-year permit term.
Additional Mitigation	Preservation of a 6,204-acre area south of the Project with habitat managed to benefit golden eagles	Preservation of a 6,204-acre area south of the Project	Preservation of a 6,204-acre area south of the Project
Unmitigated Eagle Take	None	Reoccurring loss of annual productivity from two golden eagle territories, limited to the generation time of golden eagles (11 years), equating to 12.98 young fledged estimated lost from the eagle population	None
Unmitigated Cumulative Effects	None	Potential for declines in the local population due to cumulative effects of take	Potential for declines in the local population due to cumulative effects of take
Data Collection /Monitoring	Third party post-construction occupancy monitoring of eagle nests within one mile, and up to two miles as access allows, of the Project during the first two years after the Project goes into operation (as per the Project's BBCS) and during the year prior to each 5-year check-in (i.e., years 4, 9, 14, 19, 24, and 29)	Third party post-construction occupancy monitoring of eagle nests within one mile, and up to two miles as access allows, of the Project during the first two years after the Project goes into operation (as per the Project's BBCS)	Third party post-construction occupancy monitoring of eagle nests within one mile, and up to two miles as access allows, of the Project during the first two years after the Project goes into operation (as per the Project's BBCS) and during the year prior to each 5-year check-in (i.e., years 4, 9, 14, 19, 24, and 29)

	Proposed Action – Issue Permit	Alternative 1: No Action	Alternative 2: Issue permit without eagle habitat conservation
Adaptive Management	Follows measures described in the Applicant's Bird and Bat Conservation Strategy and Eagle Management Plan and works with the Service to review eagle monitoring data at five-year intervals	Follows measures described in the Applicant's Bird and Bat Conservation Strategy	Follows measures described in the Applicant's Bird and Bat Conservation Strategy and Eagle Management Plan and works with the Service to review eagle monitoring data at five-year intervals
Company Liability for Eagle Take	No (if in compliance with permit)	Yes	No (if in compliance with permit)
Meets Eagle Act Statutory and Regulatory Requirements	Yes	No	No, unmitigated cumulative effects would exceed Service thresholds and may be incompatible with the preservation of eagles

List of Preparers

Tracy Borneman, Migratory Bird Biologist

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Appendix A. California Flats Solar Project Eagle Management Plan

CALIFORNIA FLATS SOLAR PROJECT
Eagle Management Plan

Prepared for:

California Flats Solar, LLC

135 Main Street, 6th Floor
San Francisco, California 94105

Prepared by:

Todd Mattson and Eric Hallingstad
Western EcoSystems Technology, Inc.
7575 Golden Valley Road, Suite 350
Golden Valley, Minnesota 55427

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APPENDIX

1 INTRODUCTION

California Flats Solar, LLC (California Flats) is in the process of constructing and operating, and will eventually decommission, a 280-megawatt (MW) alternating current (AC) photovoltaic (PV) solar generating facility referred to as the California Flats Solar Project (Project) located in Monterey and San Luis Obispo counties, California. The U.S. Fish and Wildlife Service (USFWS) approved a Low-Effect Habitat Conservation Plan (LEHCP) and issued an Incidental Take Permit (ITP) for the Project on July 10, 2017, that provides coverage and outlines protection and mitigation measures for federally listed species during the operation and maintenance (O&M) of the Project (Althouse and Meade, Inc. 2016). In the course of discussions between California Flats and USFWS regarding voluntary nest buffers for golden eagles (*Aquila chrysaetos*) during Project construction, USFWS requested that California Flats apply for incidental take coverage to address potential impacts to golden eagles during Project O&M. Accordingly, this Eagle Management Plan (Plan) evaluates potential impacts and proposes additional conservation measures for golden eagles and provides support for incidental take coverage for golden eagles under an eagle-specific ITP for the Project (USFWS 2016b).

2 PROJECT BACKGROUND

The Project is located within an approximately 29,000-hectare (ha; 72,000-acre [ac]) private cattle ranch. The total developed footprint of the Project encompasses approximately 1,036 ha (2,562 ac; Figure 1). The Project comprises a 858-ha (2,120-ac) solar generating area (which includes solar arrays, electrical equipment, internal roadways, and fencing), two substations, an O&M facility, and approximately 24 ha (60 ac) of access roads. Additionally, the Project includes a switching station owned and operated by Pacific Gas and Electric Company (PG&E). Operations and maintenance activities at the PG&E switching station are not covered by the LEHCP and will not be covered by this Plan.

In addition to the Project footprint, the Plan Area includes a 2,510 ha (6,203 ac) compensatory mitigation area where golden eagle nesting and foraging habitat will be preserved for the duration of the Permit term (Figure 1). The Plan Area totals approximately 3,547 ha (8,765 ac) in southeastern Monterey and northern San Luis Obispo counties. The Plan Area is located within the Dark Hole, Cholame, and Cholame Valley U.S. Geological Survey 7.5-minute quadrangles and within Township 23S, Section 15E; Township 24S, Sections 15E and 16E; and Township 25S, Range 16E (Althouse and Meade, Inc. 2016). This Plan does not propose any changes to the Project or to the Plan Area.

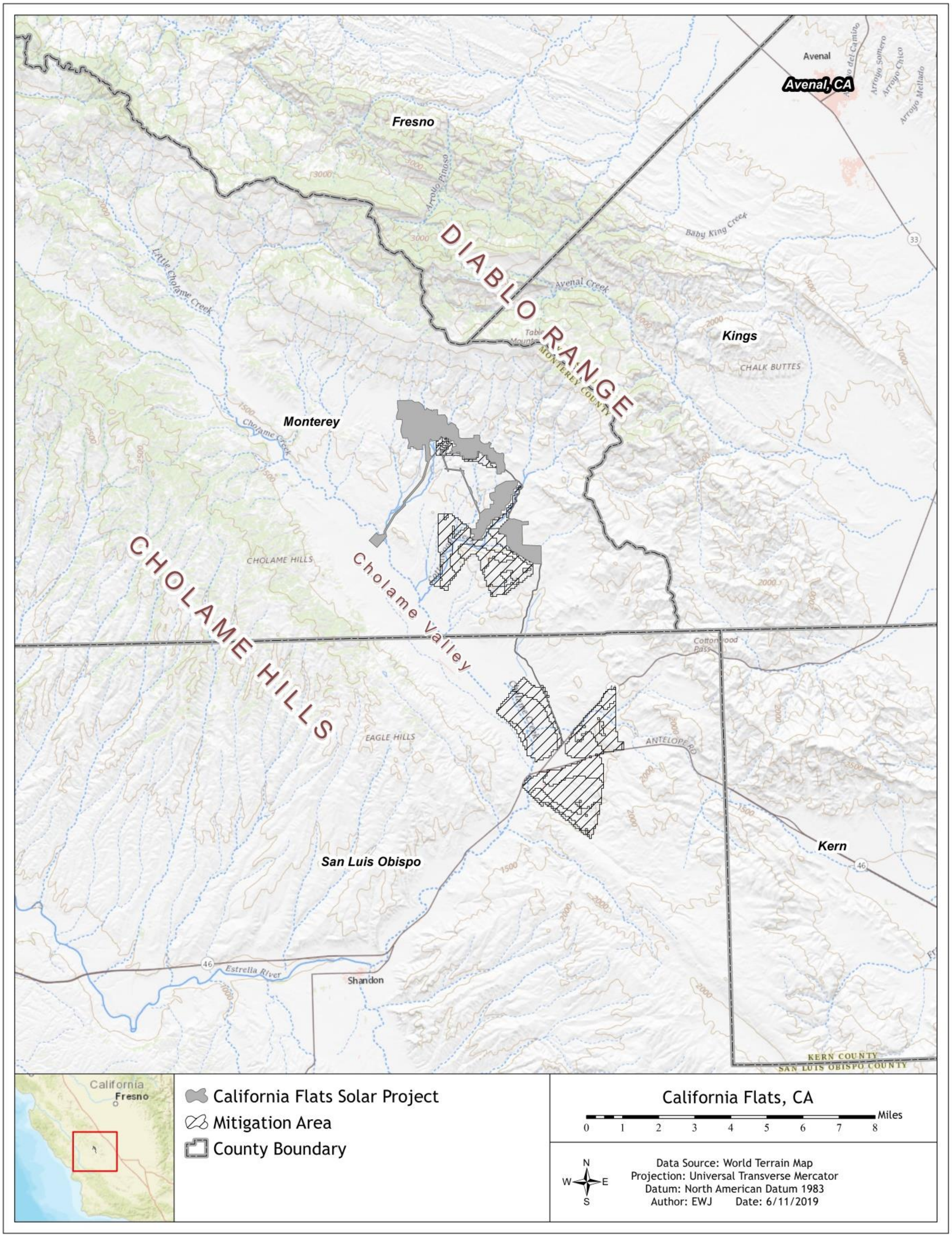

Figure 1. Vicinity map of the California Flats Solar Project.

3 ENVIRONMENTAL SETTING/BIOLOGICAL RESOURCES

The Project is located within the Pacific Flyway, in Coastal California Bird Conservation Region (BCR) 32. The Project is located in the interior portion of the California South Coast Ranges, in a northeastern extension of the Cholame Valley known as Turkey Flat. Turkey Flat is a gently undulating, largely treeless area incised by several springs and drainages; it is flanked on the east by the often steep hills of the Diablo Range. Elevations within the Project range from 488 to 640 meters (m; 1,600 to 2,100 feet [ft]) above mean sea level; the access road to the site descends to 358 m (1,175 ft), where it meets State Route 41 (Hwy 41). Grassland dominated by non-native grasses is the predominant vegetation community within the Plan Area followed by woodlands, wetlands, riparian scrub, upland shrublands and other (developed/ruderal and intensive agriculture). See the LEHCP for a full discussion of climate, soil types, hydrology and other environmental characteristics at the Project (Althouse and Meade, Inc. 2016).

4 REGULATORY FRAMEWORK

In addition to the regulations and codes described in the LEHCP (Althouse and Meade, Inc. 2016), the following federal statute is applicable to the golden eagle as proposed in this Plan.

4.1 Bald and Golden Eagle Protection Act

Golden eagles are afforded legal protection under authority of the Bald and Golden Eagle Protection Act (BGEPA), 16 US Code (USC) 668–668d. The BGEPA prohibits the take, sale, purchase, barter, offer of sale, purchase, or barter, transport, export or import, at any time or in any manner any bald (*Haliaeetus leucocephalus*) or golden eagle, alive or dead, or any part, nest, or egg thereof. The BGEPA defines take as to include “pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb,” and includes criminal and civil penalties for violating the statute. The USFWS further defines the term “disturb” to mean to agitate or bother a bald or golden eagle to a degree that causes, or is likely to cause, based on the best scientific information available: 1) injury to an eagle; 2) a decrease in its productivity, by substantially interfering with normal breeding, feeding, or sheltering behavior; or 3) nest abandonment, by substantially interfering with normal breeding, feeding, or sheltering behavior (50 Code of Federal Regulations [CFR] 22.3). As the covered species in this Plan, take of a golden eagle would be authorized under the BGEPA when permit conditions set forth in 50 CFR 22.26 are met. As such, this Plan has been designed to meet the BGEPA permit issuance criteria, including the avoidance, minimization, and other mitigation measure requirements of 50 CFR 22.26

4.2 Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) is the cornerstone of migratory bird conservation and protection in the U.S. The MBTA implements four treaties that provide for international protection of migratory birds. The statute states:

> "Unless and except as permitted by regulations…it shall be unlawful at any time, by any means, or in any manner to pursue, hunt, take, capture, kill…possess, offer for sale, sell…purchase…ship, export, import…transport or cause to be transported…any migratory bird, any part, nest, or eggs of any such bird….[The Act] prohibits the taking, killing, possession, transportation, import and export of migratory birds, their eggs, parts, and nests, except when specifically authorized by the Department of the Interior…" (see 16 USC 703).

The word "take" is defined by regulation as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture, or collect…" (see 50 CFR 10.12).

Bald and golden eagles are protected by the MBTA in addition to BGEPA. The take prohibition in the statute does not require any proof of intent, knowledge, or negligence to establish an MBTA violation. Historically, in the absence of a USFWS permit or regulatory authorization—which the USFWS has not made available under the MBTA—the USFWS considered any action resulting in a "taking" or possession (permanent or temporary) of a protected species to be a violation of the MBTA. However, several federal courts have held that the MBTA does not apply to acts that only indirectly result in the death of migratory birds. (See *Newton County Wildlife Ass'n v. United States Forest Serv.*, 113 F.3d 110, 115 (8th Cir., 1996) (interpreting "take" and "kill" to mean "physical conduct of the sort engaged in by hunters and poachers" and not conduct that only "indirectly" results in the death of migratory birds); *see also United States v. Brigham Oil & Gas, L.P.*, 840 F.Supp.2d 1202 (N.D. 2012) (citing *Newton* and holding that "lawful commercial activity which may indirectly cause the death of migratory birds does not constitute a federal crime"). Most recently, on December 22, 2017, the Office of Solicitor of the U.S. Department of the Interior released a new legal opinion, M-37050, addressing the issue of incidental take under the MBTA, which withdraws and replaces a previous M-Opinion on the same topic issued near the end of the Obama administration, M-37041. The new M-Opinion concludes that, "consistent with the text, history, and purpose of the MBTA, the statute's prohibitions on pursuing, hunting, taking, capturing, killing, or attempting to do the same apply only to affirmative actions that have as their purpose the taking or killing of migratory birds, their nests, or their eggs" (U.S. Department of Interior [USDOI] 2017). Accordingly, the current interpretation and policy of the USDOI is that incidental take of migratory birds, including bald and golden eagles, that results from the operation of a wind farm is not regulated by the MBTA.

4.3 Permit Holder/Permit Duration

The requested ITP coverage for golden eagle take at California Flats would remain in effect for the maximum permit period of 30 years, or until the Project is decommissioned, whichever comes first. Thirty-four years is the anticipated life of the Project.

5 STAGE 1 PRELIMINARY SITE ASSESSMENT

5.1 Status and Distribution

The golden eagle is federally protected under BGEPA and MBTA and state-listed as a fully protected species (California Department of Fish and Wildlife [CDFW] 2013). The applicable population estimate for the Coastal California BCR is approximately 718 individuals with a density of 0.0043 eagles/square kilometer (km^2; 0.0112 eagles/square mile [mi^2]; USFWS 2016a). Data collected 1966–2015 for the Breeding Bird Survey program suggests a stable population rate of 0.01 in the Coastal California BCR (95% Confidence Interval: -1.53–1.57; Sauer et al. 2017). Golden eagles are considered an uncommon permanent resident and migrant throughout California, except the Central Valley and far southeast corner of the state, which is considered non-breeding, winter habitat (Kochert et al. 2002).

5.2 Habitat Characteristics/Use

In the interior central Coast Ranges of California, golden eagles forage in a wide variety of landscapes, preferably in open grasslands and oak savanna where small mammals are the preferred prey (Hunt et al. 1998). Dense chaparral, agriculture, and developed areas are typically not used during foraging. The primary prey base includes California ground squirrels (*Otospermophilus beecheyii*) and black-tailed jackrabbits (*Lepus californicus*) (Hunt et al. 1998); however, birds, carrion, and feral pig (*Sus scrofa*) are also used (H.T. Harvey & Associates 2014, WEST 2014b). While cliffs are the preferred nesting substrate in other regions, golden eagles in southern and central California commonly use trees and transmission towers (Smith 2012, Wiens et al. 2015). Nest building and maintenance may occur year round, with incubation typically initiated during February – March, hatching March – April, and fledging May – July (Hunt et al. 1998, H.T. Harvey & Associates 2013a). The risk of disturbance at nests varies throughout the nesting period, is highest during the courtship through the brooding period and decreases during the nestling and post-fledging periods (Whittington and Allen 2008).

5.3 Stage 1 Questions

1. Does existing or historical information indicate that eagles or eagle habitat (including breeding, migrating, dispersal, and wintering habitats) may be present within the geographic region under development consideration?
2. Within a prospective project site, are there areas of habitat known to be or potentially valuable to eagles that would be destroyed or degraded due to the project?
3. Are there important eagle use areas or migration concentration sites documented or thought to occur in the project area?
4. Does existing or historical information indicate that habitat supporting abundant prey for eagles may be present within the geographic region under development consideration (acknowledging, where appropriate, that population levels of some prey species such as black-tailed jackrabbits (*Lepus californicus*) cycle dramatically [Gross et al. 1974] such that they are abundant and attract eagles only in certain years [e.g., Craig et al. 1984]?

5. For a given prospective site, is there potential for significant adverse impacts to eagles based on answers to above questions and considering the design of the proposed project?

6 STAGE 2 SITE-SPECIFIC SURVEYS

Site-specific surveys and assessments for golden eagles and their preferred prey base have occurred at the Project since 2012 and include a variety of survey designs and methodologies. Site-specific studies that have occurred to date include eagle nest surveys, eagle use and activity survey, and eagle prey base assessments (Table 1).

Table 1. Pre-construction surveys that provide site-specific eagle data for the California Flats Solar Project.

Study Type	Timing	Methodology	Source
Small Mammal Surveys	October 2012 – December 2013	Transect, Camera Station, and Spotlighting Surveys, Scent Dog	H. T. Harvey & Associates 2014
Baseline Raptor Nest Surveys	March – June 2013	Aerial and Ground Surveys	H. T. Harvey & Associates 2013a
Baseline Avian Activity Surveys	March – August 2013	20-min. Point Count Surveys	H. T. Harvey & Associates 2013b
Eagle Nest Surveys	April – May 2014	Aerial Surveys	WEST, Inc. 2014
Eagle Use/Activity Surveys	March – December 2014	3-hour (hr) Point Count Surveys	Mattson et al. 2015
Eagle Nest Surveys	February – May 2015	Aerial and Ground Surveys	WEST, Inc. 2015
Eagle Nest Monitoring	March – August 1016[a]	Ground Surveys	Stansbury and Hallingstad 2016
Eagle Nest Monitoring	December 2016 – June 2017[a]	Ground Surveys	Hallingstad 2017
Eagle Nest Monitoring	January 2017 – August 2018[a]	Ground Surveys	Hallingstad 2018

[a] Some portions of the Project were under construction during these surveys.

6.1 Eagle Nest Surveys

6.1.1 Methods

Surveys for bald and golden eagle nests were conducted at the Project for five nesting periods, which included three nesting periods prior to construction (2013–2015) and three nesting periods during construction (2016–2018). Survey objectives changed over the course of the survey period due to the increased understanding of nest status and distribution, and in response to project siting, development, and construction activities. During 2013, the objective of eagle nest surveys was to determine the number, location, and status of nests within 16 kilometers (km; 10 miles [mi]) of the Project and included their nesting phenology and foraging territories. In subsequent years (2014–2015), the focus was on monitoring the status of known nests and searching for other previously undocumented nests. During the 2016–2018 surveys, the statuses of nests within 1.6 to 3.2 km (1.0 to 2.0 mi) of the Project were monitored to avoid and minimize potential effects during Project construction (Figures 2 and 3). During 2013–2015, surveys were conducted from helicopters and ground vehicles within 16 km of the Project. Aerial surveys were conducted early in the nesting period (February – March) to locate and identify territory establishment and incubating individuals. Multiple follow-up surveys were conducted through June to recheck nesting status and search for previously undocumented nests. During focused monitoring in 2016–2018, the survey schedule coincided with construction activities and focused on watching active[1] eagle nests for potential behavioral responses to construction activities.

The characterization of nesting status used a combination of definitions (Pagel et al. 2010, USFWS 2013). In general, a nest was defined as active when: 1) it was found to contain eggs or young (dead or alive), or 2) an adult was observed on the nest in an incubating or brooding posture. An occupied nest contained 1) fresh nest materials that had been added during the current nesting season, or 2) had adults at or near a confirmed or probable eagle nest (H.T. Harvey & Associates 2013a). A nest was classified as unoccupied if none of these conditions were met and is synonymous with the term inactive. A successful nest was one that fledged at least one young that was at least 80% of its fledging age which was defined as greater than eight weeks old (56 days) during an observation (H.T. Harvey & Associates 2013a). A failed nest was an active nest that did not successfully fledge young either due to egg failure or nest predation.

Nest data from 2013–2015 were used to establish the baseline rates of annual nesting status, success, and productivity prior to Project construction from 2016 through 2018. Baseline nest characteristics were calculated using the following definitions (modified from Steenhof and Newton 2007):

- *Nesting Status*: the proportion of nests of a given classification (e.g., active, occupied, failed) for all nests within a particular nesting period.
- *Nesting Success*: The proportion of active nests with at least one young in the nest at the time of last survey observation and reported as the number of successful nests per total active nests.
- *Productivity*: The average number of young produced per occupied nest in a particular nesting period.

In cases where occupancy status was equivocal but field observations suggested that a pair of eagles may have occupied the territory that contained the nest, it was assumed that the nest was occupied during that season. This conservative approach undoubtedly overestimates the number of occupied nests within a territory but addresses the uncertainty in nest classification (Steenhof and Newton 2007).

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[1] An active nest is hereby defined as a nest where (1) an adult was present on the nest in incubating position, (2) an egg or eggs were present, or (3) nestlings observed.

As discussed, nest success is typically achieved when a chick reaches a certain age (i.e., 56 days); however, assessment of nest productivity was not the primary survey objective during all years. Dismissing nests with fledglings' ≤56 days as undetermined due to the construct of survey timing or objectives may underestimate the number of successful nests in an area. For consistency, it was assumed that nests that contained live chicks at the time of the last survey observation were successful. However, this approach may overestimate nest success, as several young that were only a few weeks of age are assumed to have successfully fledged.

Nests were censored from the analyses if the structures no longer provided a suitable nesting platform (e.g., collapsed nests or blow-outs that rendered the nest so dilapidated that nest occupancy was highly improbable). Nests were also censored from analyses when the total nest size and material observed during follow-up visits determined initial mischaracterization of the nest as suitable for golden eagles. A full list of all confirmed, probable, and censored (*n*=3) golden eagle nests is found in Appendix A.

6.1.2 Results

In 2013, of the 29 occupied golden eagle nests located within 16 km of the Project, 12 (46%) were active. Of the 12 active nests, two nests failed to incubate and a third had a chick predated (Table 2), resulting in a nest success rate of 75%. The nine active nests contained 18 chicks at the time of last survey, of which four had reached 80% maturity. Based on the number of chicks and all occupied nests in the area, nest productivity was 0.62 young/nest. The remaining nests were considered occupied or presumed to be occupied but did not contain eggs or young (H.T. Harvey & Associates 2013a).

In 2014, of the 40 golden eagle nests located within 16 km of the Project[2], nine (23%) were considered active during the initial survey (WEST 2014a). Of the nine active nests, three nests fledged five young, which reached 80% maturity and six nests that contained eggs failed prior to last nest survey, resulting in a nest success rate of 33%. Nine nests were considered occupied or presumed to be occupied (23%) by the presence of an adult or a pair of adults near the nest (WEST 2014a). Based on the number of chicks and all occupied nests in the area, nest productivity was 0.28 young/nest. The remaining 22 nests were considered unoccupied during the 2014 nesting period. Three nests observed during 2013 were not relocated during 2014 surveys. In addition, there was evidence that nest 17A had fallen out of the tree.

In 2015, of the 51 golden eagle nests located within 16 km of the Project, seven (14%) were considered active as determined by the presence of an incubating adult on the nest (Mattson et al. 2015; Table 2). Of the seven active nests, three nests fledged five young which were < 80% maturity at last survey observation, two had adults sitting on nests at the last check on April 16 but no sign of young, and two nests failed to successfully lay eggs or incubate. The nest success rate was 43%. An additional fourteen nests had evidence of nest tending (e.g., fresh nest material or adults near the nest) or adults present early in nesting period (February –

[2] Additional nest structures were discovered during each aerial survey.

March); these nests were also considered occupied. Based on the number of young and all occupied nests in the area, nest productivity was 0.24 young/nest. Two nests (GE28A and GE41) were no longer present in the trees where the nests were documented in previous years.

In 2016, surveys focused on monitoring the status/phenology of nests located within 1.6 km of the Project during the construction phase (Stansbury and Hallingstad 2016). Of the five nests located within 1.6 km of the Project, three (60%; nests GE12A, GE13A and GE19A) were considered active and successfully fledged two young each (Table 3). Two nests remained inactive during the breeding and nesting period; however, one was considered occupied. Based on the number of chicks and all occupied nests in the area, nest productivity was 1.5 young/nest.

In 2017, surveys focused on monitoring nests within 3.2 km of the Project were performed during the construction phase (Hallingstad 2017). During this year of construction, a nest disturbance permit had been obtained to conduct construction activities near nest GE19A; construction activities during the 2017 breeding season were limited to areas more than one mile from the other nest sites. Of the five nests located within 1.6 km of the Project, four were documented as occupied early in the nesting season (GE12A, GE13A, and GE18A, and GE19A). In mid-May, only two of the occupied nests were occupied and active (GE13A, GE18A). Nest GE12A, which had an adult in incubation position on three occasions through March, is assumed to have failed in 2017 as chicks were never observed during subsequent visits in April and May. No egg laying was documented for the GE19A pair. Two fledglings were observed near the nest GE13A on July 6. Two fledglings were also observed near nest GE18A on June 8. Given this nest was well away from active construction areas, follow-up checks were not completed at nest GE18A; however, it was assumed to have successfully fledged two young. Nest GE20A was unoccupied throughout the 2017 nesting season.

In 2018, surveys once again focused on monitoring nests within 3.2 km of the Project and were performed during the construction phase (Hallingstad 2018). During this year of construction, a nest disturbance permit had been obtained to conduct construction activities near nest GE13A; construction activities during the 2018 breeding season were limited to areas more than one mile from the other nest sites. Of the five nests located within 1.6 km of the Project, four were documented as occupied early in the nesting season (GE12A, GE13A, and GE18A, and GE19A). However, by April only three of the occupied nests were occupied and active (GE12A, GE13A, GE18A), as egg laying was not documented for the GE19A pair. Nest GE12A had two nestlings in late May, but failed in early June when the tree limbs supporting the nest broke and the nest fell to the ground. High winds, combined with rotten areas within the tree limbs, are assumed to be the cause for the structure failure. The contents of the fallen GE12A nest structure were inspected and the remains of one nestling were discovered. It is assumed that both GE12A nestlings suffered mortality. Two fledglings were observed near nest GE13A on July 20. One fledgling was also confirmed near nest GE18A on July 6. Nest GE20A was unoccupied throughout the 2018 nesting season.

Table 2. Summary of golden eagle nesting status within 16 kilometers of the California Flats Solar Project, California, 2013–2015.

Nest Status[1]	Year 2013[2]	2014[3]	2015	Comments
Active/Fledged	1	3	0	5 nestlings in 2014 were > 8 weeks old
Active/Failed	3	6	2	
Active/Undetermined[4]	8	0	5	2 nestlings in 2013 were > 7 weeks old
Occupied/Inactive	17	10	14	
Unoccupied	0	25	33	
Total Nests	**29**	**47**	**54**	

[1] Active – adult observed on nest in incubating or brooding posture or nest contained eggs or young; Occupied – adults at or near confirmed or probable eagle nest; Unoccupied – no evidence of nesting or territory occupancy observed; Fledged – young older than 51 days observed in nest; Failed – eggs did not incubate successfully or disappeared, or previously observed young predated; Undetermined – young at nest younger than 51 days old at time of last survey.

[2] Data from H.T. Harvey & Associates (2013a).

[3] Of the 47 nests, three nests from the previous year were not relocated.

[4] Nestlings observed, but were ≤ 51 days-old. Status undetermined but assumed to have fledged (USFWS 2013).

Based on the three years of preconstruction monitoring data of nests within 16 km of the Project (2013–2015), an average 26% (range 14–41%) of the nests attempts were successful. Of the 28 active nesting attempts, 17 of the nests (60%) contained fledglings during the final nest survey of the nesting period. Average annual nest productivity was 0.38 young/year (range 0.24–0.62 young/year).

Based on six years of golden eagle nesting data, there is high annual variability of nesting activity and success of nests located within 1.6 km of the Project. Between 2013–2018, of the 26 times nests were occupied within 1.6 km of the Project, there were 15 nesting attempts of which 10 were successful (Table 3). These 15 nest attempts within 1.6 km of the Project successfully fledged young 67% (range 0-100%) of the time between 2013–2018 (Table 3). When nest productivity is calculated by occupied nests and averaged over the six-year monitoring period, the average nest productivity is 0.73 young/year (range 0–1.5; median 0.72). The number of eagles fledged per year included 4, 0, 2, 6, 4, and 3 at all of the nests within one mile of the Project from 2013 to 2018. Mean golden eagle nest productivity in the U.S. is 0.55 young fledged per breeding season per occupied nesting territory (with a 95% credible interval of 0.40 to 0.75; USFWS 2016a).

Give information from 2013–2018, which included more intensive monitoring than in previous years, there are four regularly occupied golden eagle nesting territories within 1.6 km of the Project (Nests GE12A, GE13A, GE18A, and GE19A).

Table 3. Golden eagle nest success within 1.6 kilometers of the California Flats Solar Project, 2013--2018.

	Annual Nest Status[1]						
Nest ID	**2013[2]**	**2014**	**2015**	**2016**	**2017**	**2018**	**Comments**
GE12A	A	F	A	A	F	F	2 young fledged in 2013, 2015, and 2016
GE13A	A	U	O	A	A[3]	A[3]	2 young fledged in 2013, 2016, 2017, and 2018
GE18A	O	F	O	O	A	A	2 young assumed to have fledged in 2017, 1 young fledged in 2018
GE19A	O	F	O	A	O	O[4]	2 young fledged in 2016
GE20A	O	U	O	U	U	U	
GE28A	O	U	-	-	-	-	Nest observed collapsed in 2015
Per Nest Productivity	**0.67**	**0.00**	**0.40**	**1.50**	**1.00**	**0.75**	

[1] A = Active; F = Failed, O = Occupied; U = Unoccupied.

[2] Data from H.T. Harvey & Associates (2013a).

[3] In 2017 and 2018, the GE13A pair used a second nest structure located ~218 yards (200 meters) from the original nest location.

[4] In 2018, the GE19A pair was observed at the GE19A nest and carrying nest material to two other locations on the GE19A hillside; however, they did not build substantive structures at either alternate location.

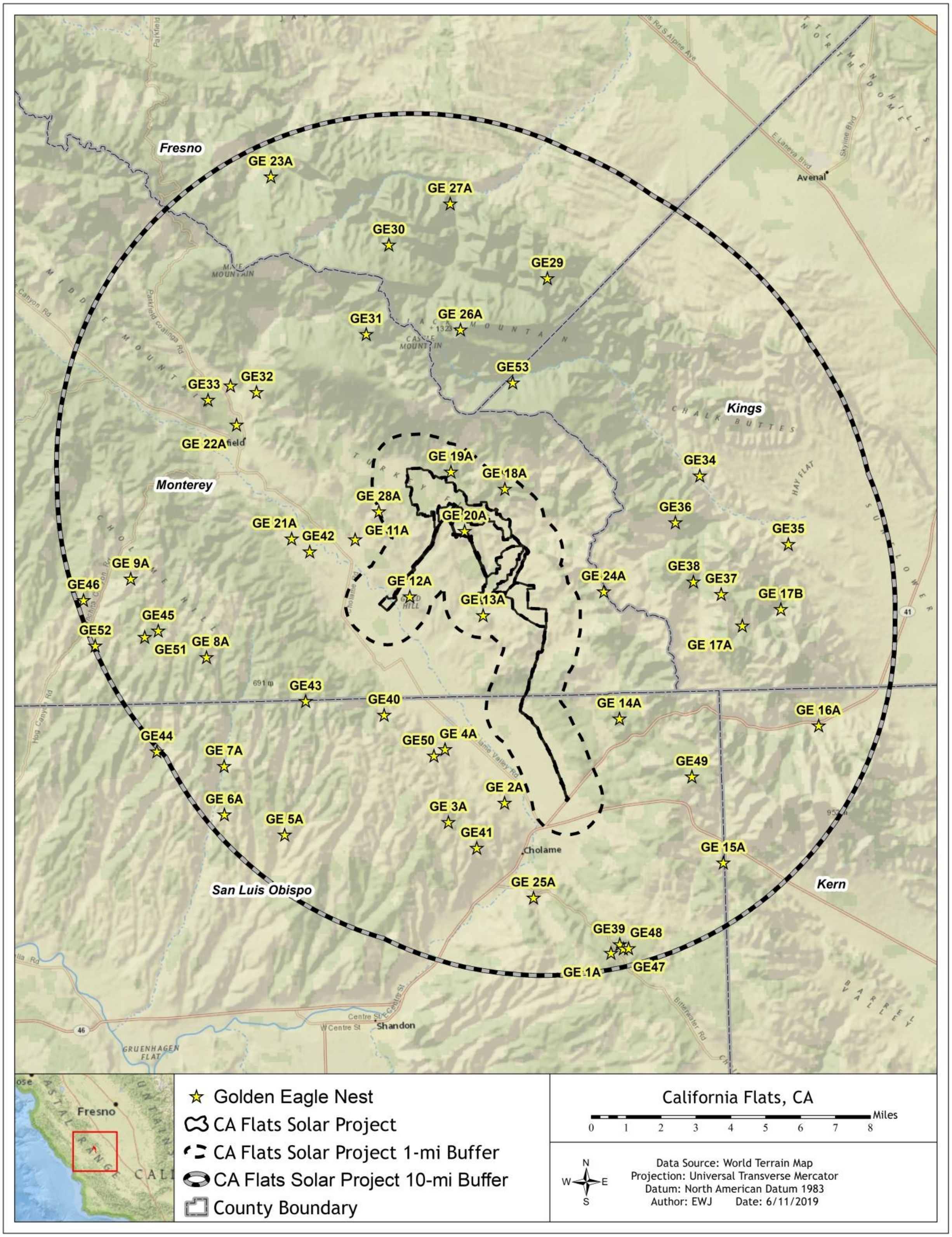

Figure 2. Golden eagle nests within 16 kilometers of the California Flats Solar Project.

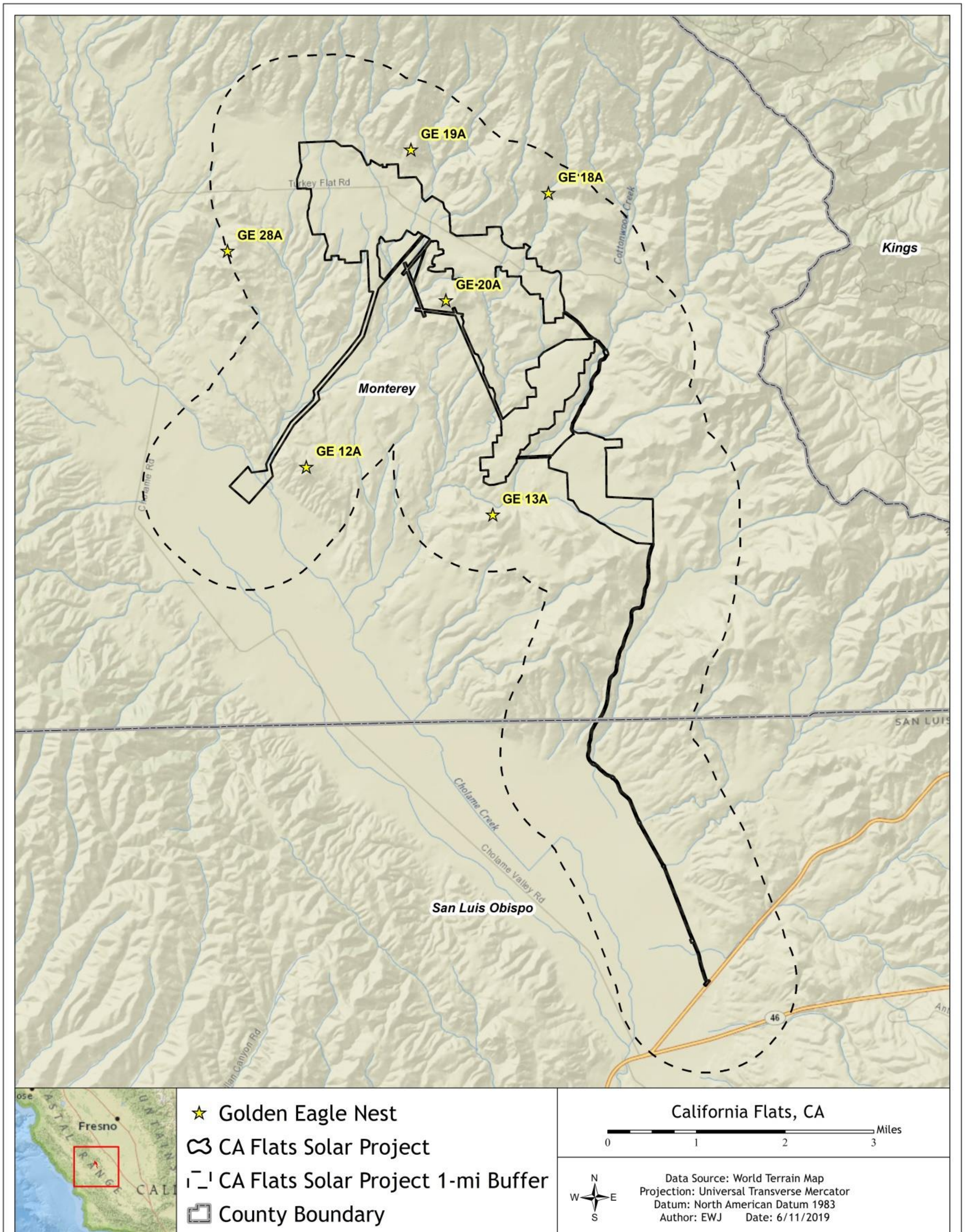

Figure 3. Golden eagle nests within 1.6 kilometers of the California Flats Solar Project.

6.2 Eagle Use Surveys

6.2.1 Methods

In addition to the nest surveys described in Section 3.2.1, general avian surveys were conducted at the Project during 2013 and 2014 that specifically included observations of golden eagles (H.T. Harvey & Associates 2013b and WEST 2015). In 2013, the survey objective was to quantify species occurrence and composition. Avian surveys were conducted from March 26 through August 22 at eight observation stations once every two to three weeks over the course of the six-month study. Surveys were conducted for 20 minutes within an 800-m (2,625-ft) survey radius of each station.

In 2014, the scope of the surveys focused on golden eagle use and activity (WEST 2015). The survey objective was to provide site-specific information on the seasonal and spatial use of the Project and surrounding landscape by golden eagles. To determine the spatial use of eagles at the Project, flight paths were recorded on topographic maps and evaluated for patterns of consistent use. Golden eagle surveys were conducted from March 10 through December 22 at 10 observation stations once every two weeks over the course of the 10-month study (Figure 4). Surveys were conducted for three hours and all golden eagles observations were recorded. Surveys were carried out during the late morning through early afternoon hours (approximately 9:00 am to 5:00 pm), the period of greatest activity for eagles and other raptors. Survey start times at stations varied from week to week such that different time periods were surveyed throughout the study at each station (i.e., early morning, late morning, afternoon).

6.2.2 Results

In 2013, seven observations of golden eagles occurred during 96 surveys for a total of 32 survey hours. Observed during 20 percent of all surveys, three golden eagles observations were recorded in spring and four during summer. Five of the observations were recorded along the proposed transmission line, in the vicinity of nest GE 20A, which has been inactive since nest surveys started in 2013 (Figure 4). In 2013, California Flats had an observation rate of 0.22 golden eagles/hour (H.T. Harvey and Associates 2013b).

In 2014, 216 observations of golden eagles occurred during 199 surveys for a total of 597 survey hours. Of the 216 observations, 71 occurred within the 800-m survey plot for an observation rate of 0.12 golden eagles/hour and a mean golden eagle use rate of 0.04 observation/20-minutes/800-m plot.

While the eagle use areas shown in Figures 4a–4e illustrate flight paths throughout the general Project area, eagles (particularly during the nesting season) are not using the landscape evenly. Regardless of season, most eagles were observed flying outside of the solar generating area (Figures 4c–4e). Another way to assess golden eagle use of the landscape is to place a grid over the surveyed area and determine the number of flight paths that passed through each grid cell. This “heat map” shows the varying levels of use that were observed throughout the Project (Figures 5a–5b).

Both the flight pathway and the heat maps illustrate that over extended periods of observation of the Project site in 2014, golden eagles did not appear to be consistently using substantial portions of the Project site, particularly in some of the flatter areas where the solar arrays are located. This may be due to a combination of factors that seem to attract higher levels of eagle use such as prey availability (prey availability may be higher in the areas adjacent to the Project boundary) and/or areas of steeper topography creating wind updrafts conducive to efficient soaring (LeBeau et al. 2015, Wiens et al. 2015).

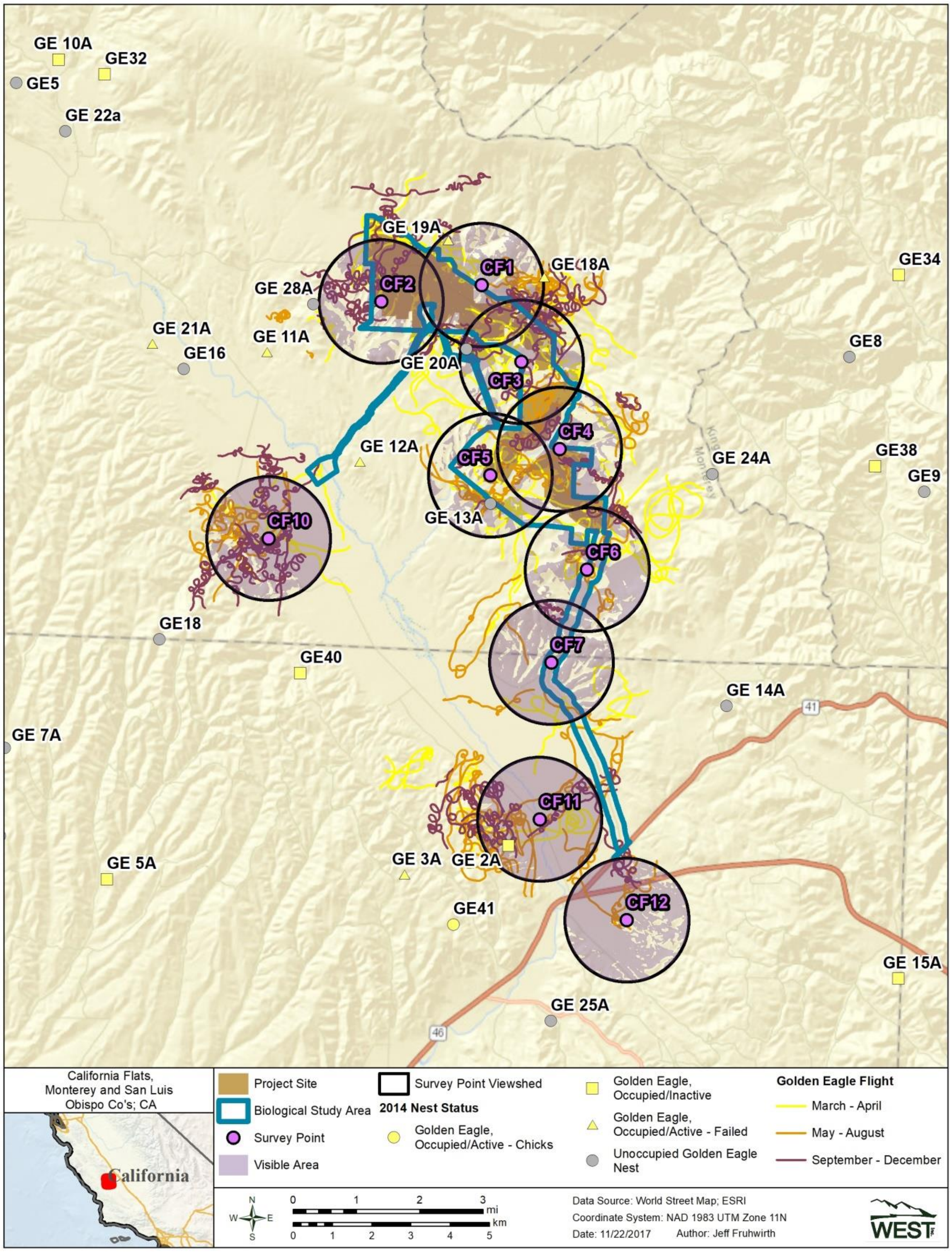

Figure 4a. Golden eagle flights recorded during eagle use surveys at the California Flats Solar Project. "Visible Area" indicates ground-level areas that were visible within 1.6 kilometers of each point.

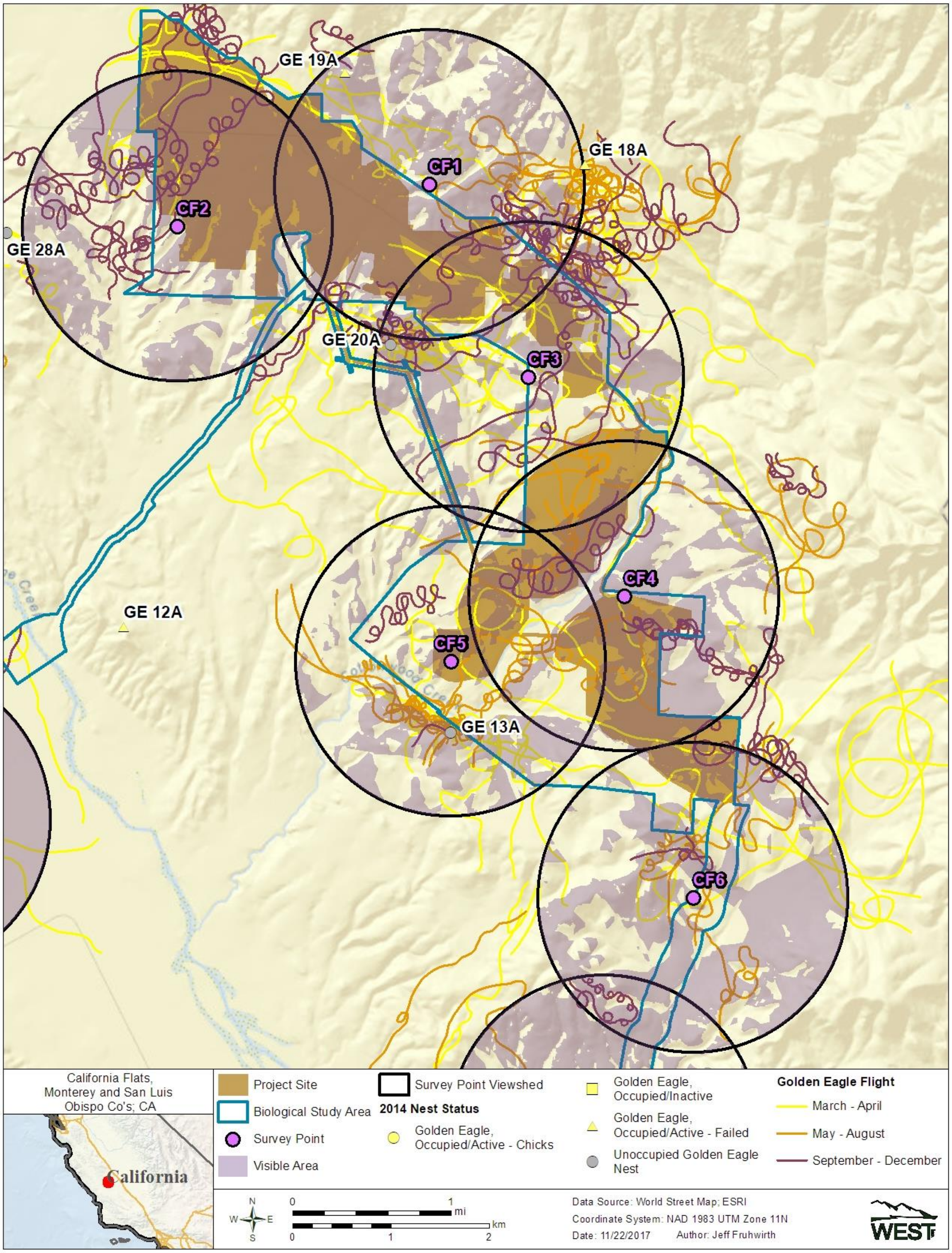

Figure 4b. All golden eagle flights recorded near the solar generating portion of the California Flats Solar Project.

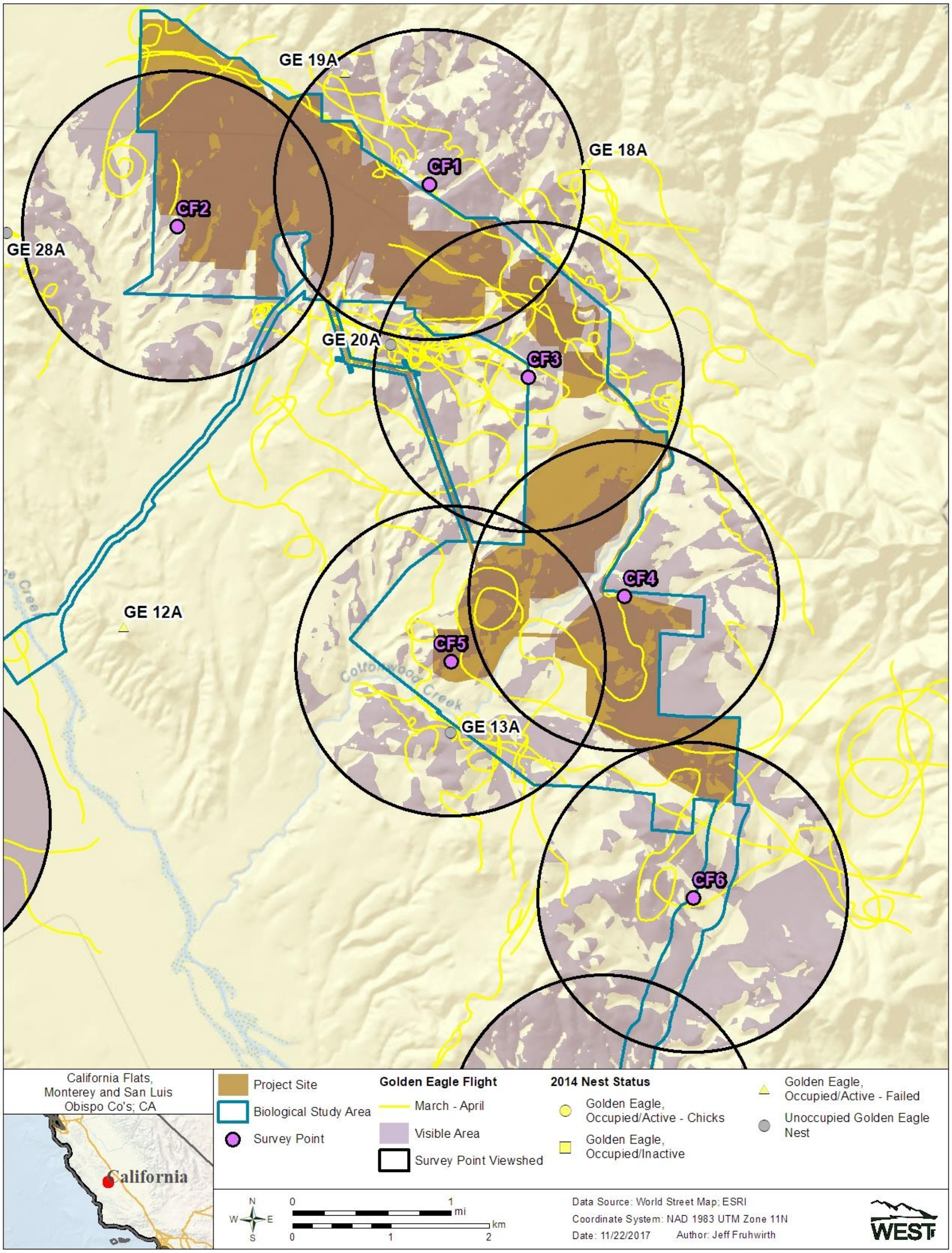

Figure 4c. Golden eagle flights recorded near the solar generating area during March and April eagle use surveys at the California Flats Solar Project.

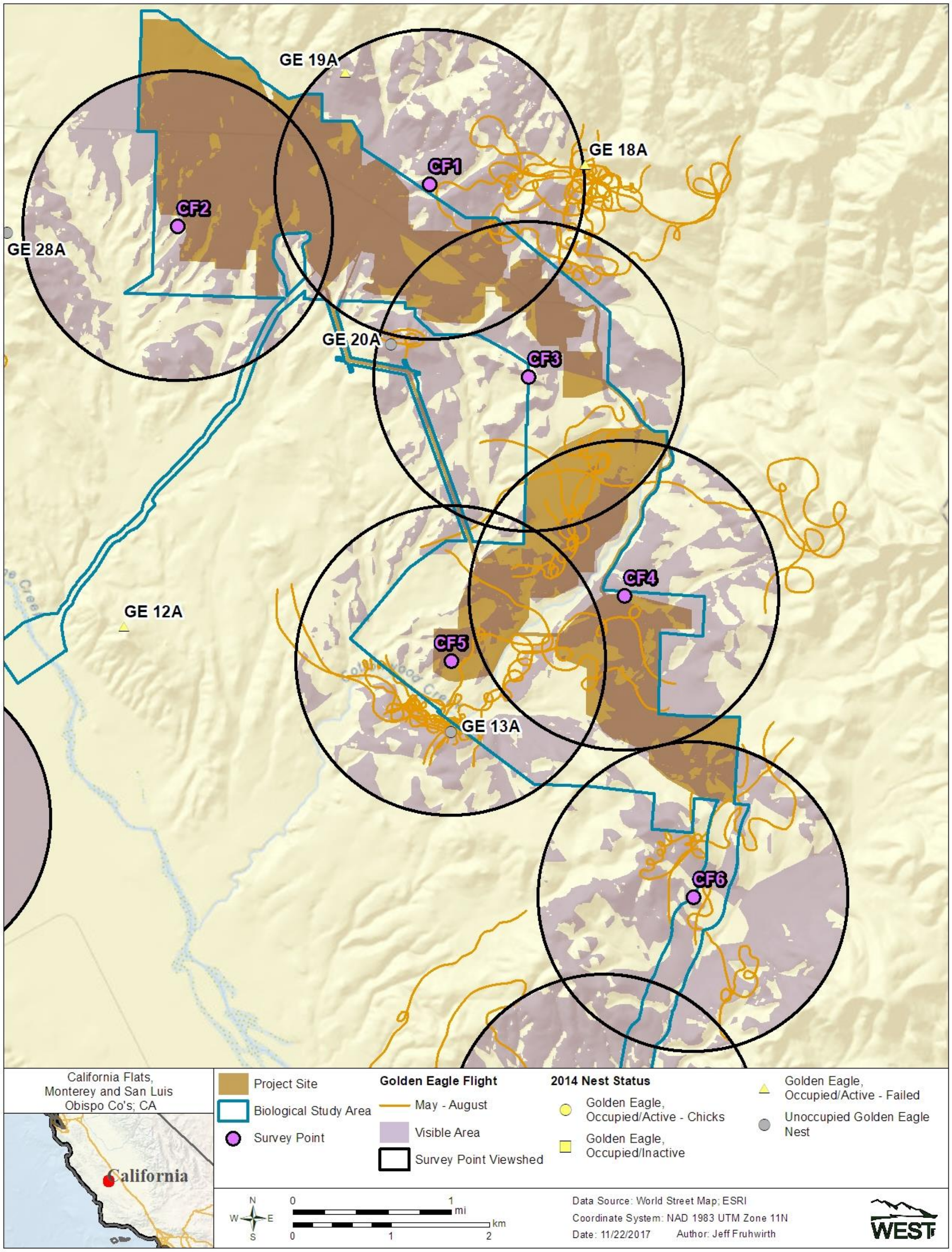

Figure 4d. Golden eagle flights recorded near the solar generating area during May - August eagle use surveys at the California Flats Solar Project.

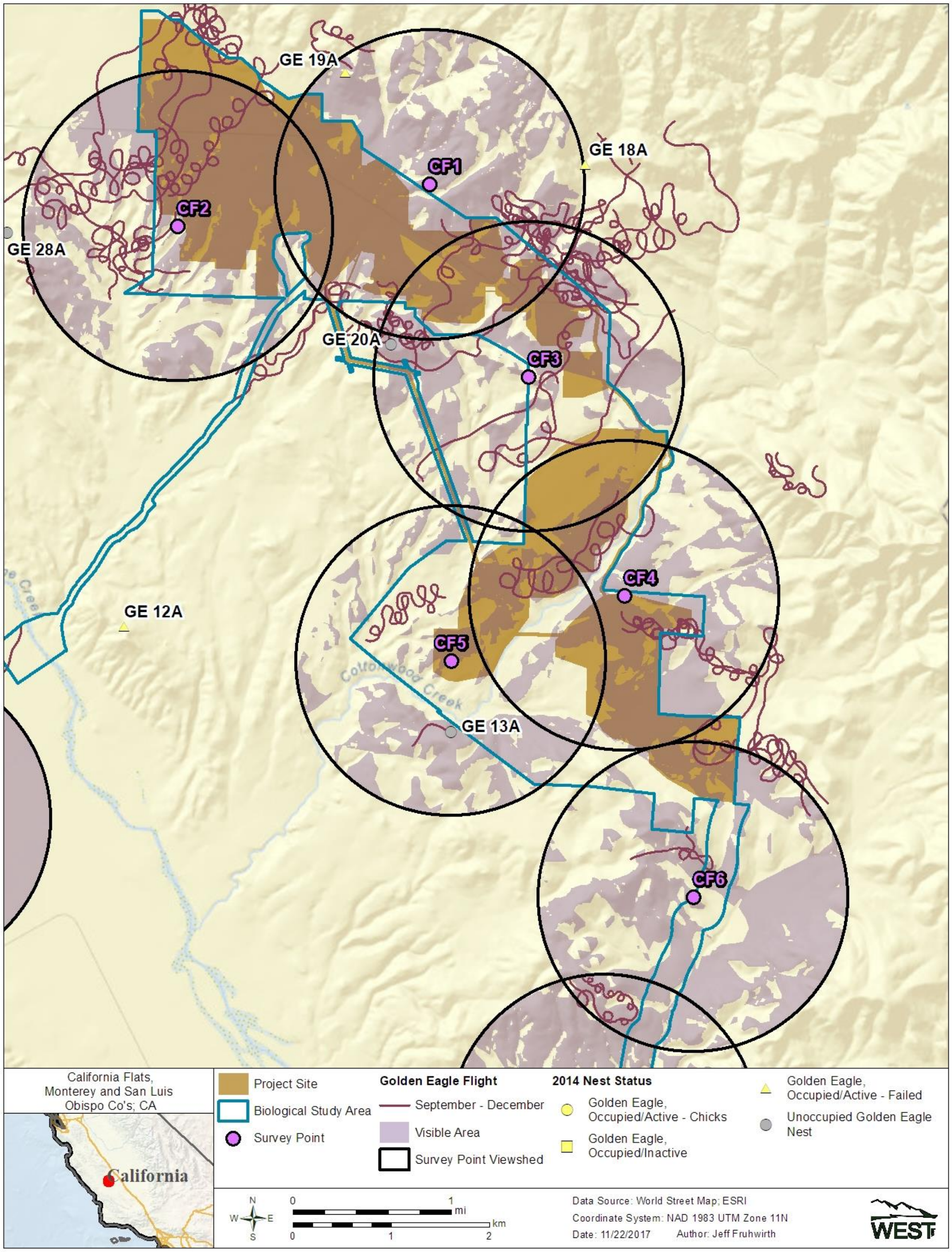

Figure 4e. Golden eagle flights recorded near the solar generating area during September - December eagle use surveys at the California Flats Solar Project.

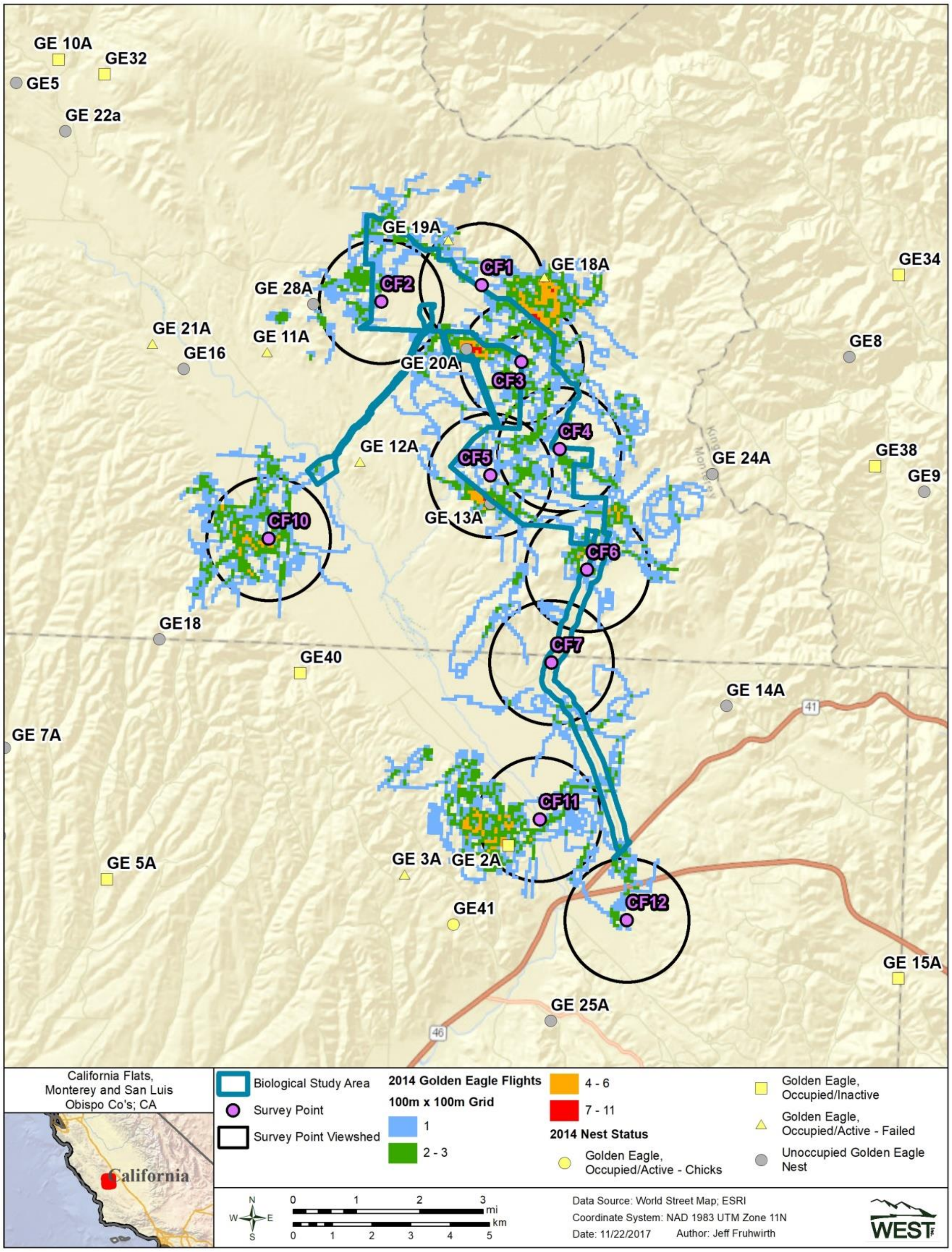

Figure 5a. Heat map of golden eagle flights recorded during eagle use surveys at the California Flats Solar Project. Grid cells are 100 meters by 100 meters.

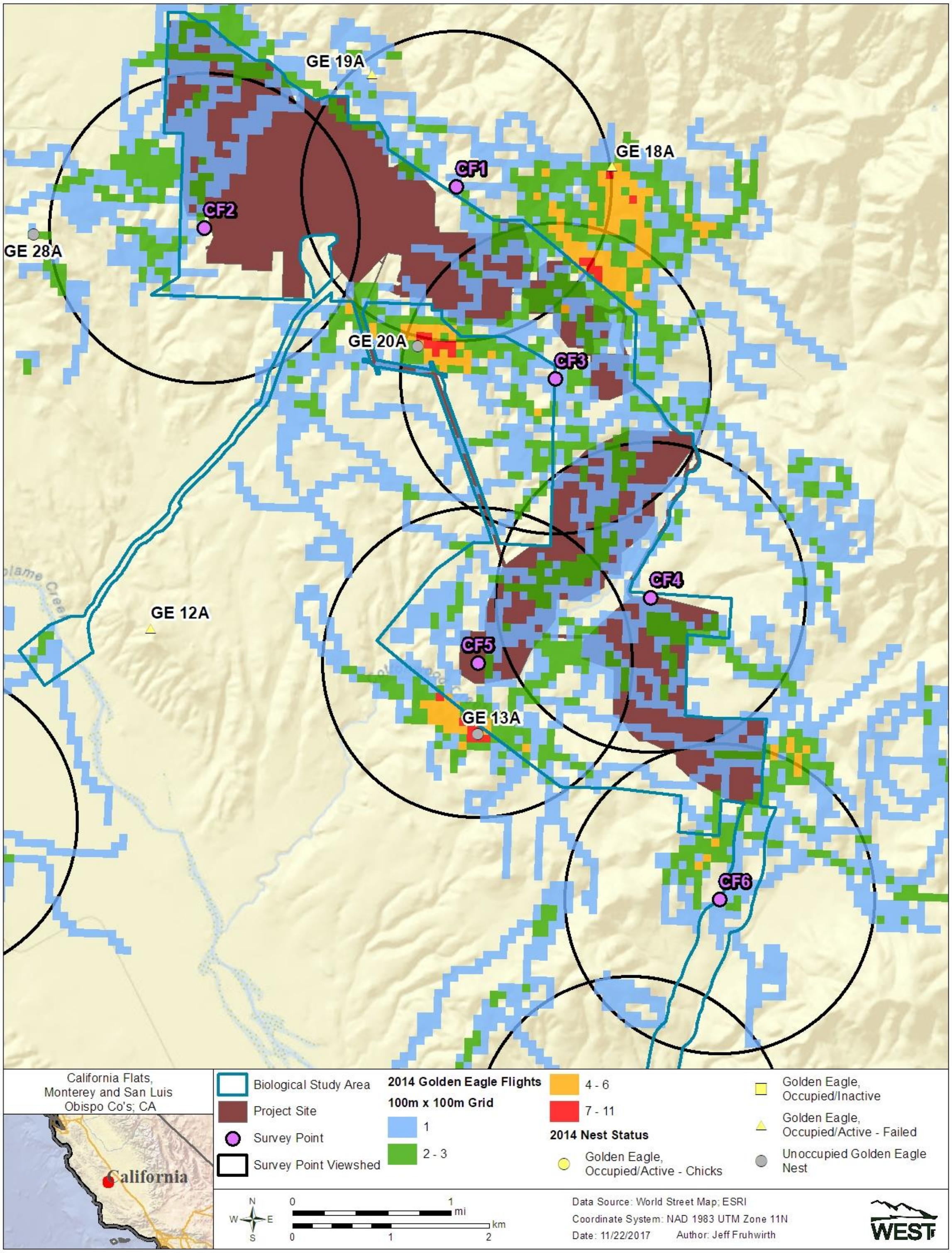

Figure 5b. Heat map of golden eagle flights recorded near the solar generating portion of the California Flats Solar Project. Grid cells are 100 meters by 100 meters.

6.3 Eagle Prey Surveys

6.3.1 Methods

Multiple surveys have been conducted since 2012 to understand the potential relationship between eagle nesting and activity patterns and the distribution of small-mammal prey in the vicinity of the Project (H.T. Harvey & Associates 2014; provided in Appendix B). A variety of methods were used to collect data of small mammal occurrence and distribution including infrared camera stations, ground transect surveys, scent dog searches, spotlight surveys, prey remains, and focal nest observations.

During October and November 2012, infrared, remote-sensing, camera-station surveys were conducted at multiple locations within the Biological Study Area (BSA) delineated around the Project site to collect observations of potential prey species (H.T. Harvey & Associates 2014).
In November 2012, systematic transect surveys were conducted to map all mammal observations across the entire BSA (H.T. Harvey & Associates 2014). Observers also mapped the locations of all burrow systems used by Heermann's kangaroo rat (*Dipodomys heermanni*), and all den or burrow systems that could be inhabited or were created by other special-status mammal species, such as American badger (*Taxidea taxus*), San Joaquin kit fox (*Vulpes macrotis mutica*), and California ground squirrel burrow systems.

During September and October 2013, scent dogs were used to locate San Joaquin kit fox scat to determine occupancy and distribution. Transect surveys covered a representative sample of the BSA, at 0.4- and 0.8-km (0.25- and 0.5-mi) intervals. The dog was trained to target and alert to fox scat but surveyors recorded all carnivore scat observed. Scats were confirmed to species through morphometric comparisons or DNA analyses (H.T. Harvey & Associates 2014).

During November and December 2012 and again in December 2013, spotlight surveys were conducted on three nights to record the occurrence of small mammals (H.T. Harvey & Associates 2014). Surveys were conducted along existing access roads that provided substantial coverage of the Project and surrounding area. Surveyors recorded each animal sighting as a location along the road where the sighting occurred.

During all biological surveys conducted in 2012 and 2013, biologists also recorded incidental observations of potential eagle prey species, including feral pigs and rabbits observed on or near the Project site (H.T. Harvey & Associates 2014).

Following the studies described above, recorded distributions of potential prey species were overlaid with the available observations of golden eagle nest sites (n = 12), observations made between November 2012 and December 2013 (n = 103), and recorded flight paths (n = 59; Figure 6). The overlays were then visually assessed for apparent patterns.

In July 2014, areas surrounding seven active golden eagle nests located within 16 km of the Project were searched for prey remains to determine the diet composition of golden eagles

(WEST 2014b). After it was determined that fledglings left the nest, surveyors searched the ground within 50 m (164 ft) of each nest and collected prey remains. Remains were classified to species if possible or grouped into general size categories that included small (e.g., rodents and rabbits), medium (e.g., jackrabbits [*Lepus* spp.], foxes [*Vulpes* spp.], skunks [*Mephitis* spp.], raccoons [*Procyon lotor*], badgers (*Taxidea taxus*), and weasels [*Mustela* spp.] and large mammals (e.g., feral pigs, deer [*Odocoileus hemionus*], and coyotes [*Canis latrans*]).

Finally, from March to July 2016, three active nests within 1.6 km of the Project were monitored to minimize nest disturbance resulting from construction activities (Stansbury and Hallingstad 2016). As part of the construction monitoring, eagle feeding schedules were monitored during all daylight hours. The frequency of the prey delivery to the nest and the species composition were collected to understand foraging frequency and activity budgets.

6.3.2 Results

A wide variety of species were observed during golden eagle prey surveys conducted between 2012–2016. Over 24,000 photographs recorded during camera-station surveys yielded 2,445 recognizable images of six potential prey species. Transect surveys detected four potential mammalian prey species, while five and 10 potential mammalian mammal prey species were detected during scent dog surveys and spotlight surveys, respectively (Appendix B). The most common species during all surveys included observation of California ground squirrel followed by Audubon cottontail (*Sylvilagus audubonii*), black-tailed jackrabbit, and feral pigs. Ground squirrel colonies were widely distributed throughout the Project site and in most habitat types; however, there were generally lower densities of ground squirrel colonies in the larger, open, and flatter habitats found on the interior of the largest portions of the Project. Higher densities were found along road berms, near water sources, along fence lines, in wooded areas, and around homesteads, ranching developments, and other structures (see Figure 6; H.T. Harvey & Associates 2014). Patterns between prey occurrence and eagle use were not readily apparent; for nests near the Project, the spacing of nesting territories may be driving eagle use more than prey availability.

Ground squirrels comprised the majority of eagle diets followed by feral pig and black-tailed jackrabbit (WEST 2014b). During 676 hours of nest monitoring, eagle feeding activity was variable among nests and ranged throughout the day (e.g., 0600–1700) with peaks concentrated during mid-day (e.g., 1000–1300) (Stansbury and Hallingstad 2016).

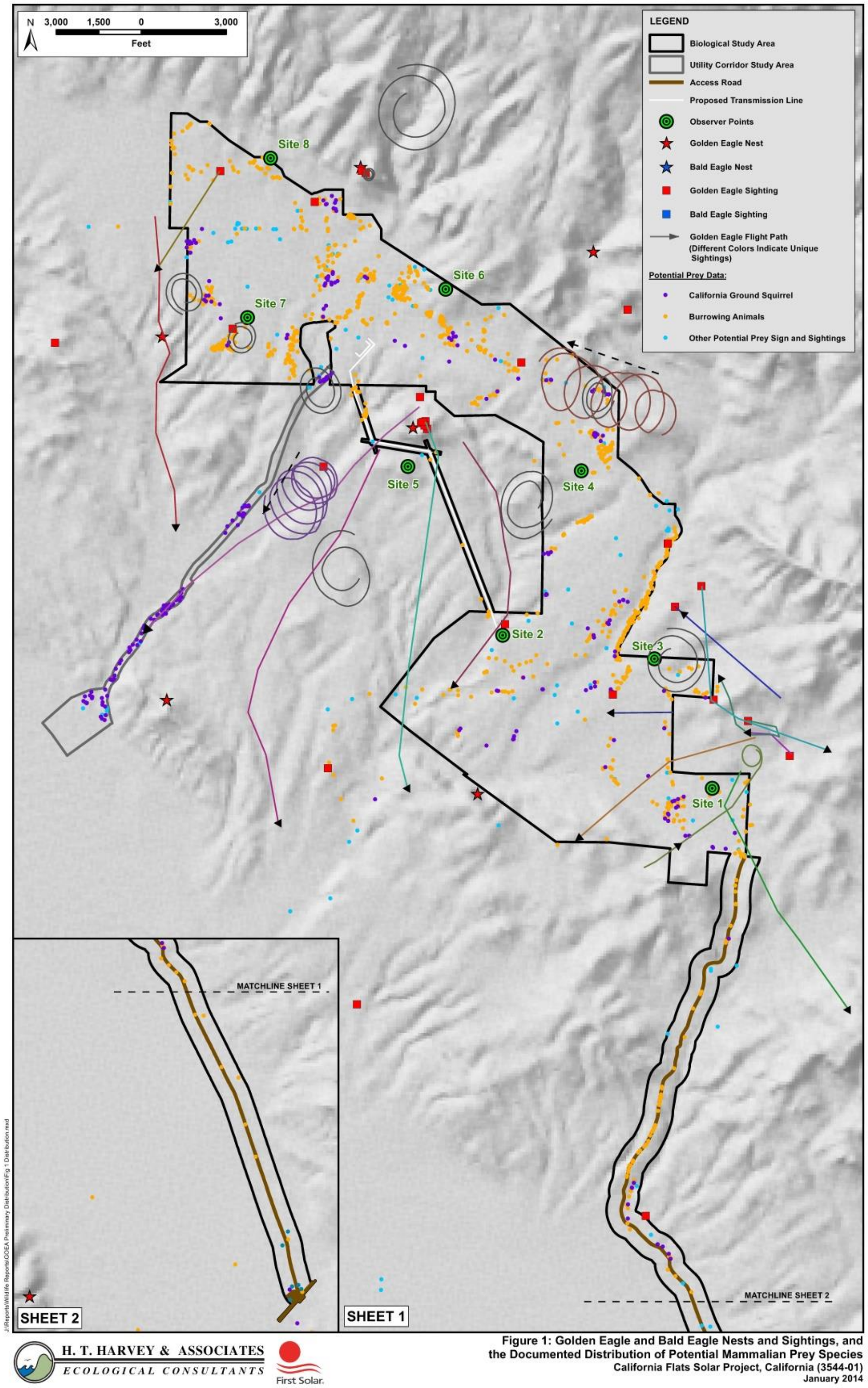

Figure 6. Golden eagle nests and sightings and documented distribution of mammalian prey species identified during all 2012 (October – December) and 2013 (September, October, December) eagle prey surveys of the California Flats Solar Project.

7 POTENTIAL BIOLOGICAL IMPACTS/TAKE ASSESSMENT

7.1 Potential Impacts to Golden Eagles

Unlike other forms of renewable energy (e.g., wind energy) that can result in eagle fatalities from collision or electrocutions, direct mortality to eagles is not anticipated from the Project.

Potential impacts on golden eagles during O&M of the Project could potentially include indirect impacts arising from two possible mechanisms: 1) noise or human activities; and/or 2) degradation of potential foraging habitat found in the vicinity of the nests (note the Project will not involve any direct impacts to the eagle nest trees).

Noise and human presence (such as that related to O&M vehicle traffic, ground disturbance associated with periodic maintenance activities such as might be associated with occasional road repairs, and minor equipment staging that could be needed for module replacement) near an eagle nest may decrease the potential for territory occupancy, result in nest abandonment, or affect the likelihood to successfully incubate or fledge young (Rosenfield et al. 2007).

It is assumed that not all golden eagle nests in the vicinity of the Project are susceptible to O&M disturbance due to long distances between nests and the Project, topography that screens the view of the Project from the nest, and anticipated O&M activities that will be limited in certain portions of the Project due to the type of infrastructure or absence of infrastructure in the relevant area. Based on this review, it was determined that there is a potential for effects associated with nests GE13A, GE19A, and GE20A from Project-specific O&M activities (although only GE13A and GE19A have been occupied nesting territories over the 2016 and 2017 seasons). The following provides background for the determination that impacts leading to take are not likely to affect other nearby nests including GE12A, GE18A, and GE28A.

- **Nest GE12A**: This nest is located over 3.2 km away from solar generating area. Only the utility corridor (overhead transmission line and associated poles, water pipeline) and an access road lie within a 1.6-km buffer of GE12A. Two areas of the utility corridor are both in view and within the 1.6-km buffer; only one of these is within 0.8 km (Hoffman 2016). The access road for the utility corridor is an existing ranch road that has been used routinely for decades during normal ranch operations. Regardless, the GE12A territory has produced two young in three out of the four monitoring years, suggesting the eagles are somewhat tolerant of vehicular traffic along the ranch road. California Flats will follow the avoidance and minimization measures outlined in Section 8.2 below when performing O&M activities associated with the utility corridor. For these reasons, no disturbance impacts related to Project O&M are anticipated at GE12A.

- **Nest GE18A:** This nest is located 1.1 km (0.7 mi) away from solar generating area. In four years of monitoring from 2013–2016, including three years of pre-construction data, no nesting attempts were documented at this nest. However, GE18A was active in 2017 (fledging two young) and 2018 (fledging at least one young). No Project infrastructure is visible from GE18A, as the nest lies low in a drainage with a large hill between it and the Project. In addition to preventing visual disturbance, the topography will also minimize the potential for noise disturbance at the nest as a result of O&M activities. For these reasons, no disturbance impacts related to Project O&M are anticipated at GE18A.

- **Nest GE28A**: The nest was located just under 1.6 km away from the western edge of the solar generating area. However, the nest structure was no longer present during the 2015 aerial survey. Survey efforts in 2017 confirmed that a new nest has not been built to replace the old structure. Additionally, no eagles were seen occupying this territory during approximately 60 hours of monitoring an adjacent territory (19A) in 2017 (Hallingstad 2017). Future monitoring efforts will provide information on whether a new nest is eventually built within this territory and, if so, its location. However, given the distance of the original nest from the nearest Project infrastructure, and the assumption that any new nest would be built in the same general location, no disturbance impacts related to Project O&M are anticipated at GE 28A.

Other forms of impacts such as loss of foraging habitat and/or reduced foraging quality could also indirectly impact eagle productivity. Adult golden eagles may easily range a mile or more from their nest sites in search of prey, and their breeding-season home ranges often extend across more than 16 square kilometers (km^2; Kochert et al. 2002). The available data suggest that adult eagles most often forage within 1.0–3.0 km (0.6–1.9 mi) of their nest site while supporting chicks (Marzluff et al. 1997, Hunt 2002). That said, a nearest-neighbor analysis of the area within 16 km of the Project indicates that the approximate average territory of golden eagles nesting encompasses a radial area of only 1.6–2.4 km (1.0–1.5 mi), which translates to nesting territory sizes of 5.6–11.4 km^2 (3.5–7.1 mi^2). Given the proximity of the nests in the immediate vicinity of the Project, it is likely that the area within approximately 1.6 km encompasses a majority of the nesting territories for Nests GE19A, GE18A, GE20A, and GE13A (see Figure 7).

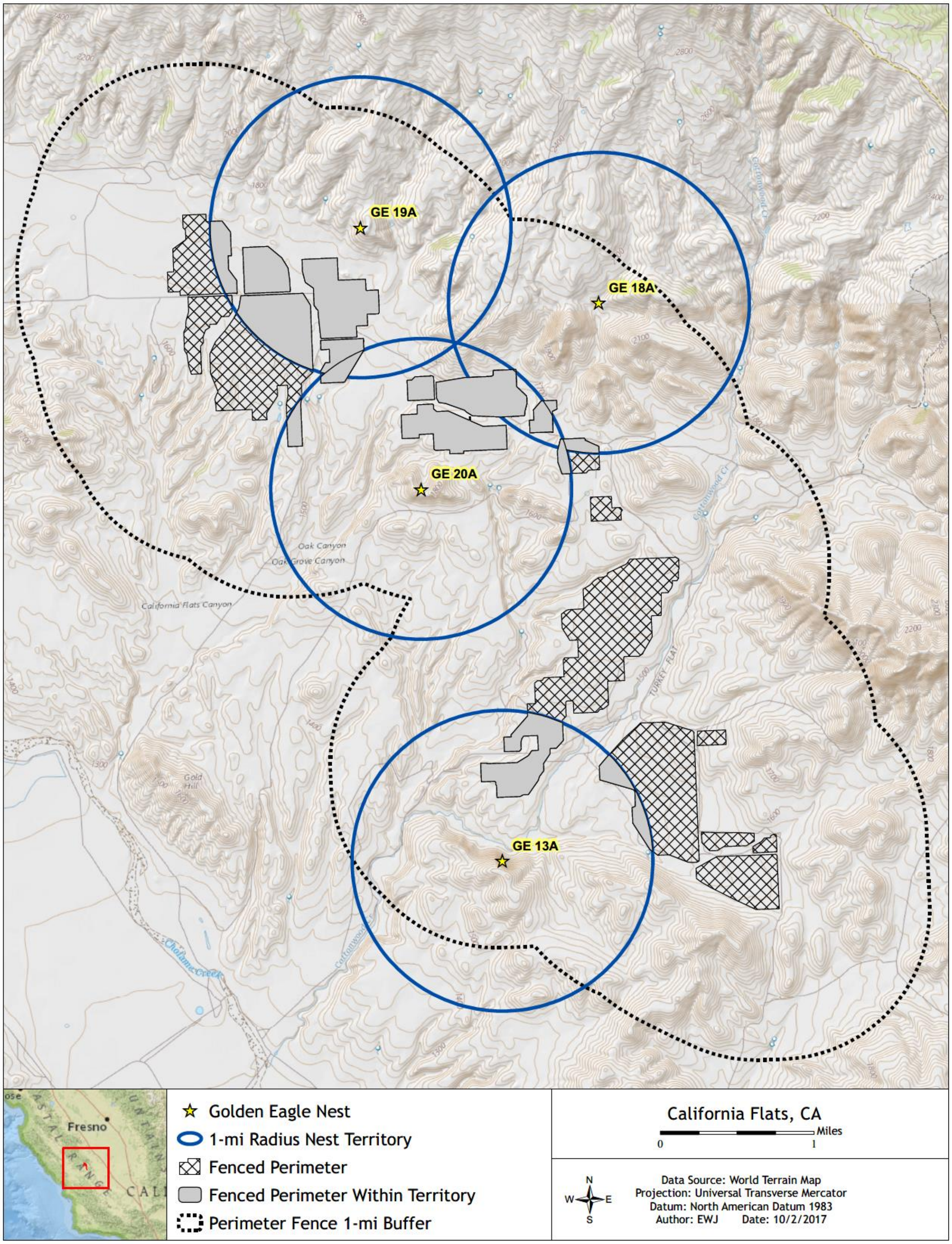

Figure 7. Golden eagle nests within 1.6 kilometers of the California Flats Solar Project. Nests GE28A and GE12A were not included in this figure as the GE28A nest structure is no longer present and GE12A falls further than 1.6 kilometers from the fenced perimeter of the Project facilities.

Golden eagles appear to preferentially use areas of more rugged topography surrounding the Project site (see Section 6.2.2). While grasslands can provide an important component of eagle habitat (Wiens et al. 2015), the removal of relatively small portions—from 4% to 17%—of the available grassland habitat within 1.6 km of the nest sites is not expected to result in reduced nest productivity and/or territory abandonment (see Table 4). Ground squirrels, rabbits, and feral pigs found in the foothills and grasslands both within and surrounding the Project location and adjacent to occupied eagle territories will continue to provide abundant foraging opportunities for eagles in the area.

Table 4. Acreage and percent of potential foraging habitat removed by Project facilities within 1.6 kilometers of eagle nests.

Nest	Buffer Area in km^2 (acres)	Project fenced perimeter within Buffer in km^2 (acres)	% of Project fenced perimeter in Buffer Area
GE12A	8.14 (2,011)	0	0
GE13A	8.14 (2,011)	0.49 (121.1)	6%
GE18A	8.14 (2,011)	0.31 (76.7)	4%
GE19A	8.14 (2,011)	1.31 (324.4)	16%
GE20A	8.14 (2,011)	0.97 (238.8)	12%
GE28A	8.14 (2,011)	0	0

7.2 Potential Take Assessment

"Take" is defined under the BGEPA as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb" a bald or golden eagle (16 USC 668–668d). Similarly, "disturbance" under the BGEPA is defined to include agitating or bothering an eagle to a degree that causes, or is likely to cause, injury, or either a decrease in productivity or nest abandonment by substantially interfering with normal breeding, feeding, or sheltering behavior (16 USC 668–668d). As described in Section 7.1, habitat loss or alternation resulting from the Project is expected to be insignificant and is not expected to rise to the level of "take." However, there is some potential risk that non-routine, non-equipment, or emergency maintenance activities could impact eagles during the nesting season without the implementation of conservation measures as described in the approved Bird and Bat Conservation Strategy (BBCS; WEST 2017) and this Plan.

Golden eagles are known to nest in the general vicinity of the Project and are expected to continue to do so in the future. Presumably, if eagles continue to nest in the vicinity of the Project, they would be tolerant to the presence of the Project facilities and routine O&M activities. As noted above, there is a potential for indirect effects associated with nests GE13A, GE19A, and GE20A from Project-specific O&M activities (although only GE13A and GE19A have been occupied nesting territories over the 2016 – 2018 seasons).

Based on annual monitoring completed between 2013 and 2016[3], the number of eagles fledged per year from the three nests within 1.6 km of the Project that are considered susceptible to disturbance is zero to four young/year (mean of 1.5 young/year). In total, these three nests were only active during four of the 12 nesting seasons available over this four-year period. With the implementation of the avoidance and minimization measures described in Section 8.2, very little if any loss in nest productivity is expected.

Mitigation and avoidance measures will be implemented that should minimize any potential disturbance to golden eagles during the nesting season. As stated in the BBCS, nesting eagles are expected to be tolerant to the presence of routine O&M activities given their ongoing exposure to ranching activities over the past several decades. No scientific studies provide a basis to quantify the potential effects of this type of disturbance and there is no evidence that the Project will result in adverse impacts to golden eagles, making it difficult to predict that there will be any reduction in nest productivity or disturbance resulting from habitat modifications caused by O&M activities. It is possible that any impacted eagles may simply shift to an alternative nesting location, resulting in little or no impacts on nest productivity. Nonetheless, after consulting with the USFWS, a worst-case scenario is assumed for this Plan in an effort to attempt to quantify and mitigate potential take. Therefore, it is assumed that for GE13A and GE19A, the two territories that are 1) considered susceptible to indirect impacts, and 2) also have a history of nest occupancy in recent years, reduced nest productivity may recur throughout the life of the Project (i.e., permanent territory loss). In the status report released by the USFWS in 2016 (USFWS 2016a), metrics for take as a result of territory loss are provided. Multiplying the average generation time for a golden eagle nest (11 years) by the mean annual loss of nest productivity (0.59 at 80th quantile) for golden eagles results in a loss of 6.5 eagles per lost territory (USFWS 2016a). Assuming these two territories are permanently lost, the worst case scenario results in the loss of 13 eagles over the 30-year permit term.

7.3 Cumulative Impacts

In the LEHCP, cumulative impacts are defined as incremental impacts of the action on the environment when added to other past, present, and reasonably foreseeable future actions. The geographic extent of for the analysis of cumulative impacts is within a 175-km (109-mi) radius surrounding the Project, which represents the average natal dispersal distance of golden eagles (USFWS 2016a). There is incomplete information available regarding the level of permitted golden eagle take in the region; thus, golden eagle take in the past, present, and foreseeable future is unknown. Additional solar facilities exist in the analysis area at various stages of development including: several small to medium sized solar facilities in the planning phase in Kings County; as well as several larger solar projects that are either in the planning, construction, or operational phase, including California Valley Solar Ranch in San Luis Obispo County (operational), Topaz Solar Farms in San Luis Obispo County (operational), Maricopa Sun Solar Complex in Kern County (planned), Kern Solar Ranch in Kern County (proposed),

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[3] The 2017 and 2018 monitoring results were not included in this calculation since a construction disturbance permit was obtained for Nest GE19A during early 2017, potentially affecting the nest productivity data for 2017.

Panoche Valley Solar Farm in San Benito County (constructing), Tranquillity Solar Generating Facility in Fresno County (constructing), and Westlands Solar Park in Fresno and Kings counties (planned). The operational 166 turbine International Turbine Research Center is located in Merced County, approximately 145 km (90 mi) northwest of the Project. Additional sources of anthropogenic sources of impacts exist in the region such as land conversion projects and the development of transportation and energy transmission networks. Wind energy projects in California that have authorized golden eagle take (Shiloh IV and Alta East) fall outside of the 175-km radius of this analysis.

Operation and maintenance of the Project, in combination with other projects and activities in the region, has the potential to contribute toward cumulative effects on golden eagles. The USFWS will evaluate the effects of cumulative impacts during their NEPA review.

7.4 Anticipated Population Level Impacts of the Taking

The impact of any incidental take of a golden eagle as a result of activities covered by this Plan would be fully mitigated to meet the preservation standard of being "consistent with the goals of maintaining stable or increasing breeding populations in all eagle management units and the persistence of local populations throughout the geographic range of each species" (USFWS 2016b). The maximum anticipated take in the form of two lost territories would not result in a net decrease of the golden eagle population once mitigation measures are applied (see Section 8.3). Furthermore, no direct impacts to nesting substrates would occur and the avoidance and minimization measures outlined in Section 8.2 are likely to result in some nest productivity at GE13A and GE19A during the permit term as environmental factors allow (e.g., weather, prey base).

In order to establish take limits to maintain stable or increasing golden eagle populations, the USFWS has identified take limits at two spatial scales: the Eagle Management Unit (EMU), defined as the Pacific Flyway, and the Local Area Population (LAP), defined as the 175-km natal dispersal distance for golden eagles (Figure 8; USFWS 2016a). To calculate the LAP, golden eagle population densities within BCRs are used and applied to the area of the LAP radius that overlaps each BCR. The allowable rate of golden eagle take within the EMU is either 1) zero unless otherwise mitigated for, 2) considered a concern when annual permitted take of ≥1% within the LAP may occur, or 3) considered the maximum allowed to meet the preservation standard when annual take of 5% is reached (USFWS 2016b).

The area within a 175-km buffer of the Project encompasses portions of two BCRs (Table 6). To calculate the LAP, the area of the BCR that is within the natal dispersal distance of the Project is multiplied by the regional eagle density. To calculate the 5% threshold within the LAP, the USFWS (2013) recommends using:

$$(\text{Local-area} \times \text{Regional Eagle Density}) \times 0.05$$

Using the equation above, an estimated local area population size for the Project is approximately 328 golden eagles. Based on this analysis, the local-area 5% benchmark would be approximately 16 golden eagles annually (Table 5). The predicted annual take of 1.18 golden eagles per year (0.59 eagles per nest during the 11-year nest "generation time") at the Project represents 7.2% of the local area threshold.

Table 5. Bird Conservation Regions and golden eagle density estimates used to calculate the 5% local area benchmark at the California Flats Solar Project.

BCR Name	BCR #	2016 Eagle Population	BCR Size (km^2)	Regional Eagle Density (eagles/km^2)	Local Area (km^2) w/in 175 km	Local-area 5% Threshold
Sierra Nevada	15	72	52,872	0.0014	4,061	0.3
Coastal California	32	718	165,550	0.0043	75,032	16.1
					Total	**16.4**

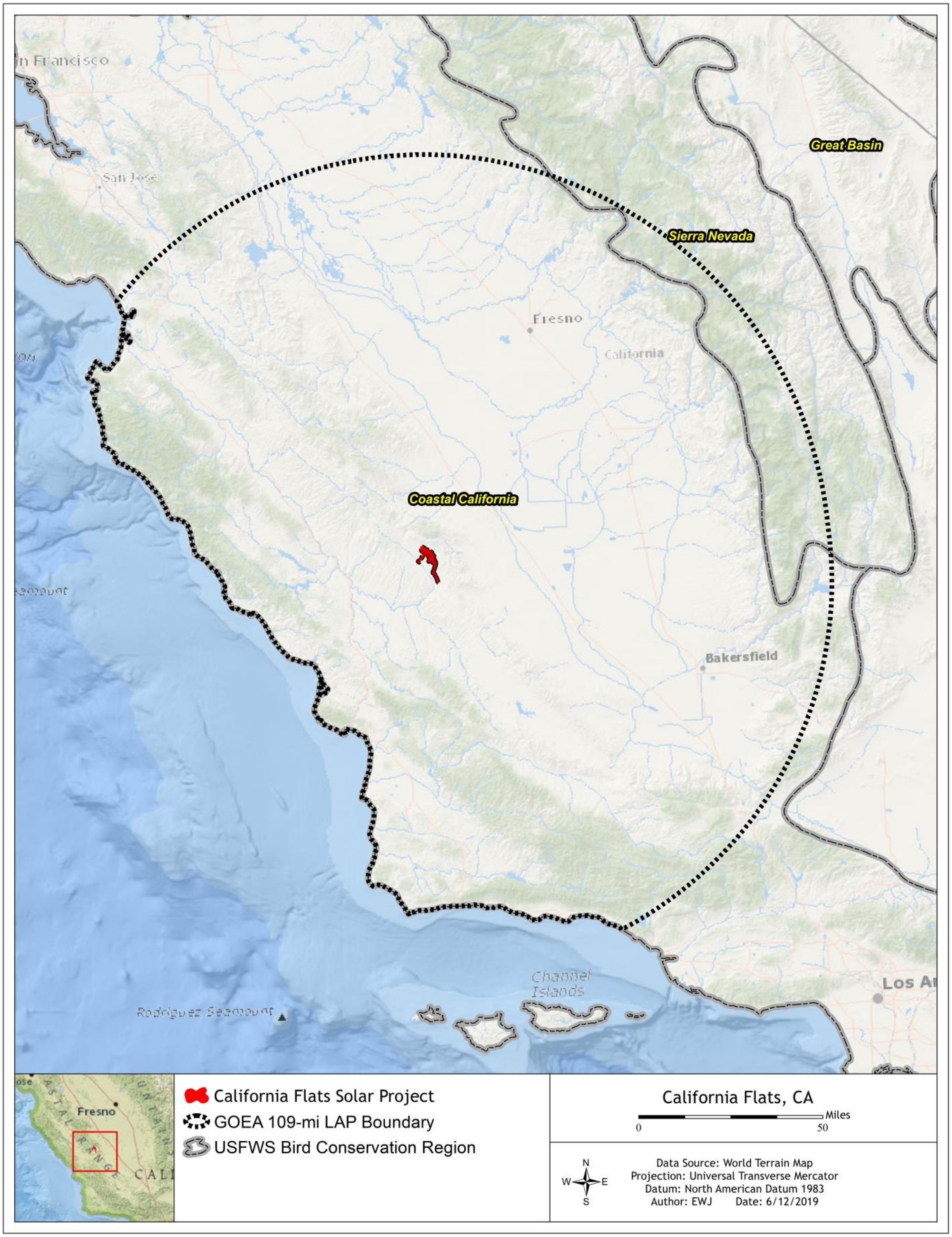

Figure 8. The Local Area Population for the California Flats Solar Project lies within the Pacific Flyway eagle management unit and overlaps two Bird Conservation Regions.

8 CONSERVATION PROGRAM/MEASURES TO MINIMIZE AND MITIGATE FOR IMPACTS

8.1 Biological Goals and Objectives

The purpose of the biological goals is to ensure that the operating conservation program in this Plan is consistent with the conservation and recovery goals established for the species. BGEPA states that any authorized take of golden eagles must be compatible with the preservation of golden eagles and consistent with the goal of maintaining stable or increasing golden eagle populations (USFWS 2009, 2016a). As such, the overall goal of this Plan is to support the persistence of a stable golden eagle population in the LAP and the EMU. The specific biological objectives of the Plan are as follows:

Objective 1: Activities covered by this Plan include practicable steps to avoid and minimize the loss of golden eagle nesting productivity as a result of O&M activities, for the duration of the ITP coverage period, and will include conservation measures to protect golden eagles in the area.

Objective 1.1: Reduce disturbance activities resulting from O&M activities within one mile of active nests during the nesting season (from about February 1 to as late as August 31, depending on the nesting season) as determined by biological monitors.

Objective 2: California Flats will enhance golden eagle habitat and populations in the region.

Objective 2.1: Provide for the protection of golden eagle habitat in the LAP in perpetuity.

Objective 2.2: Provide funds to help enhance golden eagle populations in the LAP.

8.2 Avoidance and Minimization Measures

Althouse and Meade (2016) identify 26 measures that will be taken during O&M to avoid and minimize impacts to species covered under the LEHCP. Additionally, the BBCS prepared for the Project also describes measures that would avoid and minimize impacts to avian species, including eagles (WEST 2017). A portion of these measures will also minimize impacts to golden eagles, including vehicle restrictions and speed limits, garbage abatement, limited rodenticide use, livestock carcass management, and employee awareness/training programs (Althouse and Meade 2016; WEST 2017). In addition to general measures listed in the LEHCP and BBCS, measures will be taken specifically for golden eagles that include a comprehensive nest management program to reduce the timing and duration of O&M activities surrounding active nests. Specific golden eagle avoidance and minimization measures that will be addressed in an environmental awareness/training program developed for O&M personnel include:

- **Routine Maintenance:** Routine maintenance activities generally utilize one to two vehicles or pieces of equipment with a minimum number of associated workers. This level of activity is consistent with ongoing ranching operations that have historically occurred in this area. Following discussions with the USFWS about unique site-specific conditions, it was decided that routine maintenance activities would not routinely require buffers and would not require further consultation with USFWS biologists.

- **Non-Routine Maintenance:** All non-routine maintenance activities will be scheduled to avoid the active golden eagle nesting season (February 1 – August 31) whenever practicable. If these non-routine O&M activities must occur within the one-mile radius of an historic or newly identified eagle nest in the area, a survey to confirm current nesting status will be completed. Consultation with USFWS will be conducted for non-routine O&M activities within one-mile of an active golden eagle nest (asides from nests GE13A and GE19A), whether inside or outside of the viewshed. Finally, if deemed appropriate after consultation with USFWS, a biological monitor will be present during all non-routine O&M activities that are within one mile of an active eagle nest (asides from nests GE13A and GE19A) during the first two years of operations.

  The biological monitor will have the authority to call for a Stop Work should the activity appear to be agitating the eagles or their nesting activities. If the golden eagles at the nest site appear to be habituated to or otherwise not disturbed by the activity, the nest monitor will document the eagle nest phenology, behavior of the eagles prior to and during the activities performed, and may determine that nest monitoring for this activity may no longer be necessary. In general, the biological monitor will also note the surrounding landscape topography, screening by topography or site infrastructure, and level of activity that result in a response from the eagles. These observations with be shared with the USFWS.

  Any future modifications to these avoidance or minimization measures during non-routine O&M activities will closely consider the level and type of activity, nest location and viewshed, and the stage of the nesting chronology. For example, on-site monitoring may lead to reducing the 1.6-km restrictive buffer to 0.8-km during the later stages of nesting (e.g., post-brooding and post-fledging dependency periods).

  Nests GE13A and GE19A will be excluded from these Non-Route Maintenance avoidance and minimization measures as disturbance and productivity loss are already assumed and mitigated for at these nesting territories.

- **Non-Equipment Maintenance**: Non-equipment maintenance activities may include vegetation management including mowing and grazing and the limited use of herbicides, biological surveys, road inspection and maintenance including re-grading and erosion repair, and, if necessary, general upkeep of the O&M facility. In-array vegetation management, including grazing and mowing, is described in the Project Habitat Restoration and Revegetation Management Plan (LSA Associates, Inc. 2016). Except as needed to comply with regulatory requirements, mowing or road maintenance/re-grading will be performed outside of the eagle nesting season (February 1 – August 31) to the degree practicable. In the event mowing or road maintenance/re-grading must be completed during the nesting season within one mile of an active onsite golden eagle nest and inside the nest viewshed (excluding nests GE13A and GE19A), and for road maintenance/re-grading also outside the nest viewshed, California Flats will consult with USFWS biologists and ensure that a biological monitor is present.

- **Emergency Repairs:** Emergency repairs needed to keep the Project connected to the electrical grid and producing electricity as a result of major equipment malfunction, electrical grid malfunction, or a natural disaster (e.g., earthquake, fire, storm) will be conducted in an expedient manner with consideration of nesting eagles in the Project vicinity to the maximum extent practicable depending on the emergency.

8.3 Mitigation Strategy

For projects in operation after issuance of the Eagle Permit Rule in 2009 (see USFWS 2009; 50 CFR 22.26), the USFWS recommends offsetting compensatory mitigation to offset all predicted golden eagle take. The mitigation strategy for the Project includes a specific management component for the permanent preservation, management, and enhancement of golden eagle habitat within an approximately 2,510-ha (6,204-ac) parcel group located directly south of the Project (Figure 1). Similar golden eagle foraging and nesting habitat is found within the mitigation lands as was historically found within the Project site. The proposed mitigation lands would preserve important nesting and foraging habitat for golden eagles in perpetuity. The preservation of suitable nesting and foraging habitat will support and enhance overall eagle productivity rates in the general Project area. Importantly, these mitigation lands will be protected from other land use activities (including conversion for viticulture which is increasingly common in the area) that would be less beneficial to eagles over the long term. Additionally, grass will be maintained at levels that will support an abundance of eagle prey. California Flats has developed a *Habitat Mitigation and Monitoring Plan* and a *Conservation Lands Grazing Management Plan* that describes the existing conditions of the conservation lands, ongoing habitat management (including activities that specifically target maintenance and enhancement of golden eagle habitat) and monitoring tasks, reporting, and the long-term administration of these lands.

Additionally, California Flats will deposit additional compensatory mitigation funds into the *U.S. Fish and Wildlife Pacific Southwest National Fish and Wildlife Foundation Bald and Golden Eagle Mitigation Account* (R8 NFWF account) to address loss of productivity at the affected nesting territories (GE13A and GE19A). This would be done with a one-time payment at the time of permit issuance, which will fund enough power pole retrofits to offset the loss of 13 eagles due to the permanent loss of two nesting territories. The compensatory mitigation is based on the assumption that power pole retrofits following APLIC guidelines will avoid the potential for future loss of golden eagles through accidental electrocutions along power lines that are do not currently follow these guidelines. The power pole calculations will use the USFWS Resource Equivalency Analysis (REA) described in the *Eagle Conservation Plan*

Guidance, Module 1, Version 2, April 2013, as revised to reflect indirect take (see Section 11.0). A refund from the NFWF account may be available if realized retrofit costs are lower than anticipated; conversely, if realized retrofit costs are higher than anticipated, additional funds will be deposited to complete the necessary retrofits. The mitigation calculations will assume a standard 1.2:1 mitigation ratio is used (81 Federal Register 91494).

9 POST-CONSTRUCTION MONITORING

Monitoring will provide information to aid in the implementation of avoidance and minimization measures as well provide a feedback loop into the decision making process that will help inform future management decisions. Nest monitoring will be conducted by a third-party qualified biologist the first two nesting seasons after commencement of O&M activities for the full 280-MW Project, as per the Project's BBCS. Additional nest monitoring will be conducted the year before each 5-year check in for the permit term (e.g., if a permit is issued in 2019, monitoring will occur in 2023, 2028, and so on until the permit expires).

During all nest-monitoring years, monitoring will be conducted from the ground to identify any active eagle nests within one mile of Project facilities; good faith efforts will be made to obtain permission from neighboring property owners to increase this distance to two miles. The ground surveys to identify and assess eagle nests within 1.6 km of Project facilities will follow the recommendations included in the USFWS's Interim Golden Eagle Inventory and Monitoring Protocols; and Other Recommendations (Pagel et al. 2010). Two surveys will conducted per season, at least 30 days apart. These surveys will be completed by a qualified biologist from the fence line of the Project and on the land of neighboring property owners that allow access for this purpose in a manner that will allow for a good view of potential nesting habitat (and historic nest sites) that fall within at least 1.6 km of the Project facilities. The first survey round will be conducted during February and/or early March. Nests and nesting territories will only be designated as unoccupied after two ground observation periods have been completed that are separated by at least 30 days (e.g., the first period in early February, followed by a second period at least 30 days later in March or April). Each of these observation periods will include a minimum of four hours of monitoring of eagle nests to confirm territory occupancy and/or nest activity. The qualified biologists conducting these surveys will have the equivalent of two season of intensive experience conducting survey and monitoring of golden eagles. A third visit may be conducted to active nests to document productivity during the late nesting stage (i.e., late May or early June).

9.1 Reporting

Reports will be prepared after each year of post-ITP monitoring. Reporting will include an annual summary describing the status of nests, including the number of young fledged from each nest located within 1.6 km of the Project facilities, as well as specific steps that were taken to avoid and minimize any potential impacts to occupied nests. The annual report will be submitted to USFWS by September 30 of each monitoring year.

9.2 Disposition of Dead or Injured Species

Given the Project will not result in direct fatality risks to eagles, dead or injured golden eagles are not expected to be encountered during the ITP term. In the event that a dead or injured eagle is encountered incidentally during the ITP term, California Flats will notify the Ventura U.S. Fish and Wildlife Office at (805) 644-1766 within 24 hours of its finding. Written notification will be made within five calendar days and will include the date, time, and location of the carcass; a photograph; cause of death, if known; and any other pertinent information.

10 ADAPTIVE MANAGEMENT STRATEGY

Adaptive management will be an integral part of avoidance and minimization measures that address the uncertainty related to the effects of O&M activities to golden eagles. Monitoring results from nests 13A and 19A will not be used to trigger adaptive management measures at the Project, as the permanent loss of those territories will have already been mitigated. The monitoring results from other golden eagle nests (such as 12A, 18A, or 20A) or new nests that appear after operations has begun will be used to adaptively manage the O&M activities as they relate to avoidance and minimization procedures required by this Plan. Annual review of the previous year's procedures and monitoring results (when applicable) will determine whether any changes to the Plan are needed to minimize potential impacts to nesting golden eagles.

11 RESOURCE EQUIVALENCY ANALYSIS

California Flats will compensate for the potential take of 13 golden eagles by funding power pole modifications. The original REA developed by the USFWS is intended to calculate mitigation requirement for an "average aged" eagle, as it is focused on circumstances where direct take may occur (e.g., wind turbine collision; USFWS 2013). At this Project, it is the potential indirect take resulting from reduced nest productivity that needs to be offset. Therefore, the original REA model needed to be revised to reflect the relatively lower value of a golden eagle nestling compared to an "average aged" eagle. The revised REA provided for the Project by the USFWS requires that 196 power pole modifications are needed to mitigate for the take of 13 golden eagle nestlings. Within 30 days of permit issuance, California Flats will deposit the necessary mitigation funds into the R8 NFWF account to facilitate the modification of these poles.

<u>Key assumptions of the alternative approach:</u>

- No direct loss of individuals (no eagles will be directly killed by the project)
- Only the indirect loss of potential offspring (and one subsequent generation) from two territories was calculated.

<u>Key results of the alternative approach based on those assumptions:</u>

- Total mitigation debit: 59.94 present-value bird-years
- Poles to be retrofitted: 162.8 (or 195.4 poles at a 1.2 to 1 ratio)*
- Total estimated cost of mitigation: $1,470,000

The proposed approach assumes no direct take, but only the loss of the reproductive capacity (i.e., indirect take or the potential offspring and a subsequent generation) for a single generation time (11 years) of the two pairs of nesting eagles.

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Appendix A. Summary of annual golden eagle nest status and productivity at the California Flats Solar Project, California.

Appendix A. Annual summary of golden eagle nest status and productivity at the California Flats Solar Project, California.

Nest ID[1]	Nest Substrate	Annual Nest Status[2]					Nest Productivity (eggs, young)[3]					Comments
		2013	2014	2015	2016	2017	2013	2014	2015	2016	2017	
GE1A	Oak	Occupied	Unoccupied	Unoccupied	-	-	0, 0	0, 0	0, 0	-	-	2014:Nest condition poor
GE2A	Oak	Active	Occupied	Unoccupied	-	Occupied	0, 2	0, 0	0, 0	-	0, 0	
GE3A	Oak	Failed	Failed	Failed	-	-	0, 2	2, 0	0, 0	-	-	
GE4A	Oak	Active	?	Active	-	Active	0, 2	?, 0	?, 2	-	?, 1+	2014: could not locate; 2015: Nestlings @ 14 – 21 days old April 16; 2017: One fledgling confirmed
GE5A	Oak	Occupied	Occupied	Active	-	-	0, 0	0, 0	?, ?	-	-	
GE6A	Oak	Occupied	Unoccupied	Unoccupied	-	-	0, 0	0, 0	0, 0	-	-	Nest too small for eagle; *censored from analysis*
GE7A	Transmission tower	Occupied	Unoccupied	Unoccupied	-	-	0, 0	0, 0	0, 0	-	-	2014: Nest too small for eagle, nesting ravens; *censored from analysis*
GE8A	Gray Pine	Occupied	Unoccupied	Unoccupied	-	-	0, 0	0, 0	0, 0	-	-	2015: Nest too small for eagle – poor condition
GE9A	Gray Pine	Active	Occupied	Occupied	-	-	0, 2	0, 0	0, 0	-	-	
GE10A	Gray Pine	Active	Occupied	Unoccupied	-	-	0, 2	0, 0	0, 0	-	-	
GE11A	Gray Pine	Failed	Failed	Occupied	-	Unoccupied	?, 0	3, 0	0, 0	-	0, 0	2017: nest in disrepair

Appendix A. Annual summary of golden eagle nest status and productivity at the California Flats Solar Project, California.

Nest ID[1]	Nest Substrate	Annual Nest Status[2]					Nest Productivity (eggs, young)[3]					Comments
		2013	2014	2015	2016	2017	2013	2014	2015	2016	2017	
GE12 A	Oak	Active	Failed	Active	Active	Failed	0, 2	1, 0	?, 2	?, 2	?, 0	2015: Nestlings @ 35 days old; May 5; 2016: Successfully fledged early June; 2017; no nestlings observed following incubation
GE13 A	Oak	Active	Unoccupied	Occupied	Active	Active	0, 2	0, 0	0, 0	?, 2	?, 2	2016: Successfully fledged late June; 2017: used new nest
GE14 A	Oak	Active	Unoccupied	Active	-	Active	0, 2	0, 0	?, 2	-	?, 2	
GE15 A	Oak	Active	Occupied	Unoccupied	-	-	0, 2	0, 0	0, 0	-	-	
GE16 A	Cottonwood	Active	Active	Occupied	-	-	0, 2	0, 1	0, 0	-	-	2014: Nestling @60 days old May 23rd – standing in nest
GE17 A	Oak	Occupied	-	Unoccupied	-	-	0, 0	0, 0	0, 0	-	-	2014: Nest apparently blown out of tree
GE17 B	Oak	Occupied	Unoccupied	Unoccupied	-	-	0, 0	0, 0	0, 0	-	-	Alternate nest
GE18 A	Gray Pine	Occupied	Failed	Occupied	Occupied	Active	0, 0	1, 0	0, 0	?, 0	?, 2	2014–15: Adults observed in tree w/nest in Feb.
GE19 A	Oak	Occupied	Failed	Occupied	Active	Occupied	0, 0	1, 0	0, 0	?, 2	0, 0	2015: Adults observed near nest Feb., May 2016: Successfully fledged early and late June; both juveniles predated

Appendix A. Annual summary of golden eagle nest status and productivity at the California Flats Solar Project, California.

Nest ID[1]	Nest Substrate	Annual Nest Status[2]					Nest Productivity (eggs, young)[3]					Comments
		2013	2014	2015	2016	2017	2013	2014	2015	2016	2017	
GE20A	Oak	Occupied	Unoccupied	Occupied	Unoccupied	Unoccupied	0, 0	0, 0	0, 0	0, 0	0, 0	2015: Adults observed near nest Feb., May; 2017: territory subsumed?
GE21A	Gray Pine	Occupied?	Failed	Failed	-	-	0, 0	2, 0	1, 0	-	-	
GE22A	Gray Pine	Occupied	Unoccupied	Unoccupied	-	-	0, 0	0, 0	0, 0	-	-	
GE23A	Cliff	Failed	Unoccupied	Unoccupied	-	-	?, 0	0, 0	0, 0	-	-	
GE24A	Oak	Occupied?	Unoccupied	Unoccupied	-	Unoccupied	0, 0	0, 0	0, 0	-	0, 0	2017: no adults observed in vicinity of nest
GE25A	Oak	Occupied?	Unoccupied	Unoccupied	-	-	0, 0	0, 0	0, 0	-	-	
GE26A	Cliff	Occupied?	?	Unoccupied	-	-	0, 0	?, ?	0, 0	-	-	2014: Could not locate, 2015: Verified location
GE27A	Cliff	Occupied?	?	Unoccupied	-	-	0, 0	?, ?	0, 0	-	-	2014: Could not locate, 2015: Verified location
GE28A	Oak	Occupied?	Unoccupied	Unoccupied	-	-	0, 0	0, 0	-	-	-	2014: Nest poor condition, 2015: Nest collapsed, *censored from analysis*
GE29b	Gray Pine	-	Unoccupied	Unoccupied	-	-	-	0, 0	0, 0	-	-	
GE30	Gray Pine	-	Unoccupied	Unoccupied	-	-	-	0, 0	0, 0	-	-	
GE31	Gray Pine	-	Unoccupied	Unoccupied	-	-	-	0, 0	0, 0	-	-	

Appendix A. Annual summary of golden eagle nest status and productivity at the California Flats Solar Project, California.

Nest ID[1]	Nest Substrate	Annual Nest Status[2]					Nest Productivity (eggs, young)[3]					Comments
		2013	2014	2015	2016	2017	2013	2014	2015	2016	2017	
GE32	Gray Pine	-	Occupied	Occupied	-	-	-	0, 0	0, 0	-	-	2015: Greenery in nest March 5
GE33	Gray Pine	-	Unoccupied	Occupied	-	-	-	0, 0	0, 0	-	-	2015: Greenery in nest March 5
GE34	Cliff	-	Occupied	Unoccupied	-	-	-	0, 0	0, 0	-	-	2014: Adult nearby
GE35	Oak	-	Unoccupied	Unoccupied	-	-	-	0, 0	0, 0	-	-	
GE36	Gray Pine	-	Unoccupied	Occupied	-	-	-	0, 0	0, 0	-	-	2015: Greenery in nest March 5
GE37	Oak	-	Unoccupied	Unoccupied	-	-	-	0, 0	0, 0	-	-	
GE38	Oak	-	Occupied	Unoccupied	-	-	-	0, 0	0, 0	-	-	2014: Adult nearby nest
GE39	Oak	-	Unoccupied	Unoccupied	-	-	-	0, 0	0, 0	-	-	2015: Nest condition poor
GE40	Gray Pine	-	Occupied	Unoccupied	-	-	-	0, 0	0, 0	-	-	2014: Adult nearby nest 2015: Nest condition poor
GE41	Oak	-	Active	Occupied	-	-	-	?, 2	0, 0	-	-	2014: Nestlings @55 days old May 23rd – one in nest one perched on branch 2015: Nest gone – adults present
GE42	Gray Pine	-	Unoccupied	Unoccupied	-	Active ?	-	0, 0	0, 0	-	?, 1+	2017: Nest structure could not be viewed; adults in area and food begging audible in early June.

Appendix A. Annual summary of golden eagle nest status and productivity at the California Flats Solar Project, California.

Nest ID[1]	Nest Substrate	Annual Nest Status[2]					Nest Productivity (eggs, young)[3]					Comments
		2013	2014	2015	2016	2017	2013	2014	2015	2016	2017	
GE43	Gray Pine	-	Unoccupied	Unoccupied	-	-	-	0, 0	0, 0	-	-	
GE44	Gray Pine	-	Active	Unoccupied	-	-	-	?, 2	0, 0	-	-	2014: Nestlings @55 days old May 23rd – adult feeding in nest
GE45	Gray Pine	-	Unoccupied	Unoccupied	-	-	-	0, 0	0, 0	-	-	
GE46	Gray Pine	-	Unoccupied	Occupied	-	-	-	0, 0	0, 0	-	-	2015: Greenery in nest March 5
GE47	Oak	-	-	Active	-	-	-	-	?, ?	-	-	2015: Adult sitting on nest April 16
GE48	Oak	-	-	Unoccupied	-	-	-	-	0, 0	-	-	
GE49	Oak	-	-	Unoccupied	-	-	-	-	0, 0	-	-	
GE50	Oak	-	-	Unoccupied	-	-	-	-	0, 0	-	-	
GE51	Oak	-	-	Occupied	-	-	-	-	0, 0	-	-	2015: Greenery in nest March 5
GE52	Oak	-	-	Unoccupied	-	-	-	-	0, 0	-	-	
GE53	Oak	-	-	Occupied	-	-	-	-	0, 0	-	-	2015: Greenery in nest March 5

[1] Nest ID = alpha notation "A" for the first 29 nests as reported by H.T. Harvey & Associates 2013a. Nests discovered during successive years continued in numerical order.

[2] Active = an adult, eggs, or young was present in/on the nest, Occupied = fresh nesting material was built into nest suggesting maintenance during breeding period or if adults were observed nearby, Unoccupied = none of the conditions for Active or Occupied were observed; "-" = Pre-2015 nests not found, Post-2015 nest not surveyed; "?" = Uncertain nest status based on adults in the area that could not be attributed to a specific nest.

[3] "?" = Undetermined number of eggs or young; "-" = Pre-2015 nests not found, Post-2015 nest not surveyed.

Appendix B. California Flats Solar Project Preliminary Assessment of Eagle Activity and Potential Relationships to Mammalian Prey Distribution (H.T. Harvey and Associates 2014)

H. T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

California Flats Solar Project Preliminary Assessment of Eagle Activity and Potential Relationships to Mammalian Prey Distribution

Project # 3544-01, 7-1

Prepared for:

California Flats Solar, LLC
135 Main Street, 6th Floor
San Francisco, CA 94105, Suite 2870

Prepared by:

H. T. Harvey & Associates

January 2014

Cal Poly Technology Park, Bldg. 83, Ste. 1B • San Luis Obispo, CA 93407 • Ph: 805.756.7400 • F: 805.756.7441

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Contributors

Brian Boroski, Ph.D., Vice President and Senior Wildlife Ecologist—Principal-in-Charge
Scott B. Terrill, Ph.D., Vice President and Senior Ornithologist—Technical Advisor
Jeff P. Smith, Ph.D., Senior Wildlife Ecologist—Project Manager
Jeff Zirpoli, M.S., Wildlife Ecologist—Field Biologist

Introduction

This report provides a preliminary assessment of the activity patterns of eagles, especially golden eagles (*Aquila chrysaetos*), in the area proposed for development of the California Flats Solar Project (Project) in southeastern Monterey County, California, in relation to what is known about the distribution of potential mammalian prey species in the Project area. This assessment is based on ongoing baseline surveys conducted by H. T. Harvey & Associates (HTH) ecologists, including aerial nest surveys in 2013 covering a 10-mile radius around the Project site, general avian activity surveys conducted throughout the Project site semi-monthly from March through early December 2013, and various mammal surveys conducted in 2012 and 2013. The detailed results of most of these surveys were summarized in previous reports (HTH 2013a, b, c, d, e, f).

Methods

Potential Prey

Data on potential prey were collected as follows:

- Infrared, remote-sensing, camera-station surveys conducted in October and November 2012 at various locations within the Biological Study Area (BSA) delineated around the Project site.
- Full coverage, systematic, transect surveys conducted on foot or from UTVs in November 2012 across the entire BSA. Observers recorded the locations of all burrow systems used by Heermann's kangaroo rat (*Dipodomys heermanni*), and all den or burrow systems that could be inhabited or were created by other special-status mammal species, such as American badger (*Taxidea taxus*) and San Joaquin kit fox (*Vulpes macrotis mutica*). In addition, all California ground squirrel (*Otospermophilus beecheyi*) burrow systems were mapped on approximately 645 acres of the BSA.
- Systematic scent dog surveys were conducted in September and October 2013 across a representative sample of the BSA, at 0.25- and 0.5-mile intervals. The dog was trained to target and alert to San Joaquin kit fox scat, but the team recorded all carnivore scat observed. Scats were confirmed to species through morphometric comparisons, or, when DNA amplification was possible, mitochondrial DNA sequence data involving multiple (200+) comparative points (HTH 2013d).
- Spotlight surveys were conducted on three nights during late November and early December in 2012 and 2013. Surveys were conducted along existing access roads, and were substantially expanded in 2013 to include the PIA, Project vicinity, and publicly accessible areas adjacent to the Project site that provided substantial coverage of the project area. Areas that could not be accessed during spotlight surveys included portions of the transmission corridor (where it spans drainages or steep valleys) and the interior portion of the largest Project areas. In 2012, the surveyors recorded each animal sighting as a location along the road where the sighting occurred. During the 2013 surveys, the actual location of observed wildlife was approximated and recorded using iPads equipped with a GPS, GIS Kit® software.
- During site visits and biological surveys for a variety of natural resources (e.g., birds, special-status plant species, etc.), HTH biologists also recorded other opportunistic observations of potential eagle prey, including feral pigs and rabbits on or near the Project site.

Eagles

Data on the distribution of eagles and their activities were collected as follows:

- Aerial surveys conducted in late March and mid-May 2013 throughout a 10-mile radius area surrounding the Project site. Besides observations of nesting birds, these surveys resulted in other observations of foraging, roosting, and flying eagles in areas away from known nesting areas.

- Ground surveys for nesting raptors conducted monthly in the BSA from March through June 2013, covering on foot, and while driving along accessible roads, all areas where trees or rocky outcrops capable of supporting nesting raptors occurred. During these surveys, observers opportunistically recorded other observations of golden eagles and bald eagles within the BSA.
- General avian-activity point counts (Bird Use Counts [BUC]) conducted semimonthly from March through November 2013 across the Project site (see Figure 1 for count-site locations).
- Opportunistic recording of eagle sightings while traveling Project roads and through Cholame Valley to access the Project site.

During these surveys, all eagle sightings were either located on paper maps and later digitized, or were digitally mapped in the field using an iPad equipped with a GPS, GISKit® software, project schematics, and aerial imagery. In addition, during the semi-monthly avian activity counts, the approximate flight paths of all observed eagles were mapped.

Mapping Analysis

For the purposes of this analysis, we categorized potential mammalian prey species into three categories: 1) California ground squirrel; 2) other burrowing animals; and 3) other potential prey species. The first category included locations of California ground squirrel burrows and burrow complexes. The second category included burrowing owl sign and sightings, unknown mammal burrows (typically a single den or burrow system that was the appropriate size and shape to be inhabited by or created by a burrowing mammal species other than a California ground squirrel; e.g., American badger, San Joaquin kit fox, coyote [*Canus latrans*], and striped skunk [*Mephitis mephitis*]), and Heermann's kangaroo rat precincts. The third category included all confirmed sightings and sign of other species listed in Table 1, except California ground squirrel and Heermann's kangaroo rat. Many of the unknown mammal burrows, burrowing owl locations, and Heermann's kangaroo rat locations were situated among California ground squirrel colonies, with surveyors specifically describing many of these locations as being among California ground squirrel colonies. In these instances, we mapped the points as California ground squirrel burrows for the purpose of this analysis. Nevertheless, it is important to understand that the currently available data on the distribution of California ground squirrels—a key eagle prey species—on the Project site and in the surrounding landscape is substantially incomplete.

To provide a preliminary illustration of the degree to which eagle nesting and activity patterns around the Project site may reflect the distribution of potential prey species, we overlaid the recorded distributions of potential prey species, including California ground squirrels, and the available observations of eagle nest sites, sightings, and flight paths. We then visually assessed the overlays for apparent patterns.

Table 1. Potential Mammalian Prey Species for Golden Eagles Foraging in the Vicinity of the California Flats Solar Project

Species	Notes
American badger	Potential prey species
Audubon's cottontail	Known primary prey species
Black-tailed jackrabbit	Known primary prey species
Bobcat	Potential prey species
California ground squirrel	Known primary prey species
Coyote	Potential prey species
Domestic cattle	Scavenging resource
Feral pig	Known prey species (piglets) /scavenging resource
Heermann's kangaroo rat	Unlikely prey species
Long-tailed weasel	Potential prey species
Raccoon	Potential prey species
San Joaquin kit fox	Potential prey species
Striped skunk	Potential prey species
Pronghorn	Potential prey species/scavenging resource
Tule elk	Potential prey species (young calves)/scavenging resource
Feral cat	Potential prey species
Black-tailed deer	Potential prey species (fawns)/scavenging resource
Red fox	Potential prey species
Gray fox	Potential prey species
Domestic dog	Potential prey species

Results

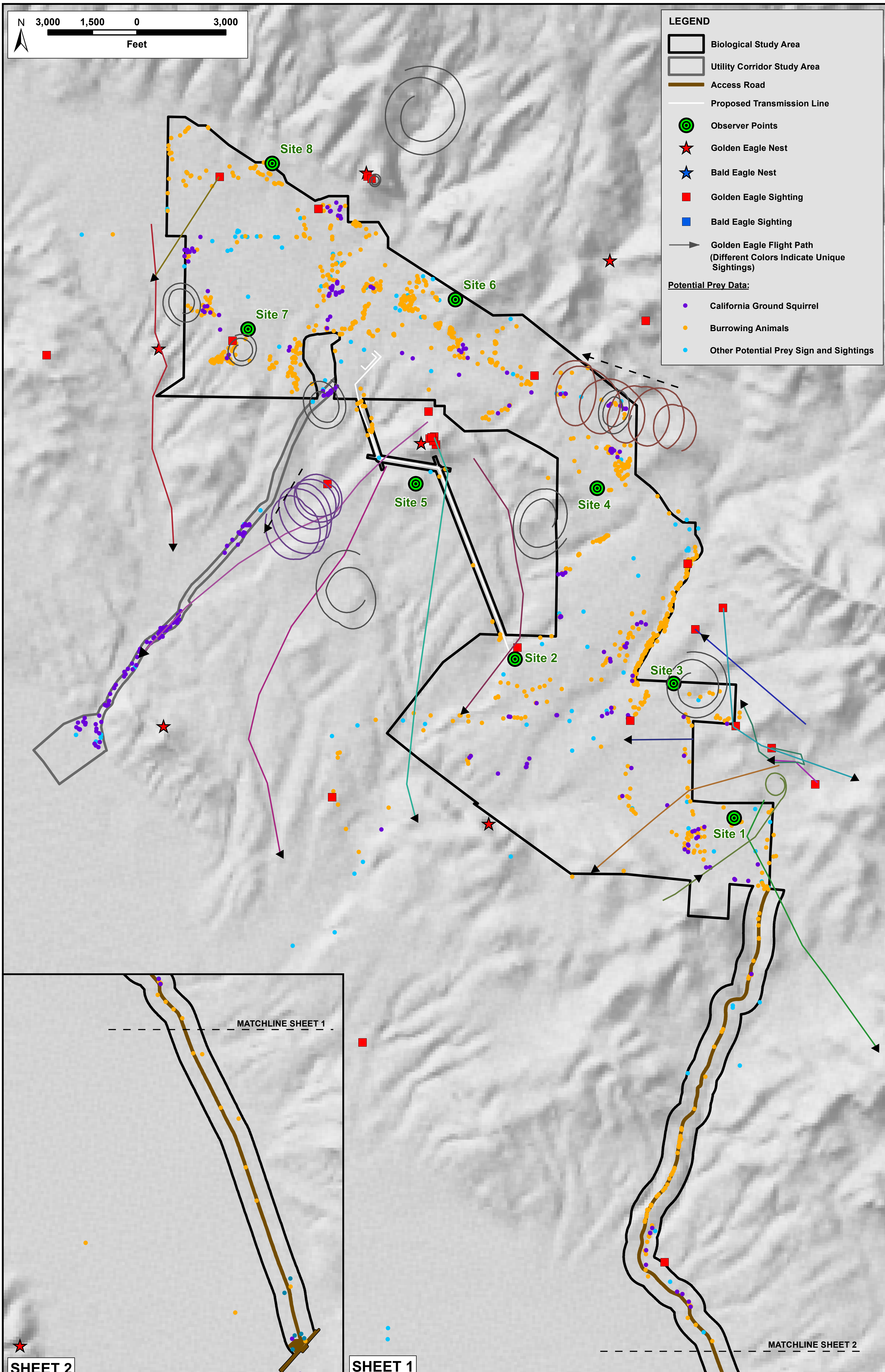
Distribution of Potential Prey

A variety of potential mammalian prey species for golden eagles occur in the Project vicinity (Table 1). The most common include California ground squirrel, Audubon's cottontail (*Sylvilagus audubonii*), black-tailed jackrabbit (*Lepus californicus*), coyote, and young feral pigs (*Sus scrofa*). Among the 24,047 photographs recorded during camera-station surveys, 2,445 had recognizable images of 6 potential prey species. Full coverage ground surveys detected 4 potential mammalian prey species, scent dog surveys detected 5 potential mammalian prey species, and spotlight surveys detected 10 potential mammalian prey species.

Eagle Activity

The aerial surveys confirmed 12 active golden eagle nests and 1 active bald eagle nest, plus a variety of other known or potential eagle nests in the vicinity of the Project, but none on the Project site (Figure 1). Currently, our records contain 103 distinct observations of individual or multiple golden eagles or bald eagles, comprising a total of 103 golden eagle and 7 bald eagle observations on or adjacent to the Project site from November 2012 through 05 December 2013. Thirty-seven of those sightings were of perched birds (32 perched golden eagles, 5 perched bald eagles), 60 sightings were of birds in flight (59 flying golden eagles, 1 flying bald eagle), and 12 sightings (11 golden eagles and 1 bald eagle) did not have flight or perch information associated with the observation. We recorded 18 sightings of non-adults, 65 sightings of adults, and 20 sightings of unknown-age golden eagles. We recorded 2 adult and 5 subadult bald eagles on or near the Project site. During the non-breeding season (November 2012 – 15 January 2013 and 01 September – 05 December 2013), we recorded 23 observations of golden eagles: 5 adults, 9 non-adults, and 9 unknown-age eagles. During the breeding season (15 January – 31 August 2013), we documented 80 observations of golden eagles: 56 adults, 13 non-adults, and 11 unknown-age eagles. During the breeding season, we observed 4 adult and 4 subadult bald eagles. During the non-breeding season, we observed 1 subadult bald eagle.

We have not conducted any formal analysis of eagle distribution and habitat use; however, the observations collected to date have revealed a few areas of eagle activity (Figure 1). The southeast portion of the Project site near BUC sites 1 and 3 appears to be a relatively high use area, as does a centrally located area near BUC site 5 in the vicinity of the proposed powerline corridor. During the standardized avian point counts conducted through November 2013, eagles were observed on 9 occasions; 4 of these sightings occurred at BUC site 5. A number of sightings also occurred near BUC site 8 in the northern Project area.



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H. T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

First Solar.

Figure 1: Golden Eagle and Bald Eagle Nests and Sightings, and the Documented Distribution of Potential Mammalian Prey Species
California Flats Solar Project, California (3544-01)
January 2014

Discussion

Distribution of Potential Prey

The California ground squirrel is the most abundant, and probably most important, prey species in the Project area for golden eagles. The ground squirrel colonies and burrow systems on the Project site are well established, many with an apparent long history of occupation and development. Our observations suggest that ground squirrel colonies are distributed widely across the Project site in most habitat types, but higher concentrations tend to occur along road berms, near water sources, along fence lines, in wooded areas, and around homesteads, ranching developments, and other structures. There are notable absences and generally lower densities of ground squirrel colonies in the larger, open, and flatter habitats that compose the interior portions of the largest Project areas. Some of these areas have been historically dryland farmed or disked, recently burned (summer 2012), or contain soils (heavier clay-mesic soil types) that have not been colonized (or re-colonized) and are less suitable for high-density ground squirrel occupation. In these habitats, the ground squirrel colonies are concentrated mainly along fence lines and in drainages and washes.

The distribution of burrowing owls, unknown mammal burrows, and Heermann's kangaroo rats were systematically mapped on the entire Project site (collectively represented as burrowing animals in Figure 1). There are some basic habitat preferences of burrowing owls, burrowing mammals, and Heermann's kangaroo rats that overlap those of the California ground squirrel. On the Project site, Heermann's kangaroo rats and California ground squirrels generally avoid the historically dryland farmed or disked areas, and areas that contain heavier clay-mesic soil types. However, Heermann's kangaroo rats are more restricted to the gentler slopes, flat areas, and more xeric soil types found on the Project site, and California ground squirrel colonies can be found in a broader variety of habitat types (e.g., on steeper slopes and in more mesic soils). Many of the burrowing owl sightings/sign and unknown mammal den locations also were recorded among California ground squirrel colonies.

We have not precisely quantified the degree of habitat overlap between California ground squirrels and other burrowing animals, but we observed an expected amount of co-existence between the relevant species groups. The locations of these other species and their sign can be used as a partial proxy for potentially suitable and occupied California ground squirrel habitat and, therefore, potential eagle foraging habitat; however, there are likely to be many areas inhabited by California ground squirrels that are outside of these mapped areas.

In addition to ground squirrels, potential prey species that our biologists recorded most frequently were feral pigs, Audubon's cottontails, and black-tailed jackrabbits, each of which may constitute significant proportions of the local eagles' diets. The distribution of cottontails and jackrabbits appears more patchily distributed than the distribution of ground squirrels, and they are likely found at much lower densities on the Project site than ground squirrels. Cottontails typically were seen around ranching structures and where large pipes and culverts provided protection, and black-tailed jackrabbits were often observed where vegetation (grass, forb, shrub, or crop) provided sufficient cover. During daylight hours, feral pigs were most often observed in riparian corridors and wooded areas around the Project site, but sign of their foraging (ground disturbances) is evident across much of the Project site. Other larger species that may provide scavenging opportunities for foraging eagles include cattle, Tule elk (*Cervus canadensis*), and pronghorn (*Antilocapra americana*); to date, we have not recorded the latter two species on the Project site.

Eagle Activity

We regularly observed golden eagles, and bald eagles to a lesser extent, on and adjacent to the Project site throughout the year. We observed golden and bald eagles foraging on California ground squirrels (both on and off the Project site) and golden eagles feeding on road-killed feral pig (not on the Project site). However, based on the current mapping of prey distributions and the eagle activity data we have collected thus far, distinct patterns of association cannot be readily discerned. The specific distribution of nest sites is likely driven primarily by substrate availability and appropriate territory spacing, and the limited data on flight activity patterns that we have collected thus far may reflect primarily the territory dynamics of adjacent nesting pairs and flight dynamics related to topography and wind patterns favorable to soaring and general movement.

Many of the general sightings shown on Figure 1 were observations of adult eagles near known or suspected nests sites. In addition, several of the flight paths tracked from the BUC site 5 area, in particular, suggested connections to the active nesting territories located southwest of this area, with other sightings just north of this site involving other distinct adults that were located near another inactive nest in this area. In other words, it appeared that the concentration of activity in the BUC site 5 area might have reflected a boundary conjunction zone for multiple nesting territories. This is an area of mostly annual grassland habitat, with small sections of sparse oak woodland on some north facing slopes. At present, we have little specific information about the distribution of potential prey in this area, but there are likely more California ground squirrel colonies than depicted on Figure 1.

The southeast portion of the project site near BUC site 1, where eagle activity has been relatively high (Figure 1), is an area dominated by annual grassland, but with some ranching structures and debris (e.g., water storage sheds, windmills, discarded irrigation pipes etc.), areas of willow-cottonwood woodlands, riparian oak woodlands, and some non-native woodland. To the east, the hills rise to many exposed rocky outcrops and ridges. There are substantial concentrations of ground squirrel colonies in the area, and we often observed cottontails using the structures and debris in this area. The relatively high concentration of prey is not readily apparent on Figure 1, because our mapping was limited to the BSA and did not fully represent California ground squirrels (other areas mapped within the BSA also under-represent actual ground-squirrel densities, because mapping ground-squirrel colonies was not a primary objective of the previous mapping effort). One active golden eagle nest was located approximately 2 miles west and another 2 miles east of BUC site 1 and the nearby eagle concentration area, and some of the documented flights suggested connections between eagles seen in the area and at least the nesting territory to the west (Figure 1). The eagle observations in this area included both adult and subadult eagles. Therefore, it appears that the southeastern sector of the Project area and the adjacent foothills may be a popular foraging area for the eagles that nest along the southwestern edge of the BSA, as well as for other young eagles, which potentially could be previous offspring of the nesting pair.

The other concentration area near BUC site 8, in the northern section of the Project site and the adjacent foothills (Figure 1), features annual grassland and scattered oak woodlands to the south, whereas to the north the elevation rises quickly and habitats change to a mixture of dense chaparral and gray pine-juniper woodland. The chaparral and gray pine-juniper woodlands do not provide quality foraging habitat for eagles, but the relatively steep terrain likely provides updrafts favored by soaring eagles. The sightings in this area likely reflect the activities of a breeding pair of eagles near an inactive nest site. These eagles also regularly perched in the old orchard trees south of the ranch house located immediately north of the Project site. Drawing conclusions about eagle activity relevant to prey distributions is not yet feasible for this area, because the current mapping of potential prey species does not adequately represent the distribution of key species such as the California ground squirrel.

Based on currently available information, we are unable to draw definitive conclusions about relationships between eagle activity patterns and prey distribution. We can, however, say that eagles frequently use the overall Project area and the surrounding habitats year-round. We have observed adult and subadult golden and bald eagles throughout the monitoring period. We observed more adult (56) than subadult (13) golden eagles during the breeding season, whereas the reverse may have been true during the non-breeding season (9 subadults, 5 adults, 9 unknown age). This suggests that the area may be important for wintering and migrating birds, as well as resident breeders and subadults.

In conclusion, we regularly observed golden eagles, and bald eagles to a lesser extent, on and adjacent to the Project site throughout the year. The current data on prey distribution and limited data on eagle activity do not suggest a distinct pattern of eagle habitat use related to prey distributions. More intensive, extended-duration eagle activity surveys, combined with expanded efforts to map and model prey distributions across both the Project site and surrounding areas, are required to clarify the territory dynamics of golden eagles and patterns of habitat use. One facet of particular importance will be extended observations of eagle activity conducted at sites that are not located in the middle of the proposed Project. The presence of observers in the middle of Project areas may influence eagle activity patterns and bias results (Pagel et al. 2010).

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Appendix B. California Flats Solar Project Bird and Bat Conservation Strategy

California Flats Solar Project
Bird and Bat Conservation Strategy

Prepared for:

California Flats Solar, LLC

135 Main Street, 6th Floor
San Francisco, California 94105

Prepared by:

Western EcoSystems Technology, Inc.

415 W. 17th Street, Suite 200
Cheyenne, Wyoming 82001

July 26, 2017

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1 INTRODUCTION

California Flats Solar, LLC (California Flats) proposes to construct, own, operate, and eventually decommission a 280-megawatt (MW) alternating current (AC) photovoltaic (PV) solar generating facility referred to as the California Flats Solar Project (Project). This Bird and Bat Conservation Strategy (BBCS) was developed to provide a written record of California Flats' efforts 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. After introductory material on project description, the BBCS purpose, and regulatory framework, the BBCS includes the following major sections:

- baseline conditions
- risk assessment
- risk reduction and conservation measures
- construction and post-construction monitoring
- adaptive management

Background and Purpose

The BBCS is not intended to initiate formal consultation for take of federal or state listed or protected species; rather, it provides a summary of current biological conditions and describes conservation measures intended to avoid, minimize, and/or mitigate potential impacts to bird species. Information in this BBCS is intended to correspond to California Flats' proposed measures and mitigation to be described in environmental review documentation being prepared for the Project pursuant to the National Environmental Policy Act (NEPA) and California Environmental Quality Act (CEQA), and includes the following objectives:

- describe baseline conditions for bird and bat species present within the Project site, including results of surveys performed to date;
- present a risk assessment identifying activities during the construction and operation and maintenance (O&M) phases that may increase the potential of adverse effects to bird and bat species located on and adjacent to the Project components;
- specify conservation measures that will be employed to avoid, minimize and/or mitigate any potential adverse effects to these species;
- provide details for an Avian Fatality Monitoring Study to be conducted post-construction including applicable approved protocols that would be used for surveys and monitoring; and
- detail long-term monitoring and reporting goals for the Project.

Corporate Policy and Coordination

California Flats is committed to working cooperatively with federal and state agencies to minimize adverse impacts to protected bird and bat species. Through the planning stages of the Project, California Flats and its consultants have been working in coordination with federal and state agency personnel regarding necessary wildlife surveys and siting considerations to ensure that all parties understand the scope of the Project and potential issues that could be identified and addressed early in the planning process. California Flats will continue to work with the agencies to implement conservation measures intended to avoid, minimize, and/or mitigate potential impacts to bird species, including those measures identified in this BBCS.

2 SITE AND PROJECT DESCRIPTION

The California Flats Solar Project is a proposed 280-MW AC photovoltaic solar power plant located in southeastern Monterey County, California (Figure 1). When approved, the solar facility and related operational infrastructure will be built within an approximately 3,000 acre area of private ranchland. The solar generating portion of the Project (shown as “Project site” on the figures in this document) would be located on approximately 2,720 acres, including an approximately 2,120-acre solar development area. The Project will include construction, installation, and operation of energy-related infrastructure (e.g., solar panels, inverters, substations, a switching station to be owned and operated by Pacific Gas and Electric Company (PG&E), and new power poles and lines) and improvements needed to operate and maintain energy-related facilities (e.g., buildings, internal roadways, access roads, fencing, and lighting). The overall development will also include approximately 60-acres of improvements to an existing access road and its connection to the California Department of Transportation (Caltrans) right-of-way at California State Route (Hwy) 41, approximately 5 miles south of the Project site, as well as a new 155-acre utility corridor. Because the utility corridor was added to the Project plan after some of the initial surveys reported here began, some surveys summarized in the BBCS did not cover that area; however, the relevant area has been subsequently surveyed. The Project site and access road/Hwy 41 improvement areas constituted the original Project impact area (PIA), where all direct, Project-related impacts are projected to occur. A Biological Study Area (BSA) delineated around the PIA and the utility corridor identified the area in which most Project-related biological surveys and assessments were conducted (Figure 1).

California Flats has developed a plan to construct and operate the proposed Project within the Competitive Renewable Energy Zone, under the State’s Renewable Energy Transmission Initiative. The Project site’s elevation and generally flat, south-facing topography creates an ideal place for solar development. Sunlight is plentiful year round because the elevation places the site above the coastal marine layer, and the site does not receive winter fog from the Central Valley. The flat, south-facing topography minimizes the need for mass grading and alteration of landforms to position modules in a way that favors collection of solar energy. In addition, the Morro Bay–Gates 230-kilovolt transmission line crosses the Project site, with capacity sufficient to accommodate the Project.

Power Plant Operations and Maintenance

Power Plant Operations

Upon completion, the Project (Power Plant) generates commercial electricity during daylight hours, seven days per week. Some non-generating equipment remains on-line 24 hours per day and some equipment remains energized briefly after sunset due to capacitance.

Power plant operation is almost entirely automated via an advanced Supervisory Control and Data Acquisition (SCADA) system and redundant automatic controls, with 24 hour per day, seven day per week operational monitoring and event intervention provided through the offsite First Solar Operations Center (FSOC), located in Tempe, Arizona. Under normal operation, few operational tasks are executed by onsite personnel. During abnormal operational events, onsite personnel have the skill and ability to intervene in the highly unlikely event that programmed and redundant automatic safeguards fail to function as designed.

Power Plant Maintenance

Typically, a permanent onsite staff is employed to perform various equipment monitoring, inspection, maintenance, and repair tasks on photovoltaic (PV) generation and transmission equipment. Onsite personnel typically include a site manager/supervisor and 2 to 4 technicians depending upon the size of the power plant and technologies used. Upon assignment, onsite personnel receive thorough and specific training regarding permit conditions, environmental compliance and species-related requirements in effect during operations and maintenance.

For the purpose of this strategy, maintenance activities are separated into three categories, Routine Maintenance, Non-Routine Maintenance and Non-Equipment Maintenance. The large majority of these activities are conducted during daylight hours with rare exceptions that, for safety reasons, require nighttime work when photovoltaic electricity generation is off-line.

Greater than 89% of all maintenance tasks are routine in nature. Each of these tasks are typically executed by one technician that deploys to the field location via pick-up truck and employs only handheld tools and instruments. The large majority of these tasks are accomplished in less than one half hour, including transit time to and from the work location (which typically consumes more time due to distance and low speed limits than the actual task being done).

Non-routine and non-equipment maintenance/biological monitoring historically typically consumes remaining 11% of the time and is skewed by extremely infrequent events which will be discussed in the next two sections. Except in emergency situations, all vehicle traffic is confined to the defined plant roadways only, therefore, technicians park on the roadway adjacent to the work area and walk to the work site from that point.

Routine Maintenance

Routine *preventive* maintenance consists of inspections, calibrations, tests, scans and equipment cleaning pursuant to inspection (referred to as a clean/inspect task).

Routine *corrective* maintenance consists primarily of a wide variety of component replacements that are safely executed by one to two technicians using only handheld tools and equipment.

Non-Routine Maintenance

Non-routine maintenance consists of extremely infrequent tasks that require more than handheld tools or equipment. Across a plant management portfolio of 4.23GWac examples include fence repairs requiring a contracted crew, which has occurred once in the last 7 years; power conversion station (PCS) transformer replacement, which has occurred twice in the last 7 years; substation switchgear replacement which has occurred once in the last 7 years, and substation generator step-up (GSU) transformer replacement, which has occurred once in the last 7 years. Non-routine maintenance may require larger machinery, such as cranes, boom trucks, excavators, or heavy-haul transport.

Non-Equipment Maintenance

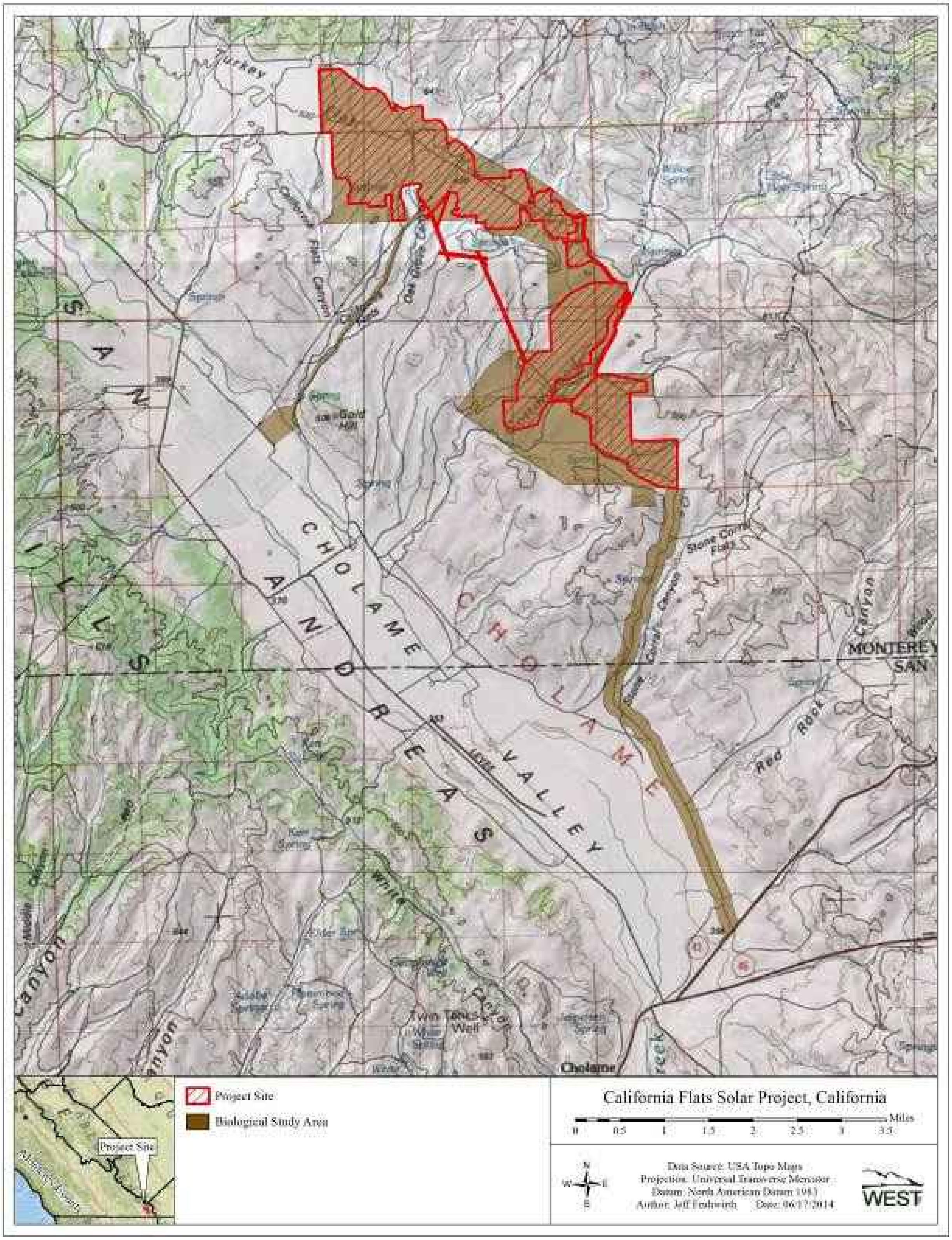
Non-Equipment Maintenance activities include work on other than solar power equipment. These activities consist primarily of compliance-related tasks such as various types of periodic biological surveys. The majority of these activities are conducted by a number of contracted personnel deployed by pick-up truck and afoot and typically occur on either a quarterly, semi-annual or annual basis. Certain power plants require vegetation management in order to maintain low fuel loading around electrical generation equipment. Site-wide vegetation management is characteristically conducted twice per year and may either be performed by livestock grazing or mechanical mowing depending upon permit conditions as indicated in the Project Habitat Restoration and Revegetation Management Plan (HRRMP) (LSA, 2016).. Grazing is the primary method for vegetation management. When vegetation management by grazing is applied, it is usually performed twice per year and entails delivery and retrieval of livestock by a typical livestock trailer most often being moved by a commercial pick-up truck. The livestock are typically shepherded from point-to-point on the hoof and not relocated by vehicle. Vegetation management by mowing is infrequent and typically entails the use of one or more small (sized to fit between array rows) commercial mowers that may either be fuel or electrically powered.

Emergency Repairs

Emergency repairs needed to keep the Project connected to the electrical grid and producing electricity as a result of major equipment malfunction, electrical grid malfunction, or a natural disaster (e.g., earthquake, fire, storm) will be conducted in an expedient manner.

PG&E would be responsible for inspecting, operating, and maintaining its own facilities in compliance with state and federal wildlife regulations, including the Project switching station and the existing Morro Bay–Gates transmission line. These facilities are not covered under this BBCS.

Figure 1. California Flats Project Location



3 REGULATORY REQUIREMENTS RELEVANT TO THIS BBCS

Several federal and state laws and regulations, including NEPA, Endangered Species Act (ESA), Migratory Bird Treaty Act (MBTA), Bald and Golden Eagle Protection Act (BGEPA), CEQA, California Endangered Species Act (CESA), and California Code of Regulations, provide or may provide the foundation for the development of the BBCS. This document represents a comprehensive plan to address the requirements of these regulatory mechanisms as they apply to birds and bats in the Project site.

National Environmental Policy Act

Under NEPA (42 U.S.C. §§ 4321-4370h), federal agencies are required to analyze the potential environmental effects of a major federal action. Because an Individual Permit will be necessary under Section 404 of the Clean Water Act, the U.S. Army Corps of Engineers (USACE) is the lead federal agency responsible for the NEPA analysis for this Project and is in the process of preparing an Environmental Assessment to analyze the potential impacts of the Project.

Endangered Species Act

Certain species at risk of extinction, including many birds and bats, are protected under the federal ESA of 1973, as amended (16 U.S.C. §§ 1531-1544). The ESA 1973 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). The USACE is consulting with the U.S. Fish and Wildlife Service (USFWS) pursuant to Section 7(a)(2) of the ESA.

Migratory Bird Treaty Act

The MBTA (16 U.S.C. §§ 703, et seq.), passed by the U.S. 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 (inclusively referred to as "take") any native migratory bird, part, nest, egg, or product" The MBTA, enforced by the USFWS, protects all MBTA-listed migratory birds from "take" as previously defined, within the United States. In the continental U.S., native non-covered species generally belong to the Order Galliformes. Common non-native species not protected from take by the MBTA include rock pigeon (*Columba livia*), Eurasian collared-dove (*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, as incidental mechanisms are not defined in the Act as a take. Nevertheless, federal agencies such as the USACE have been directed to evaluate the effects of its actions on migratory birds, with an emphasis on species of concern (per Executive Order 13186).

Bald and Golden Eagle Protection Act

BGEPA (16 U.S.C. §§ 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 (*Halieetus leucocephalus*) or golden eagle (*Aquila chrysaetos*). Through recent regulation (50 C.F.R. § 22.26), the USFWS may authorize the 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.

California Environmental Quality Act

Under the California Environmental Quality Act (CEQA) as amended (Public Resources Code [PRC] Section 21000, et seq.), state and local agencies must identify the significant environmental impacts of their actions and avoid or mitigate those impacts, if feasible. The County (Monterey) is the public agency with the principal responsibility for approving the Project, and as such is the Lead Agency for this project under CEQA. The County has determined that the proposed Project is a project of regional importance and that it would have a potentially significant impact on the environment, and therefore is preparing an Environmental Impact Report (EIR), which will address the impacts. Potential impacts to birds and bats are being considered in this document.

California Endangered Species Act

The California Endangered Species Act (CESA; Fish and Game Code Sections 2050 to 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 native species of fishes, amphibians, reptiles, birds, mammals, invertebrates, and plants, and their habitats, threatened with extinction as well as those experiencing a significant decline which, if not halted, would lead to a threatened or endangered designation. CESA also allows for take that is incidental to otherwise lawful development projects.

California Fish and Game Code

Fully Protected Species

The California Fish and Game Code provides protection for a variety of species, referred to as fully protected species. Section 5050 lists fully protected amphibians and reptiles, Section 3515 lists fully protected fish, Section 3511 lists fully protected birds, and Section 4700 lists fully protected mammals. The California Fish and Game Code defines take as to “hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill.” Except for take related to scientific research, all take of fully protected species is prohibited, and the California Department of Fish and Wildlife (CDFW) cannot issue take permits for fully protected species.

Section 3503 and 3503.5 (Protection of Birds and Raptors)

Section 3503 of the California Fish and Game Code prohibits the killing of birds and/or the destruction of bird nests. Section 3503.5 prohibits the killing of raptor species and/or the destruction of raptor nests. Typical violations include destruction of active bird and raptor nests as a result of tree removal and failure of nesting attempts (loss of eggs and/or young) as a result of disturbance of nesting pairs caused by nearby human activity. Consultation with CDFW would be required if nesting would be affected by construction activities.

4 ENVIRONMENTAL SETTING AND PRELIMINARY SITE EVALUATION

The Biological Study Area (BSA) for the Project, which is intentionally larger than the Project site, comprises approximately 4,872 acres in an unincorporated area of southeastern Monterey County and northeastern San Luis Obispo County, California, near the Kings County and Fresno County borders (Figure 1). The BSA is located along the eastern rim of the Cholame Valley. The San Andreas Rift Zone trends northwest-southeast south of the BSA. The BSA is bounded by mostly undeveloped private land in all directions. Sparse residential settlements and small farms are located south and east of the BSA. The BSA is vacant and is currently a working landscape that includes cattle ranching. Most level areas of the BSA (i.e., the area north of the access road spur to Hwy 41) have been historically disked and dryland farmed for hay and small grain production. The BSA can be found on three U.S. Geological Survey (USGS) 7.5-minute quadrangle maps: The Dark Hole, Cholame Valley, and Cholame. Elevation ranges from 1,180 feet National Geodetic Vertical Datum (NGVD) at the intersection with Hwy 41 to approximately 1,860 feet NGVD along the northwest edge of the BSA. Topography within the BSA consists of steeply rolling hills along the edges of the Project site, with extensive alluvial terraces forming wide level plains, primarily within the Project site. These plains and hills are bisected by a number of drainages that typically flow from north to south, with drainage eventually to the Cholame Valley.

Based on vegetation mapping conducted in 2012 (H.T. Harvey and Associates [HTH] 2013a), the predominant natural community on the Project site and BSA includes California annual grassland dominated by non-native grasses typical of the region but also supporting a healthy complement of native forbs (Figures 2a – 2d). Other habitats within the Project site include wildflower fields, serpentine bunchgrass grasslands, valley needlegrass grasslands, grassland riparian, interior coast range goldenbush scrub, willow–cottonwood riparian woodlands, ornamental non-native woodlands, blue oak (*Quercus douglasii*) woodlands, valley oak (*Quercus lobata*) riparian woodlands, ephemeral streams, intermittent streams, perennial streams, perennial marsh, seasonal wetlands, and developed/ruderal grasslands. Habitat composition of the larger BSA is generally similar to that of the Project site with the exception that the BSA contains areas of shrubland (interior coast range goldenbush scrub) that is absent from the Project site. Acreages and the percent of the total land area of communities and habitats on the Project site and BSA, as well as the access road/Hwy 41 improvement areas, are listed in Tables 2 and 3, respectively, of the Biotic Report (Appendix A).

Figure 2a. Natural communities/biotic habitats present within the California Flats Solar Project site and Biological Study Area; based on vegetation mapping conducted by H.T. Harvey and Associates (2013a).

Figure 2b. Natural communities/biotic habitats present within the California Flats Solar Project site and Biological Study Area; based on vegetation mapping conducted by H.T. Harvey and Associates (2013a).

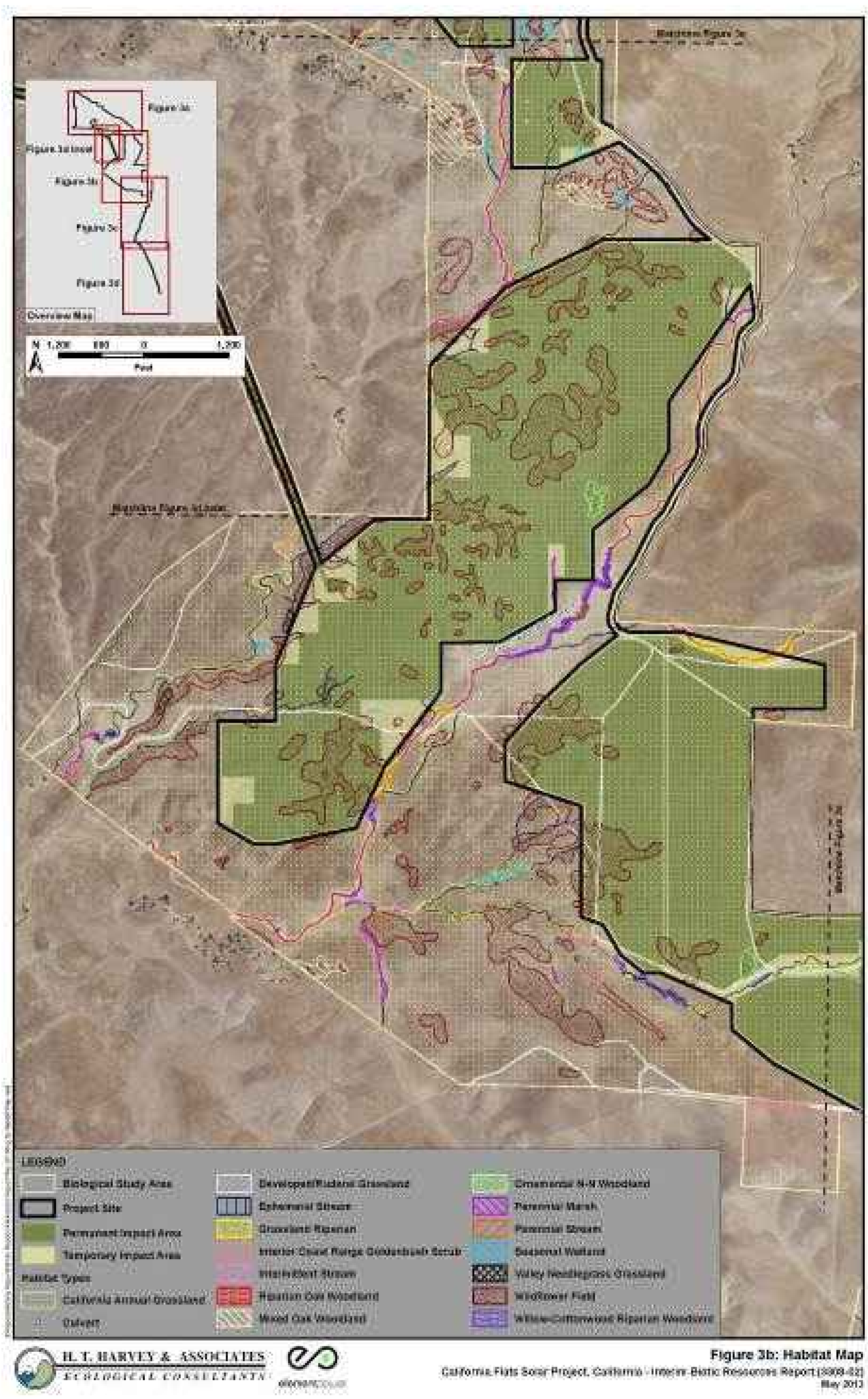


Figure 2c. Natural communities/biotic habitats present within the California Flats Solar Project site and Biological Study Area; based on vegetation mapping conducted by H.T. Harvey and Associates (2013a).

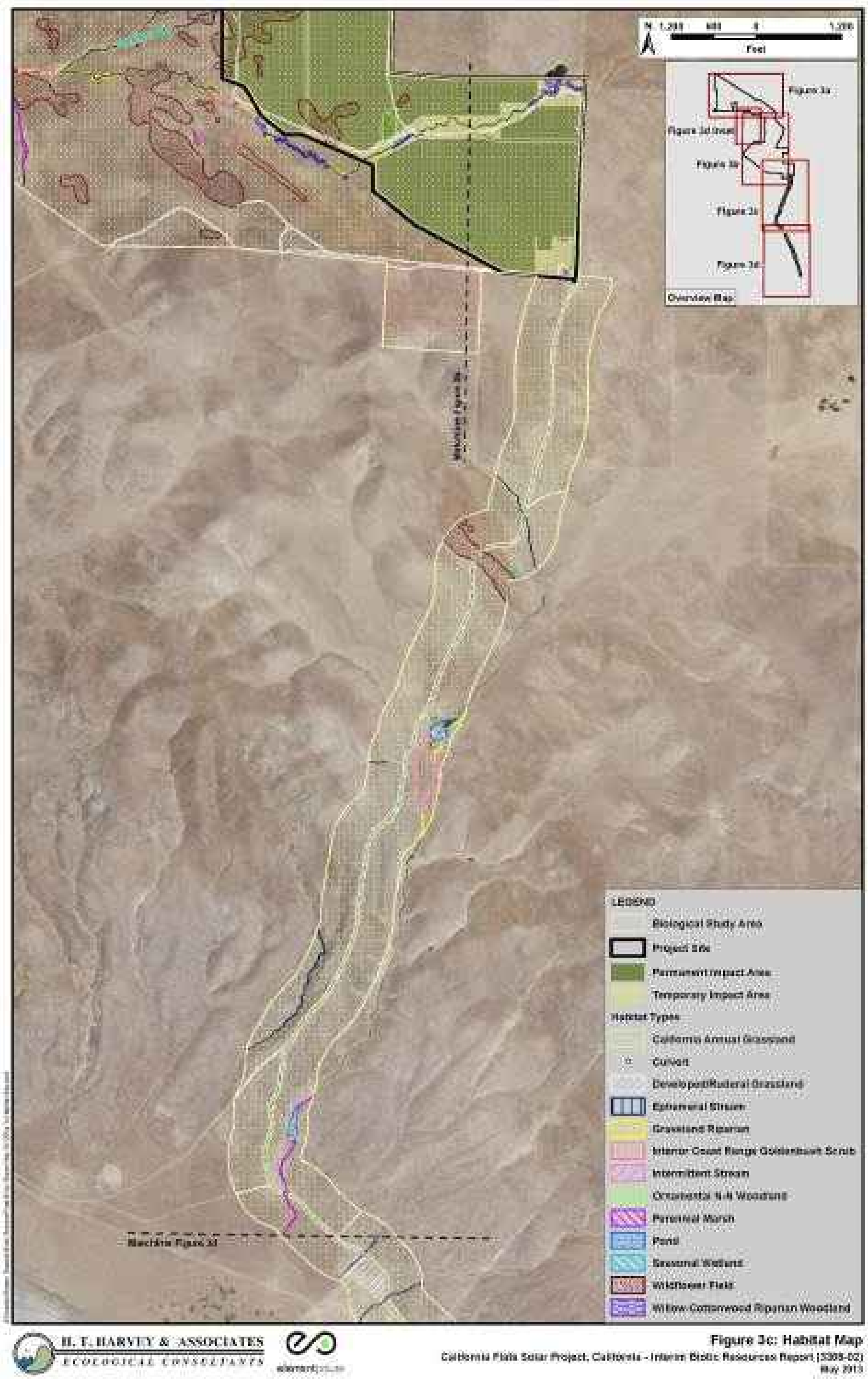
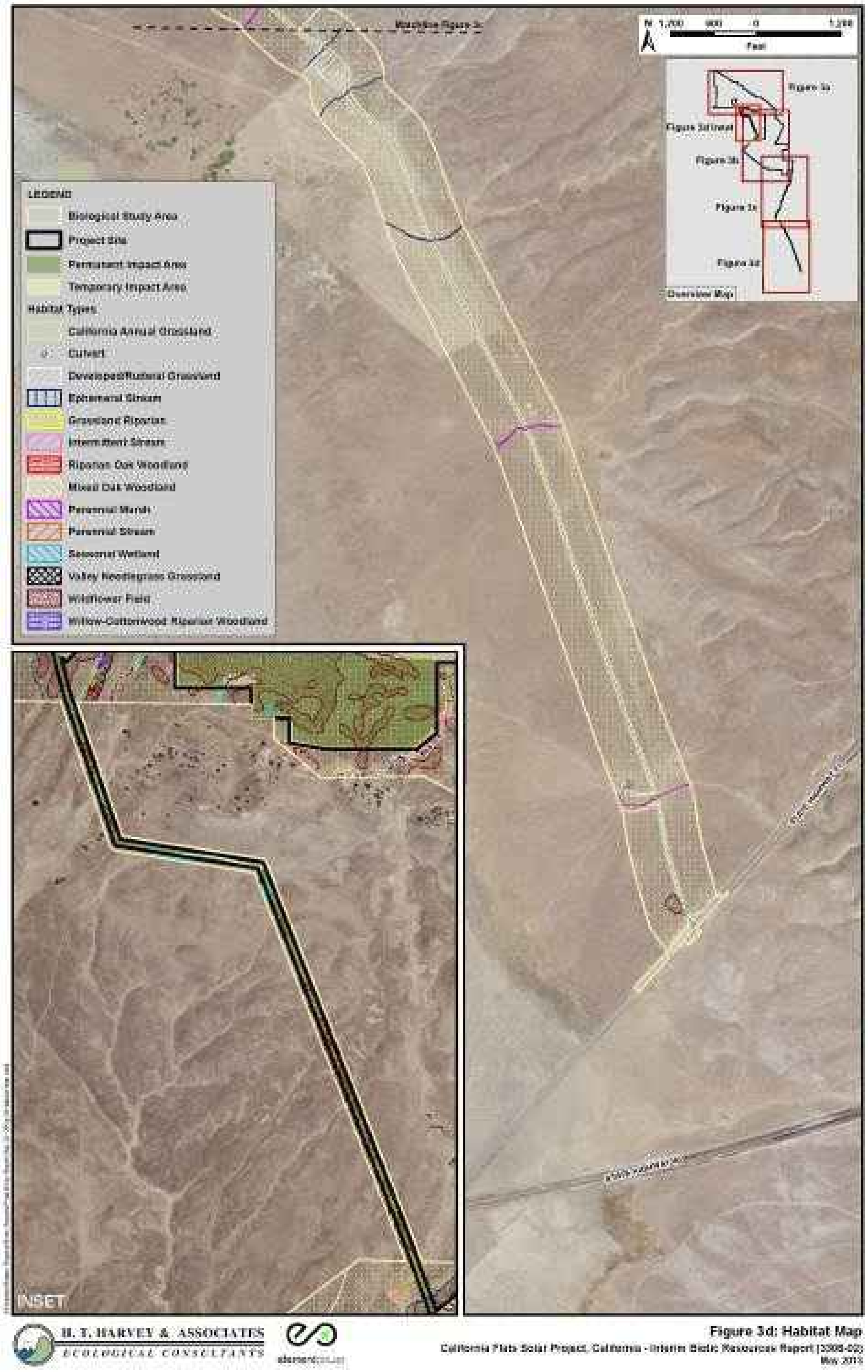


Figure 2d. Natural communities/biotic habitats present within the California Flats Solar Project site and Biological Study Area; based on vegetation mapping conducted by H.T. Harvey and Associates (2013a).



A preliminary evaluation of biological resources within the Project site and surrounding area was conducted by HTH through site visits and a desktop review of existing information. Site visits consisted of reconnaissance field surveys conducted within portions of the BSA on August 19 and 24, 2011 to identify biotic habitats, evaluate botanical and wildlife resources, and assess habitat suitability for special-status plant and animal species that may occur within the Project site. Additionally, HTH collected and reviewed published literature and datasets concerning threatened, endangered, and other special-status species and habitats in the Project vicinity (including the BSA and 5-mile radius). Information was obtained from the California Natural Diversity Database (CNDDB), National Wetlands Inventory, and technical publications.

A list of special-status bird and bat species with potential for occurrence in the Project site has been compiled based on the site evaluation conducted by HTH, an updated search of the CNDDB (2014), and the site-specific baseline studies conducted for the Project to date (see Section 5 and Appendices A, B, C and E; Table 1).

Table 1. Special-status bird and bat species with the potential for occurrence in the California Flats Solar Project.

Species	Scientific Name	Status[1] Fed/State	Detected During Baseline Surveys?
Birds			
Allen's hummingbird	*Selasphorus sasin*	BCC/-	No
Bald eagle	*Haliaeetus leucocephalus*	BGEPA, BCC/SE, FP	Yes
Burrowing owl	*Athene cunicularia*	BCC/SSC	Yes
California condor	*Gymnogyps californianus*	E/E	No
Golden eagle	*Aquila chrysaetos*	BGEPA, BCC/FP	Yes
Grasshopper sparrow	*Ammodramus savannarum*	-/SSC	No
Lawrence's goldfinch	*Spinus lawrencei*	BCC/-	No
Lewis's woodpecker	*Melanerpes lewis*	BCC/-	Yes
Loggerhead shrike	*Lanius ludovicianus*	BCC/SSC	Yes
Long-billed curlew	*Numenius americanus*	BCC/SSC	Yes
Long-eared owl	*Asio otus*	-/SSC	No
Mountain plover	*Charadrius montanus*	BCC/SSC	No
Northern harrier	*Circus cyaneus*	-/SSC	Yes
Nuttall's woodpecker	*Picoides nuttallii*	BCC/-	Yes
Oak titmouse	*Baeolophus inornatus*	BCC/-	Yes
Oregon vesper sparrow	*Pooecetes gramineus affinis*	-/SSC	No
American peregrine falcon	*Falco peregrinus anatum*	BCC/FP	No
Purple martin	*Progne subis*	-/SSC	No
Short-eared owl	*Asio flammeus*	-/SSC	Yes
Swainson's hawk	*Buteo swainsoni*	BCC/T	Yes
Tricolored blackbird	*Agelaius tricolor*	BCC/SSC	Yes
White-tailed kite	*Elanus leucurus*	-/FP	No
Yellow-billed magpie	*Pica nuttalli*	BCC/-	Yes
Yellow warbler	*Dendroica petechia brewsteri*	BCC/SSC	No
Vaux's swift	*Chaetura vauxi*	-/SSC	No

Bats			
Pallid bat	*Antrozous pallidus*	-/SSC	Yes
Townsend's big-eared bat	*Corynorhinus townsendii*	-/SSC	No
western red bat	*Lasiurus blossevillii*	-/SSC	No
Western mastiff bat	*Eumops perotis californicus*	-/SSC	No

[1]Compiled from the California Natural Diversity Database (CNDDB) as well as baseline studies (CNDDB 2014; Appendices B-D).

E=Endangered (CDFW 2014); T=Threatened (CDFW 2014); BCC=USFWS Bird of Conservation Concern in Bird Conservation Region 32 (Coastal California; USFWS 2008); FP=Fully Protected (CDFW 2014); SSC=Species Special Concern (CDFW 2014); BGEPA= Bald and Golden Eagle Protection Act (BGEPA 1940)

5 SITE-SPECIFIC BASELINE AVIAN AND BAT STUDIES

A number of site-specific baseline avian and bat studies have been, and continue to be, conducted within the BSA (Table 2). Summaries of the baseline avian and bat studies are provided below and final reports are provided in Appendices B-E.

Table 2. Baseline avian and bat studies conducted at the California Flats Solar Project.

Study Type	Dates	Description	Report
Burrowing owl surveys	November 2012	Daytime grid surveys and nighttime spotlight surveys in Project site and access road/Hwy 41 improvement areas.	H.T. Harvey and Associates (2013a) (Appendix A)
Raptor nest surveys	March – June 2013	Aerial survey for golden eagle, bald eagle, and California condor nesting territories within 10 miles of Project and Swainson's hawk nests within 5 miles of Project; ground surveys for other raptors nesting within 500 m of Project.	H.T. Harvey and Associates (2013b) (Appendix B)
Aerial golden eagle nest surveys	March – June 2014	Aerial (helicopter) surveys to locate golden and bald eagle nests and assess nest productivity within 10 miles of Project site.	WEST (2014a) (Appendix B)
Bird use count surveys	March 2013 – March 2014	Fixed-point bird use surveys within 800-m survey viewshed conducted at eight locations throughout the BSA; 20-min surveys conducted at each point twice/month.	H.T. Harvey and Associates (2014a) (Appendix C)
Eagle use/distribution surveys	March – December 2014 (ongoing)	Eagle (and other raptor) use surveys within unlimited viewshed conducted at 10 points (6 in Project site and 4 in surrounding landscape); 3-hr surveys conducted at each point twice/month.	WEST (2014a) (Appendix D)
Bat habitat assessment	October 4 and 15, 2013	Driving/walking surveys to identify and evaluate potential bat habitat within the BSA.	H.T. Harvey and Associates (2014b) (Appendix E)

Acoustic bat surveys	October 16-24, 2013	Passive acoustic surveys at locations identified during initial habitat assessment as having potential for higher bat use or roosts.	H.T. Harvey and Associates (2014b) (Appendix E)

Burrowing Owl Surveys

Methods

Surveys for burrowing owls, and other burrowing animals, were conducted by HTH throughout the Project site over the course of 10 days in November 2012. Surveys were conducted by walking transects throughout the entire Project site and recording all direct observations of burrowing owls or owl sign (e.g., potential burrows and burrow systems, whitewash, pellets, feathers).

Additionally, spotlight surveys were conducted over three nights in November and December 2012 and six nights in September 2013 by two teams comprising two surveyors each. Surveyors searched from both sides of the vehicle with high output spotlights. Animals were identified using high-powered binoculars or spotting scopes.

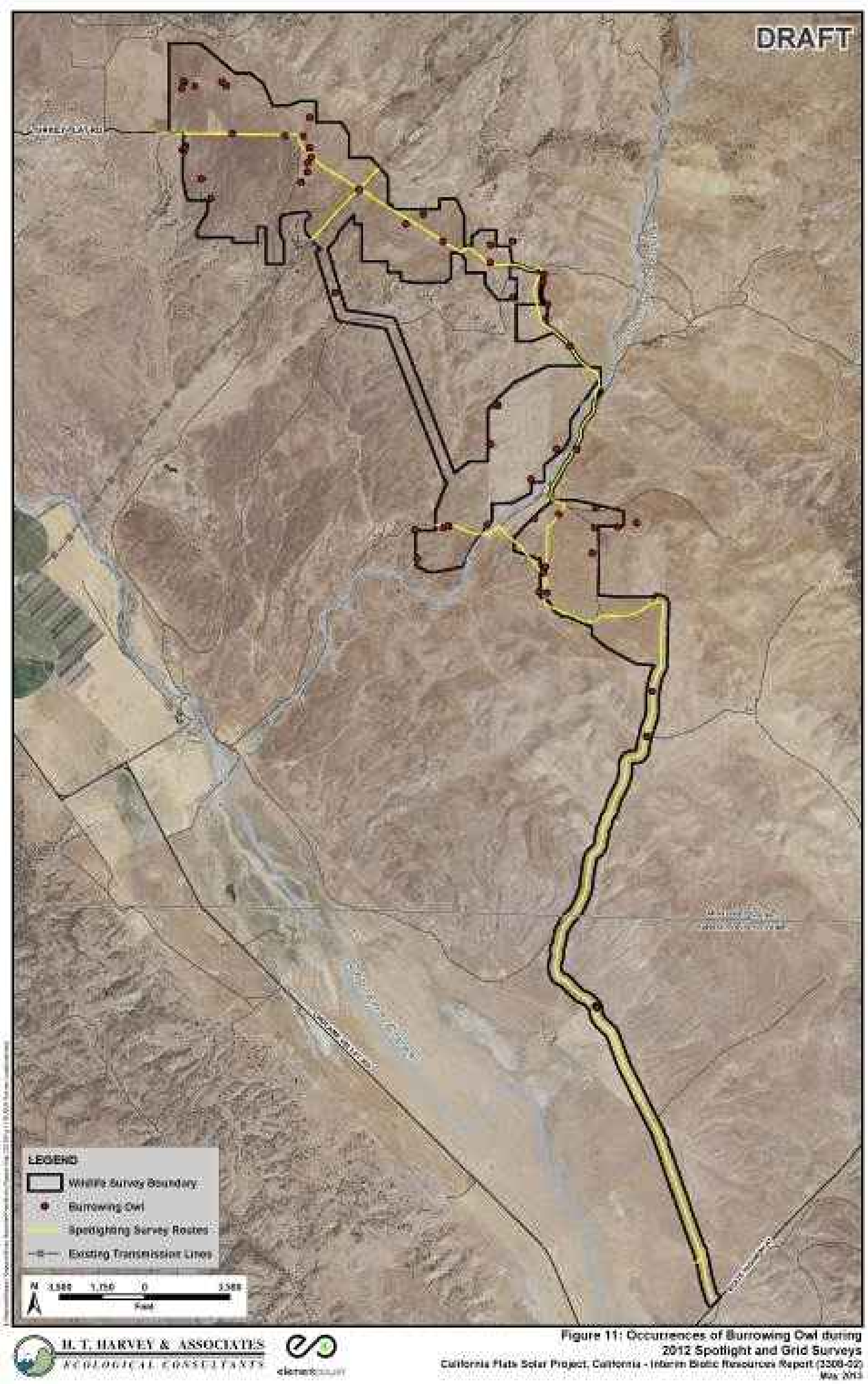
Results

Daytime transect surveys and nighttime spotlight surveys conducted in 2012 confirmed burrowing owls or their sign throughout most areas of the Project site and in several areas along the access road (Figure 3).

Conclusions

Nearly the entire Project site currently provides suitable foraging and breeding habitat for burrowing owls. The grassland, rolling foothill habitats and California ground squirrel (*Otospermophilus beecheyi*) burrow systems in the area provide suitable foraging, nesting, and sheltering opportunities for resident, wintering, and transient owls. Suitable habitat for the species is also present along the access road.

Figure 3. Occurrences of burrowing owl during 2012 spotlight and burrowing animal surveys, taken from Biotic Report by H.T. Harvey and Associates (2013a).



Raptor Nest Surveys

Methods

Ground and aerial surveys for nesting raptors within the Project vicinity were conducted by HTH during the 2013 breeding season (Appendix B). The goals of the surveys were to determine the degree to which Project development might influence the nesting and foraging activities of golden eagles whose home ranges overlap the Project site, and to assess the potential for Project development to adversely affect other raptors that nest or roost on or near the Project site. The study involved both aerial (helicopter) and ground surveys. The primary objectives of the helicopter surveys, conducted in late March and mid-May, were to: 1) achieve a comprehensive, baseline inventory of golden eagle, bald eagle, and California condor occupied nesting territories, nest locations, and nesting activity within 10 miles of the Project site (Figure 1); 2) search for potential Swainson's hawk nesting territories within 5 miles of the Project site; and 3) obtain an indication of nesting success and productivity for the local golden eagle population. The objective of the ground surveys, conducted from March through June 2013, was to collect additional information about raptor nesting activity on the Project site and within a 1,640-foot buffer area.

A second year of eagle nesting surveys was conducted by WEST during the 2014 breeding season (Appendix B). The goals of this survey effort were to identify the distribution of golden and bald eagle nests within a 10-mile radius of the Project site, as well as territory occupancy, hatching success, and fledgling production. An initial comprehensive nest survey that included initial notes on active nesting status was conducted on April 15-17 and a follow-up survey to further document and confirm nesting status and productivity was conducted on May 23, 2014. All aerial surveys, conducted during both 2013 and 2014, were consistent with the USFWS survey guidelines (Pagel et al. 2010).

Basic nest use was categorized consistent with definitions from the USFWS Eagle Conservation Plan Guidance (April 2013). Nests were classified as occupied if any of the following were observed at the nest structure: (1) an adult eagle in an incubating position, (2) eggs, (3) nestlings or fledglings, (4) occurrence of a pair of adult eagles (or, sometimes subadults), (5) a newly constructed or refurbished stick nest in the area where territorial behavior of an eagle had been observed early in the breeding season, or (6) a recently repaired nest with fresh sticks (clean breaks) or fresh boughs on top, and/or droppings and/or molted feathers on its rim or underneath. Occupied nests are further classified as active if an egg or eggs have been laid or nestlings are observed, or inactive if no eggs or chicks are present. A nest that is not occupied will be classified as inactive, as evidenced by no indication of recent use or attendance by adult eagles. Eagle nests are classified as unoccupied if no eagles were seen at the nest nor in the vicinity of the nest—evidence that the breeding territory itself may be unoccupied.

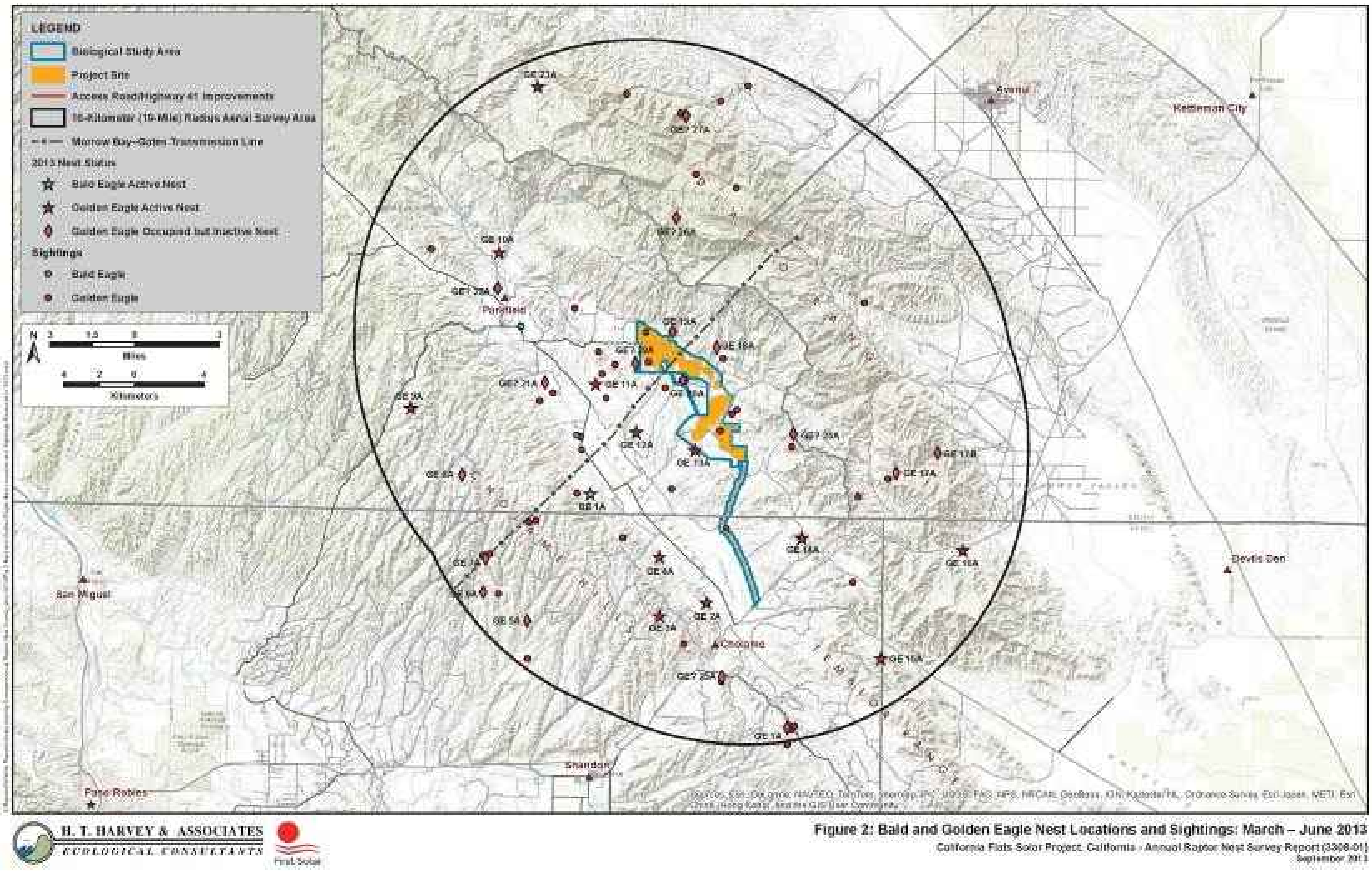
Results

2013 Surveys

During the 2013 survey effort, 12 occupied and active golden eagle nests and one occupied and active bald eagle nest were documented (Figure 4) within the survey area but outside of the

Project site. No Swainson's hawks or California condors were observed within the overall aerial survey area. A single bald eagle nest was located along the eastern edge of the Cholame Hills, 4.0 miles southwest of the Project boundary. Active golden eagle nest 13A was located in Cholame Valley on an oak-covered hillside southwest of the Project site and 0.3 mile from a proposed solar array location. Active golden eagle nests 11A and 12A were located 1.9–2.0 miles west of the Project site in Cholame Valley, in a gray pine and oak, respectively. Five other active golden eagle nests were located on oak hillsides ≤ 5 miles from the Project site or access road: golden eagle nests 14A and 15A were located south of the Project in the western foothills of the Diablo Range; golden eagle nests 2A and 4A were located in the southeastern Cholame Hills overlooking Cholame Valley; and golden eagle nest 3A was located in the southwestern Cholame Hills. The four remaining, active golden eagle nests (9A, 10A, 16A, and 23A) were located > 5 miles from the Project site or access road (Figure 4).

Figure 4. 2013 Raptor Nest Locations. Taken from H.T. Harvey 2013 Raptor Nest Survey Report



In addition to the 12 pairs tending active nests, five pairs of adult golden eagles were documented near an inactive nest or a nest that clearly did not belong to another pair's core nesting area. Two of these pairs were associated with large, distinctive eagle nests (1A and 18A) that were in good shape and had been built up over several years. The remaining three eagle pairs were observed at inactive nests 6A, 19A, and 20A. Although pairs of golden eagles were observed near each of these nests, the nest structures were not unequivocally classifiable as eagle nests. Two other locations (17A and 5A) clearly represented other distinct golden eagle nesting areas, but the presence of established breeding pairs was not confirmed (Figure 4).

While no eagle nests were documented within 1,640 feet of the Project site, a number of other raptor nests were identified in this area, including five active red-tailed hawk (*Buteo jamaicensis*) nests and one active great horned owl (*Bubo virginianus*) nest (Appendix B). No prairie falcon (*Falco sparverius*) nests were documented within, or in the immediate vicinity of, the Project site or access road; however, two active prairie falcon nests with chicks were documented 1.3 miles northwest of the Project site, and 2.0 miles east of the Project site (Appendix B).

<u>2014 Surveys</u>

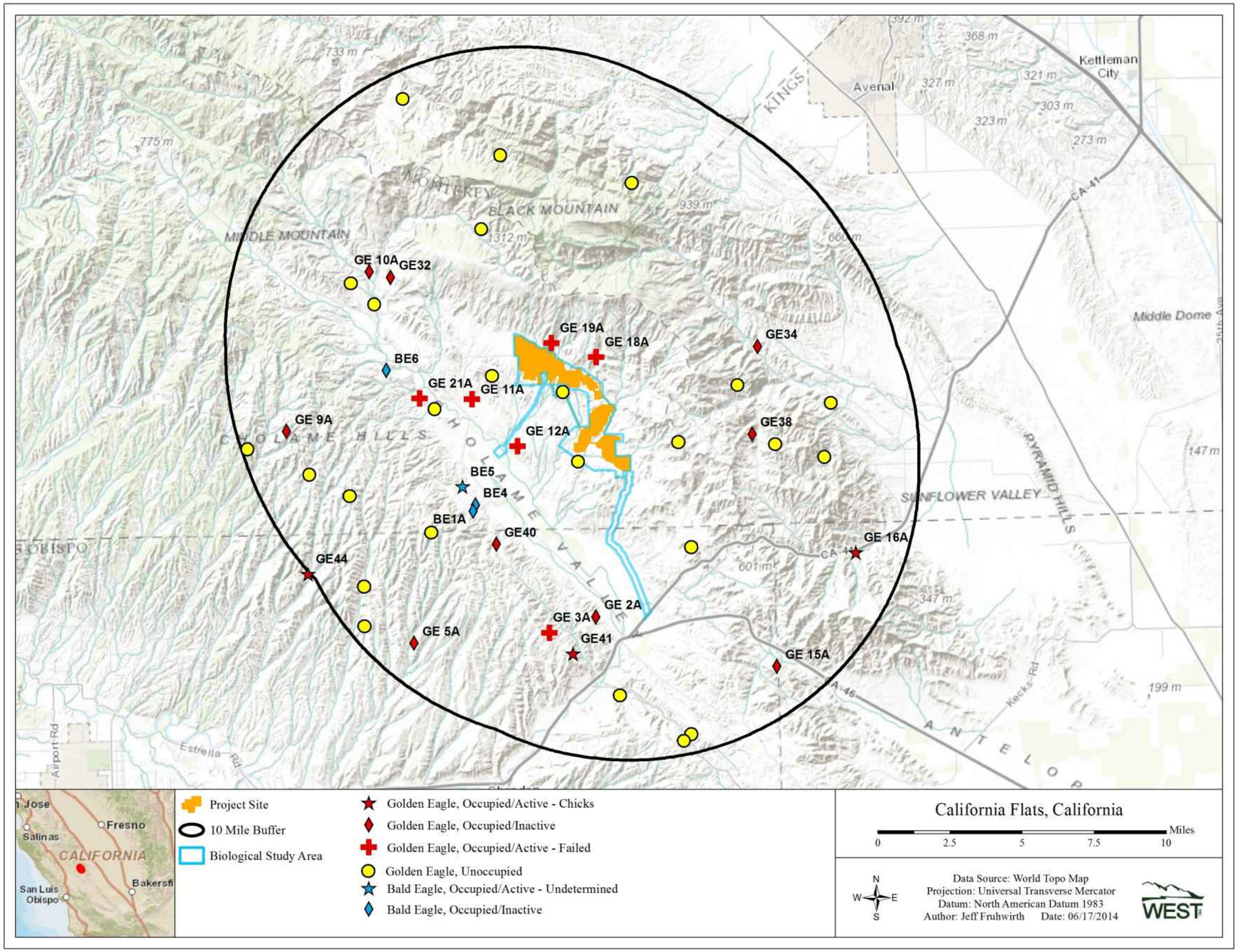
During the April 2014 eagle nesting survey, a total of nine occupied and active golden eagle nests and one occupied and active bald eagle nest were documented. Of the active nests, six golden eagle nests (GE18A, GE19A, GE11A, GE12A, GE3A, and GE21A) were determined to have failed and the remaining three active golden eagle nests (GE13, GE16A, and GE19) and the single active bald eagle nest (BE15) all successfully fledged young. Nine additional golden eagle nests and one bald eagle nest were documented as occupied but inactive, and 25 nests were documented as unoccupied golden eagle nests (Figure 5). Of the active nests, five failed golden eagle nests and one successful bald eagle nest are located within 8 km (5 miles) of the Project site. These include GE19A and GE18A which are 0.3-1.1 km (0.2-0.7 miles) northeast of the Project site, GE11A, GE12A, and GE21A which are 3.0–5.8 km (1.9–3.6 miles) west of the Project site, and BE15 which is approximately 6.7 km (4.2 miles) southeast of the Project site (Figure 5).

Of the 13 eagle nests identified as active in 2013, four were active again during the 2014 nest survey (GE16A, GE3A, GE11A, GE12A), four were occupied but inactive in 2014 (GE15A, GE2A, GE9A, GE10A) and the remaining five were unoccupied in 2014 (GE14A, GE4A, BE1A, GE13A, and GE23A).

Two occupied active, failed golden eagle nests (GE 18A and GE 19A) were located within 1.5 miles of the Project site. No other occupied (active or inactive) eagle nests were located within 1.5 miles of the Project site, although three unoccupied golden eagle nests were located within this distance.

Appendix B provides more information on the results of the 2013 and 2014 eagle nest surveys.

Figure 5. 2014 Raptor Nest Locations



Conclusions

The landscape in the Project vicinity is dominated by gently rolling terrain and grasslands, surrounded by woodlands and shrublands where various trees and rocky outcrops provide nest substrates suited to eagles. While eagle nesting substrate is lacking within the Project site, the site does provide potential foraging habitat for eagles nesting in the surrounding region. Results from the two years of eagle nest surveys suggest that the Project vicinity supports a relatively high density of nesting golden eagles.

One-half the mean inter-nest distance has been used as a coarse estimate for the territory boundary in a number of raptor studies (e.g., Soutullo et al. 2013). As such, the USFWS (2012, 2013) recommends using nearest-neighbor distances among occupied nests to estimate approximate territory size in the vicinity of a project. Typically, this involves measuring the distances between occupied nests and calculating a mean inter-nest distance, with half this value being the radius of an eagle territory. For this Project, both occupied bald eagle and golden eagle nests were used to calculate this distance, since it appears that the bald eagles in the Project are using similar foraging and breeding habitat as the golden eagles, and would therefore be assumed to affect the territory of adjacent breeding golden eagles. Nearest-neighbor distances among occupied nests (active and inactive) ranged from 0.38 to 7.71 km (0.24 – 4.79 mi) with a mean inter-nest distance of 3.42 km [2.12 mi]). Note that two of the occupied-inactive bald eagle nests (BE1A and BE4) are located 0.38 km from each other; based on field observations it is assumed that both of these nests and nest BE5 are all occupied by the same bald eagle pair. Therefore, the overall range and mean is likely conservative (i.e., indicating a smaller/denser territory size than is actually the case). In comparison, in 2013, the nearest-neighbor distances for occupied eagle nests (active and inactive) had a mean of 4.9 km (3.0 mi; HTH 2013).

Understanding that eagle territories are not perfectly circular, the nearest-neighbor calculations for this study population nevertheless suggest that the typical distance that nesting eagles are defending is on the order of 1.05 to 1.5 miles from the nest. This range of values suggests that the territories of eagles that nest within 1.5 miles could overlap the Project site. Based on the 2014 survey results, there were two occupied nesting territories that were outside of the Project site but were within 1.5 miles.

In other areas of the country where golden eagles are relatively common, the 3.42 to 4.9 km (2.12 – 3.0 mi) mean nearest distances recorded at the California Flats Project area in 2013 and 2014 appear comparable. For example, in 12 areas of Wyoming, mean distances between adjacent occupied golden eagle nests ranged from 3.1 to 8.2 km (1.9 – 5.1 mi, mean 5.3 km [3.3 mi]; Phillips et al. 1984). In Denali National Park, Alaska, among 72 golden eagle pairs, nearest-neighbor distances ranged from 1.5 to 8 km (0.9 – 5.0 mi, mean 6 km [3.7 mi]), and among 56 golden eagle pairs in southwest Idaho, nearest-neighbor distances were 0.8 to 16 km (0.5 – 9.9 mi, mean 4.3 km [2.7 mi]; Kochert et al. 2002).

One of the greatest densities of nesting golden eagles in California was documented in a radio-telemetry study conducted in Central California’s oak savannah and woodland habitat near the

Altamont Wind Resource Area near the northern end of the Diablo Mountain range (Hunt et al. 1995, 1999; Hunt 2002, Hunt and Hunt 2006). In this study area near Altamont, extensive radio-telemetry research demonstrated minimum densities of about 1 golden eagle pair per 30 square kilometers (Hunt 2002). While the data collected in the California Flats project area does not provide for a direct comparison, it appears habitats and likely eagle nesting densities (and presumably territory sizes) in the Cholame Valley and the southern Diablo Range is roughly comparable to that found in similar habitats in the northern Diablo Range.

The relatively high density of occupied golden eagle territories recorded at the Project (2.12 to 3.0 mile mean inter-nest distance compared to 2.7 – 3.7 mile for other studies in the western U.S.) is likely in part due to the abundance of high quality foraging habitat located throughout the area. Preferred habitats include mountainous canyon land, rim-rock terrain of open desert and grassland areas, particularly those areas that are greater than 457 m (1,499 ft.) in elevation (Kochert et al. 2002). In central California, golden eagles nest primarily in open grasslands and oak savanna and to a lesser degree in oak woodland and open shrublands (Hunt et al. 1995, 1999), all habitats to be found in abundance surrounding the Project. In addition, golden eagles are common in grazed areas and much of the remaining habitat in central and southern California is found in patches of relatively inaccessible mountainous country, primarily livestock ranches (Thelander 1974) like those found within and surrounding the Project.

Eagle use surveys were specifically conducted to better understand eagle use of the Project site and the surrounding landscape (see Section 5.4).

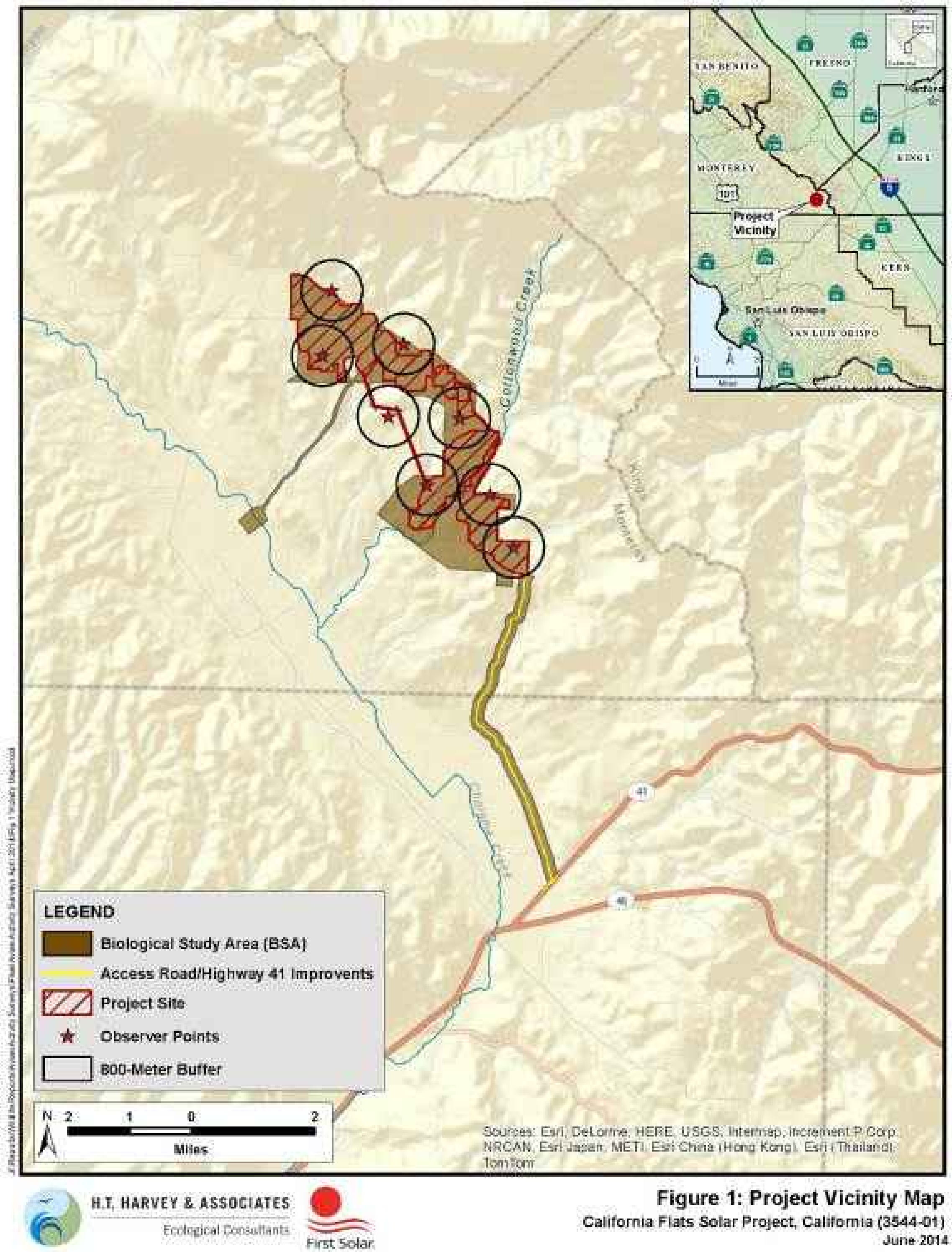
Bird Use Counts

Methods

Bird use count (BUC) surveys were conducted by HTH from late March 2013 through early March 2014 at eight locations chosen to represent the proposed Project site (Figure 6, Appendix C). The 0.5-mile-radius (800 meter) viewsheds of the eight survey plots collectively covered approximately 44% of the Project site, effectively representing the proposed development areas and the primary habitats found within the site. Each month, two 20-min surveys were conducted at each BUC location, one during morning hours and one during afternoon hours. Counts generally occurred semimonthly, on one day each, during the first and third weeks of the month. The order in which surveys occurred each month was based on a random-start, systematic-progression protocol designed to ensure equitable coverage of all sites during morning and afternoon hours. During each 20-min BUC, all birds seen or heard within 0.5 miles of each count location were recorded. For informational purposes, larger birds, such as eagles, seen beyond the 800-m plot were also occasionally and separately recorded; however, these observations were not included in the analyses.

For summary purposes, raw counts were translated into sightings per hour, and patterns of variation were examined for five distinct species groups: raptors (hawks, eagles, falcons, owls, and vultures), shorebirds (sandpipers, plovers, and allies), corvids (Corvidae: ravens, crows, magpies, and jays), icterids (Icteridae: blackbirds, orioles, and starlings), and other, mostly smaller, birds (passerines, hummingbirds, swallows/swifts, woodpeckers, quail, etc.). Metrics of activity were evaluated for the five groups of birds as a function of survey location and season.

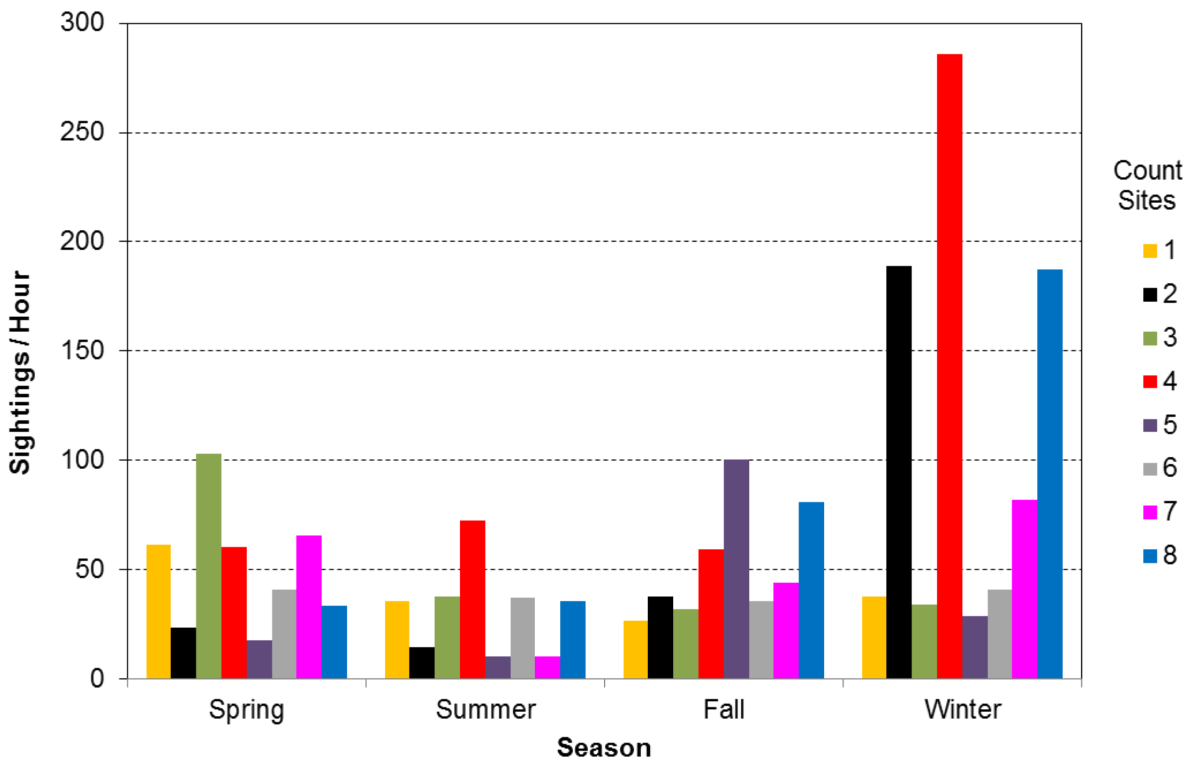
Figure 6. Bird Use Count Locations, and associated 800-m viewsheds, at the California Flats Solar Project, March 2013 – March 2014. Taken from H.T. Harvey 2013 Avian Activity Survey Report



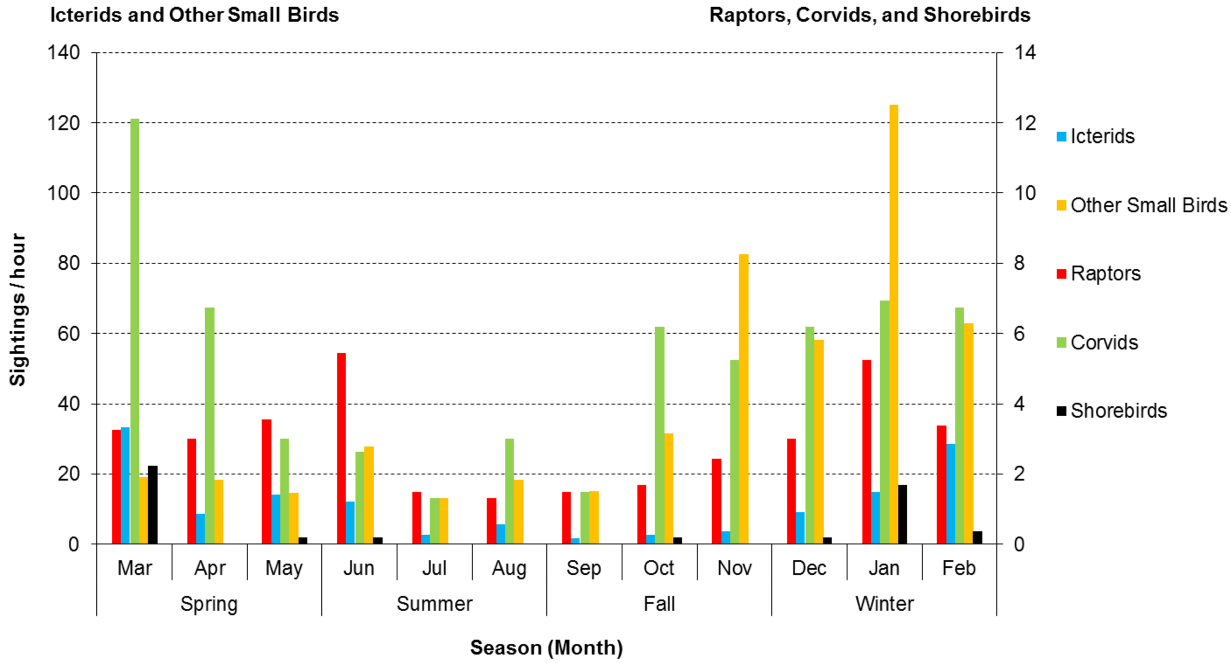
Results

From late March 2013 through early March 2014, a total of 200 20-minute BUCs were conducted, with each count site surveyed at least six times during each quarterly season (spring, summer, fall, and winter) across the year-long survey period. It should be noted that throughout the survey period, moderate to severe drought conditions prevailed across the entire region and Project site. The low precipitation resulted in minimal to no growth of grassland vegetation and limited seasonal development of wetlands and intermittent streams preceding and during the survey period.

A total of 4,061 individual bird observations, representing 45 species were recorded during the surveys (Appendix C). Species diversity was higher in spring and winter than in summer and fall (Appendix C). With data for all species combined and summarized across all seasons, the highest average activity rates occurred at BUC Site 4 (117 sightings/hour) and BUC Site 8 (82 sightings/hour), with slightly lower rates at BUC Sites 2, 3, and 7 (51–64 sightings/hour), and the lowest rates occurred at BUC Sites 1, 5, and 6 (38–41 sightings/hour) (Appendix C). The high overall activity rates at BUC Sites 4 and 8 mostly reflect relatively large wintering flocks of horned larks and house finches. Examination of site-specific activity rates across seasons revealed that most sites supported at least moderate activity during at least one season. At the species-group level, raptors, shorebirds, corvids, and icterids showed higher activity rates in spring, lower activity rates in summer, and then higher activity rates again from late fall through winter (Appendix C).



Graph 1. All-bird average activity rates by count site and season.



Graph 2. Seasonal activity pattern of primary species groups.

One hundred ninety-seven raptor and vulture observations, representing nine species, were recorded during surveys. Raptors and vultures accounted for 4.9% of total bird sightings (Appendix C). American kestrels (*Falco sparverius*; 39 sightings) and red-tailed hawks (113 sightings) were relatively abundant and recorded during all seasons. Golden eagles (16 sightings) were also recorded during all seasons and at all locations but Site 2, and turkey vultures (*Aura cathartes*; nine sightings) were generally present year round. Ferruginous hawks (*Buteo regalis*; 11 sightings) were observed relatively frequently during fall and winter; prairie falcons (five sightings) between October and June (they nested in the nearby foothills); and northern harriers (*Circus cyaneus*), burrowing owls, and Swainson's hawks only once or twice each during the scheduled fall, winter, and spring counts (Appendix C).

The modeling results confirmed marginally significant seasonal variation in overall raptor activity, as well as significant variation across sites. Average raptor activity was lower in fall and lower at BUC Sites 2, 5, 7, and 8. Sites 1, 3, and 4 encompassed active red-tailed hawk nests, and Sites 1 and 3 were among the survey areas closest to an active golden eagle nest. The analysis of shorebird activity rates indicated no overall seasonal variation, but indicated marginally higher activity at BUC Site 3 compared to the sites where no shorebird activity was observed (Sites 5, 6, and 8).

Five special-status bird species were observed during the scheduled surveys: Swainson's hawk (state threatened), golden eagle (state fully protected and federal bird of conservation concern [BCC]), northern harrier (state species of special concern [SSC]), burrowing owl (SSC and BCC), and loggerhead shrike (*Lanius ludovicianus*; SSC and BCC). Two short-eared owls (*Asio* *flammeus*; SSC) and several small flocks of tricolored blackbirds (*Agelaius tricolor*; SSC and BCC) were also observed on the Project site outside of the scheduled survey times.

Conclusions

The species observed during BUCs constituted a diurnal assemblage typical of the open grassland, oak savanna woodland, and riparian habitats of the inner Coast Ranges of central California, with species representation varying by season. Species notably absent from the survey counts included waterfowl and most other aquatic-oriented species. These species generally are not expected in upland grassland habitats, but may be expected to be more prevalent in the area during years when drought conditions do not prevail, including in the seasonal wetland habitats identified on the Project site and along the riparian corridors that transect the area.

The overall seasonal patterns, much of the species composition, and the activity rates were similar to those documented over a two-year period (fall 2011 to fall 2013, and ongoing) at the California Valley Solar Ranch (CVSR) on the open grassland habitats of the Carrizo Plain, approximately 40 miles to the south (HTH 2014b). However, the Project site features a considerably greater abundance of woodland habitat than is found at CVSR, and the observed species composition therefore includes several additional species more characteristic of such habitats; e.g., Bullock's oriole (*Icterus bullockii*), ash-throated flycatcher (*Myiarchus cinerascens*), Lewis's woodpecker (*Melanerpes lewis*), Nuttall's woodpecker (*Picoides nuttallii*), and yellow-billed magpie (*Pica nuttalli*). In addition, the density and relative proximity of tree-nesting raptors such as golden eagles and red-tailed hawks is greater in this Project area. For most of these additional species, however, development of this Project is not expected to pose a substantial threat, because little woodland habitat will be directly affected. The occurrence of special-status species in the Project vicinity has been limited, with the exception of golden eagles, which are present in the Project vicinity.

Eagle Use Surveys

Methods

Eagle use/activity surveys were conducted by WEST from March 2014 through December 2014 (WEST 2015). The purpose of the surveys was to characterize use of the Project site and surrounding landscape by golden eagles, particularly the foraging habits of locally breeding, migrant, and wintering eagles. Surveys were conducted every two weeks from 10 observation points including six points located within or adjacent to the Project site, and four points located in areas to the west and south of the Project site (Figure 7). Observation points were established in locations that afford broad overviews of the Project site and surrounding landscape and allow for effective documentation of the activity patterns and home-range dynamics of resident breeders, as well as use of the region by migrant and wintering eagles. Documentation of flight paths and identification of potential high activity areas (foraging, perching, roosting) or seasons was the primary focus of the survey effort. Each observation point was surveyed every two weeks for a continuous 3-hour period, with surveys scheduled such that observation periods covered most daylight hours (approximately 9:00 am to 6:00 pm) over the course of the 10-month study.

Although the focus of the surveys was eagles (particularly golden eagles), all raptors and other sensitive avian species seen or heard during each survey were recorded, as well as observations of these species made while in-transit between points. Data collected during each 3-hour survey included: date, start and end time of the observation period, plot number, species or best possible identification, number of individuals, sex and age class, distance from plot center when first observed, direction of flight, height above ground, activity, and habitat. Additionally, for each individual eagle observed during the survey period, the above data were recorded for each minute that eagle was in view.

Figure 7. Location of 2014 eagle use/activity survey stations at the California Flats Solar Project.

Results

As stated above, WEST began the eagle use/activity surveys in March 2014 and continued these surveys through December 2014. Surveys were conducted at 10 observation stations once every two weeks over the course of the ten-month study, for a total of 199 surveys totaling 597 hours of survey. During the course of the study, a total of 216 separate golden eagle observations (flying and perched) were recorded and 1,215 golden eagle flight minutes were recorded within an unlimited viewshed surrounding the survey stations. Eagle flight paths that were mapped during this time period are shown on Figure 8.

During the ten-month study period, the greatest overall golden eagle use occurred in the spring, with use appearing to gradually decrease throughout the summer, and increasing somewhat during the fall and early winter.

While the mapped flight paths shown on Figures 8 and 9 indicate golden eagles are clearly using the general Project area, they do suggest that golden eagles flying in the vicinity of the Project are not using the landscape consistently and/or evenly. Furthermore, the mapped flight pathways illustrate that over extended periods of observation of the Project site during the spring, summer, fall, and early winter of 2014, golden eagles did not appear to be consistently using substantial portions of the Project site, particularly in some of the flatter areas for the solar arrays. This may be due to a combination of factors that seem to attract higher levels of eagle use such as prey availability (based on a burrowing animal survey of the site, ground squirrel burrows appear particularly concentrated along the edge of drainages) and/or areas of steeper topography creating wind updrafts conducive to efficient soaring. Additionally, a substantial amount of the activity that was observed near point CF1 on the northeast edge of the Project site was associated with golden eagle activity in the vicinity of the two active (failed) nests (GE19A and GE18A), while activity near points CF3 and CF5 on the west and southwest edge of the Project site was associated with golden eagles traveling to and from trees in the ravines outside of the Project site, which they used as temporary perching points.

Figure 8. Digitized golden eagle flight paths recorded during eagle surveys at the California Flat Solar Project, March 10 to December 22, 2014.

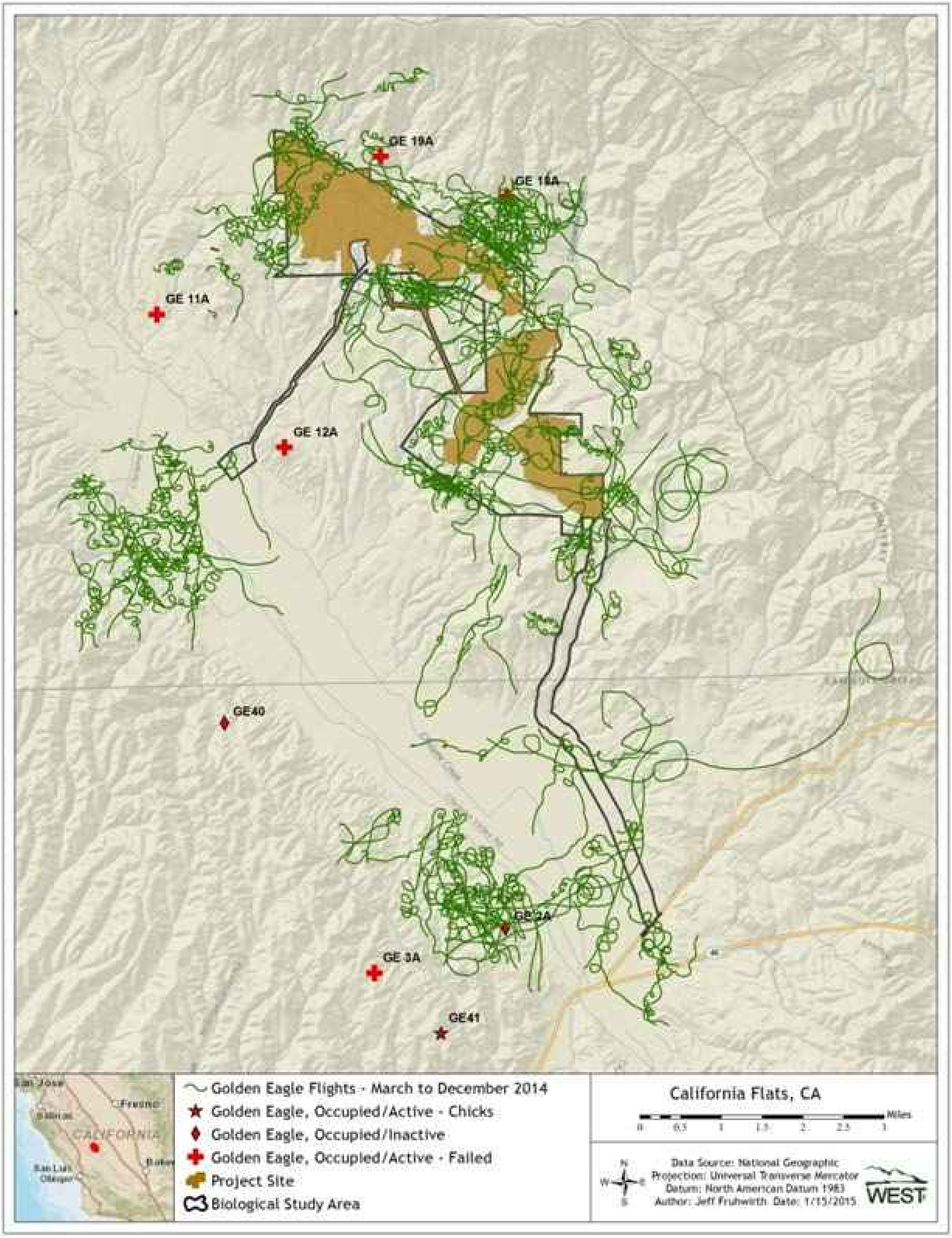
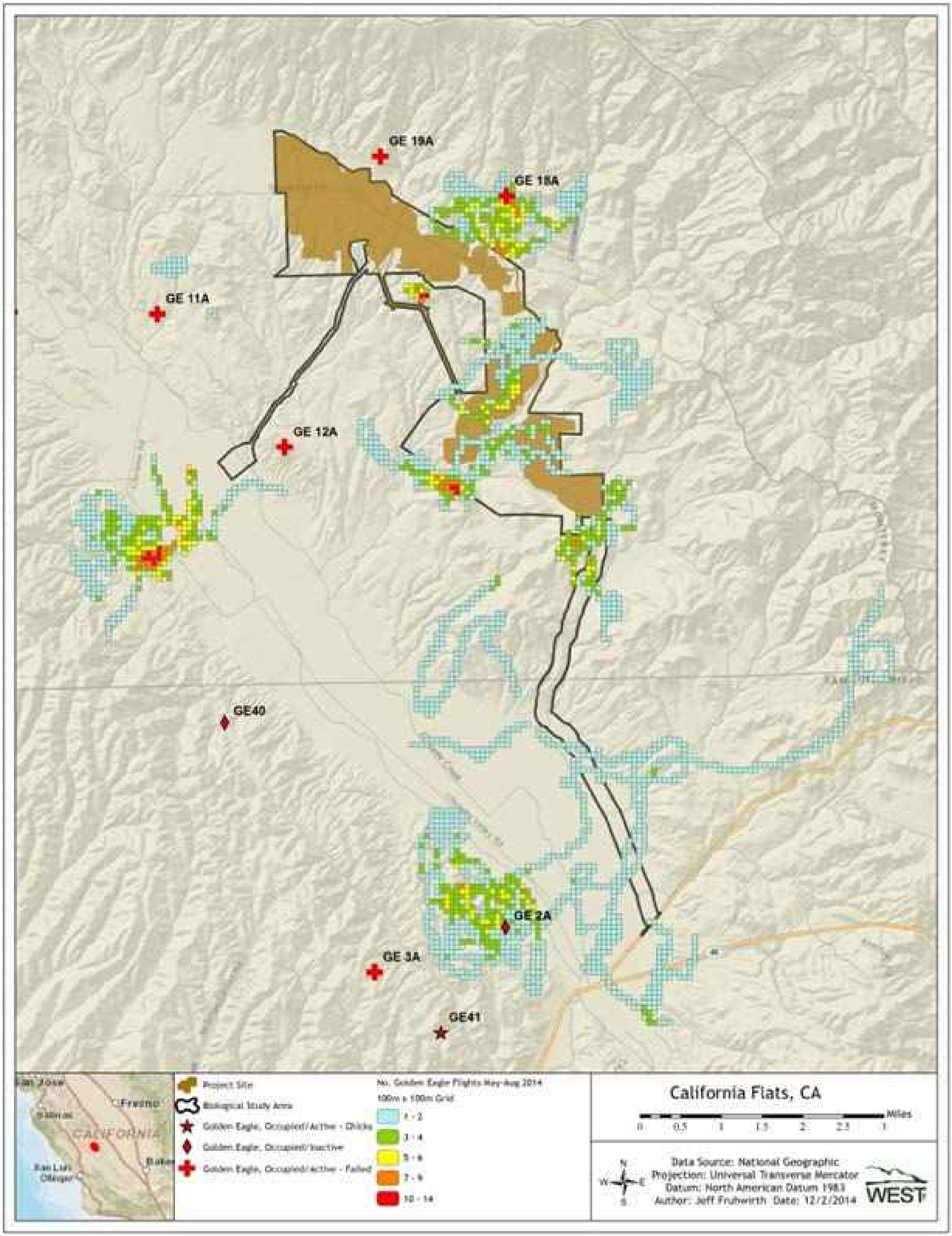
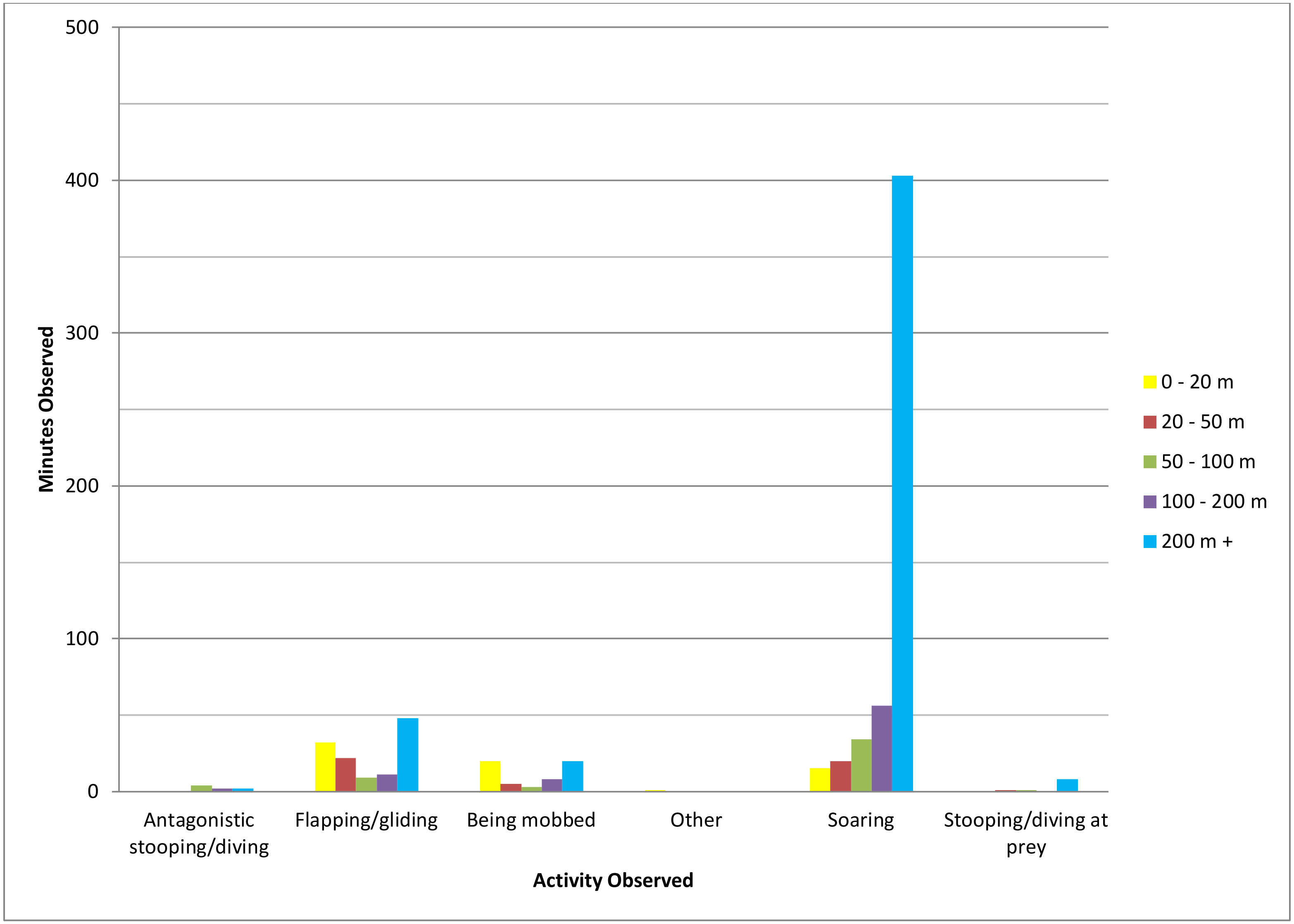


Figure 9. Golden eagle flights recorded during eagle use surveys at the California Flats Solar Project during May through August (late breeding season).



An examination of the flight height and type of activity indicates that the majority (56%) of observed golden eagle flight minutes were eagles soaring over 200 m. Overall, the majority (73%) of activity observed was soaring at various heights, with flapping/gliding activities occurring for approximately 17% of the minutes, eagles being mobbed by other birds occurring for approximately 8% of the minutes, and stooping/diving at prey, antagonist stooping/diving at other eagles or birds, and other activities each taking up less than 2% of the minutes. No hunting or kiting/hovering activities were recorded during this time period. The majority (66%) of all activities occurred at heights over 200 m, followed by 100 – 200 m (11%), 0 – 20 m (9%), and 20 – 50 m and 50 – 100 m (7% each). Figure 10 shows the height/activity breakdown for flights recorded between March 10 and June 24, 2014.

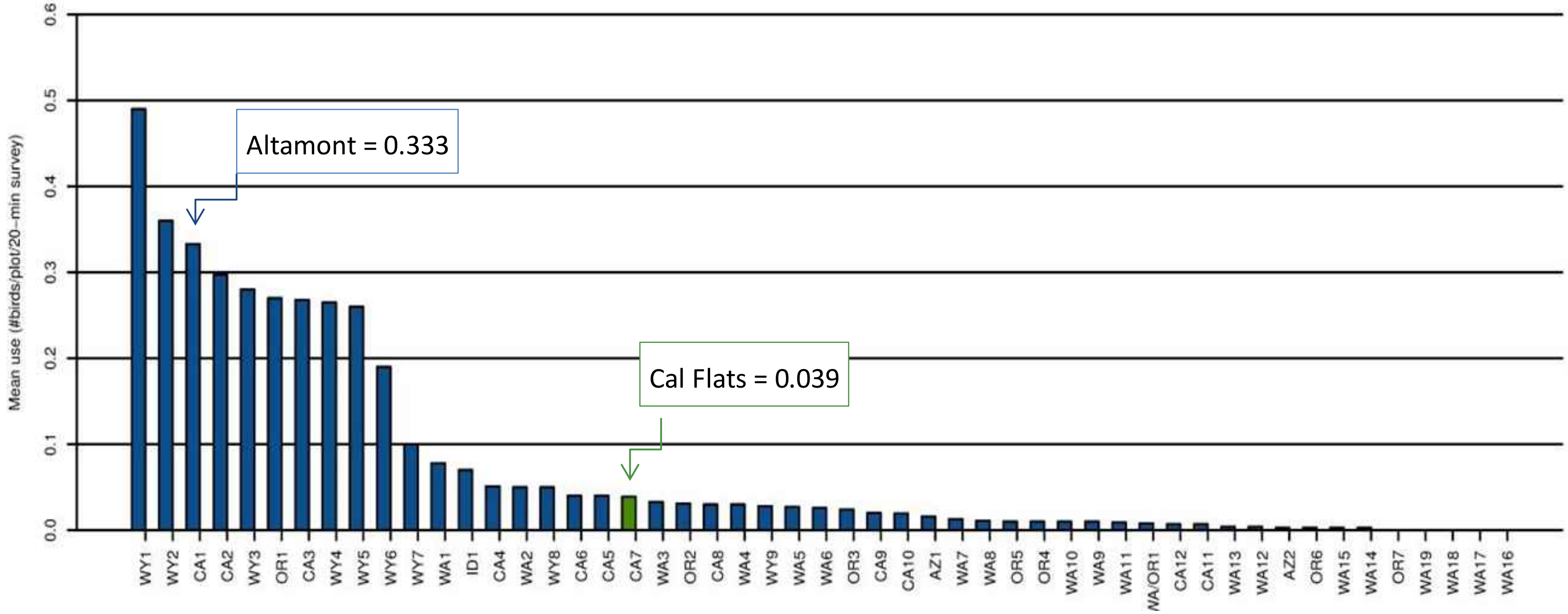
Figure 10. Golden Eagle Activity and Flight Height, March 10 – June 24, 2014.



Conclusions

As expected from the eagle nest surveys, the observed flight paths shown on Figures 7 – 9 indicate golden eagles are using the Project vicinity (while bald eagles were observed in Cholame Valley, they were not seen during surveys of the Project site). To compare the level of golden eagle use observed to date at the California Flats site to that of other projects in the western U.S., the eagle obs/hr use rate was examined for those eagles that were observed within 800 m of the survey points per 20 minutes of observation (whereas the use rates discussed in Section 5.4.2 include all eagle observations out to any distance where they are identifiable, and are shown per one hour of observation). This was done to provide a similar basis for comparison, since most publicly available eagle use information is limited to 800-m radius survey plots for 20-minute survey periods. Figure 11 shows that the mean eagle use rate for California Flats (0.039 obs/20-min) is within the lower range of mean use rates compared to other Projects; it is lower than the use found at six other sites in California, and higher than five California sites.

Figure 11. Comparison of Golden Eagle Use (Obs/20-min Survey/800 m) between California Flats and Other Projects in the Western U.S.



Bat Habitat Assessment and Acoustic Surveys

Methods

An initial bat habitat assessment was conducted by HTH on October 4 and 15, 2013 (Appendix E). The assessment was conducted by driving the entire main access road, beginning at the northern edge of the Project site at Turkey Flat Road and ending at the southern edge of the Project site, near Hwy 41. From the main road, biologists walked to many parts of the BSA such as rocky outcroppings and riparian areas. Aerial photos highlighting areas of rocky outcrops, trees, and buildings were used to target potential bat roosting habitat in the BSA and within 200 feet of the BSA. All rocky outcrops identified on the aerial photos were visually inspected and evaluated for their height, overhanging features, and the quality of cracks and fissures that could potentially support roosting bats. Trees within the Project site and along the access road were assessed by an unpublished evaluation system (D. Johnston, HTH) that assigns a number from 0 to 3 based on the probability of bats roosting in a given tree (0=no probability of roosting; 3=potentially occupied roosting habitat). In addition to rocky outcrops and trees, an abandoned granary building and several riparian areas with mature trees and snags were also examined by walking and visually inspecting these areas for the presence of cavities or gaps and guano (granary), and exfoliating bark or cavities (trees). Any tree that scored a 3 or any riparian area or rocky habitat that showed bat sign or the potential for bat roosting habitat was acoustically surveyed.

Based on the initial bat habitat assessment, HTH deployed five Song Meter SM2 BAT bat detectors (Song Meter) (Wildlife Acoustics Inc., Concord, MA, USA), to monitor for bat activity (Figure 12). One detector was deployed at each of five locations within the BSA: two rocky outcrops, the granary, a riparian area with a perennial stream and mature cottonwoods, and a stock pond. The detectors were set to record acoustic data from sunset to sunrise during the period of October 16 – 24, 2013. Data were analyzed using AnaLook, v.3.9c (Corben 2011), and examined for temporal and spatial activity patterns that would indicate the presence of maternity colonies in the area. Where possible, calls were identified to species, as described further in Appendix E.

Results

<u>Habitat Assessment</u>

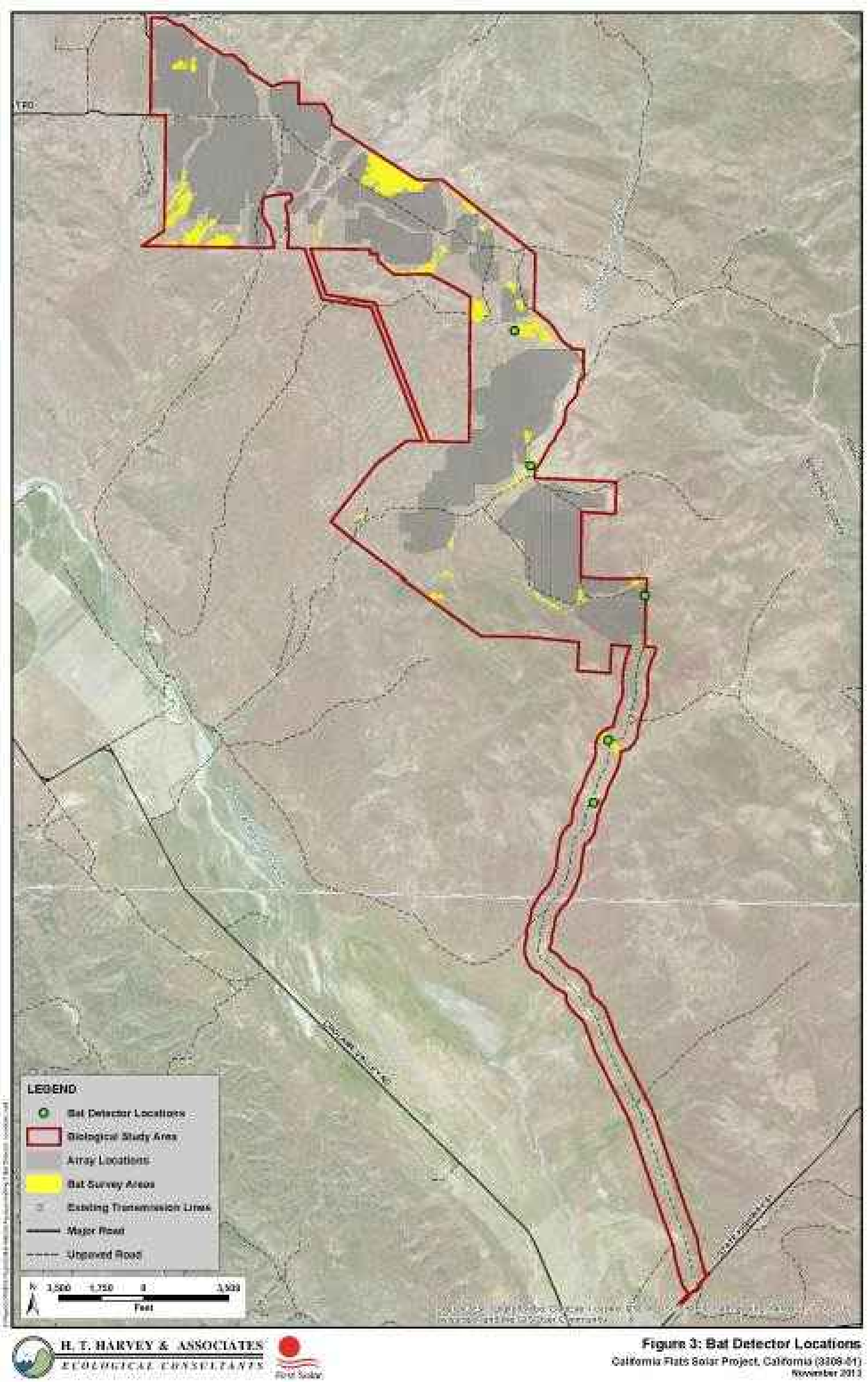
The bat habitat assessment determined that low- to moderate-quality roosting habitat (rocky outcrops with crevices, deciduous trees and snags with cavities and exfoliating bark), and a few anthropogenic structures that have cave-like areas like attics, are present on the BSA for mostly solitary-roosting bats or small congregations of bats (Appendix E). Three rocky outcrop areas include crevices that could potentially provide day roosting habitat for solitary pallid bats (*Antrozous pallidus*) and canyon bats (*Parastrellus esperus*), although none of these appeared large enough to support maternity colonies of either species. Many trees within the riparian areas included cavities and exfoliating bark that would support roosting bats including small maternity roosts of pallid bats. The western red bat (*Lasiurus blossevillii*) is expected to roost in the foliage of riparian trees during spring and fall migratory periods, but is not expected to breed (raise young) in the BSA. Cavernous roosting habitat occurs in a very few areas of the BSA where structures provide potential habitat for the Townsend's big-eared bats (*Corynorhinus townsendii*). This species may occasionally occur as dispersed males, particularly in the winter, in buildings within the BSA. No western mastiff bat (*Eumops perotis*) roosting habitat occurs in the BSA, and no roosting habitat for any species of bats occurs within the Project site; however, pallid bats are expected to roost in small numbers in larger trees occurring in the riparian areas and as individuals in the crevices of rocky outcrops within the larger BSA.

<u>Acoustic Surveys</u>

The average minutes of activity per site per hour ranged from 1.8 minutes at the western outcrop to 18.2 minutes at the southern outcrop (Appendix E). Although only four nights of data were collected at the riparian site, this site showed the most activity in the early evening hours, and this activity was sustained over the evening, as would be expected in an area supporting aquatic foraging habitat. Recorded bat activity levels ranged from 0 to 60 minutes of activity per hour at each of the four sites where data were successfully collected. The general pattern of activity at all sites demonstrated a strong pulse of activity early in the evening that gradually tapered off until the following morning. There were no pulses of activity in the early morning hours at any of the sites, but rather very low levels of activity. There was no activity at the granary past 11 PM on any of the three nights during which data were collected. Because high activity levels were generally absent in the early morning hours, it is presumed that there are no large (> 75 individuals), sensitive colonial roosts in the BSA. Bats are generally most active in the early evening after sunset and then in the early morning before sunrise (Hayes 1997). Peaks in bat activity in early morning hours generally indicate final foraging and commuting before returning to day roosts (Kunz 1974), and if placed in proximity to a potentially suitable roost site, a bat detector may also detect the presence of a bat roost.

The species identified through acoustic analysis varied across the surveyed sites. At the granary site, the dominant frequency group detected was California/Yuma myotis bats (*Myotis californicus/Myotis yumanensis*). At the other three sites, there was considerably more species richness. At the southern outcrop, hoary/Mexican free-tailed bats (*Lasiurus cinereus/ Tadarida brasiliensis*), small-footed/long-legged bats (*Myotis ciliolabrum, Macrophyllum macrophyllum*), and canyon bats were detected. At the western outcrop, canyon bats as well as all four of the broader frequency groups were detected. All frequency groups were also detected in the riparian area. Given the known presence of pallid bats in the region and the high-quality foraging habitat for the pallid bat in the BSA, this sensitive species is presumed to be among the 30-kHz bats detected. Appendix E contains additional information on the results of the acoustic surveys.

Figure 12. Bat Detector Locations and Bat Survey Locations at the California Flats Solar Project. Taken from H.T. Harvey 2013 Bat Assessment Report



Conclusions

Four species of special-status bats (pallid bat, western mastiff bat, western red bat, and Townsend's big-eared bat) are expected to roost and/or forage in the BSA; however, no roosting habitat occurs within the Project site, and the BSA contains no high-quality roosting habitat in rocks, such as vertical or horizontal crevices on large or small rocky cliff faces, that could support a large maternity colony of pallid bats or other cliff-roosting bats. Additionally, no signs of pallid bat or any other bat roosts were detected in any of the areas inspected during the assessment. There were numerous small cracks, fissures, and crevices in the rocky outcrop areas that could support solitary roosting species or small congregations (two or three individuals) of pallid bats; however, these areas are not considered to have strong potential to support other potentially occurring special-status bats (Townsend's big-eared bat or western mastiff bat). The riparian areas support broadleaf trees such as sycamore (*Platanus occidentalis*), which could provide suitable roosting habitat for western red bat and small maternity colonies of the pallid bat. Western red bats were not detected during acoustic surveys and are expected to only winter or migrate through the BSA and then only within the small riparian area. Pallid or western red bats occurring in the riparian area would not be directly affected by the Project. Further, the Townsend's big-eared bat is considered mostly extirpated from the region but dispersed solitary males may occur occasionally in unused attics or other cavernous habitats within the BSA. The granary was the only building within the Project site considered to potentially support roosting bats. However, very little activity was detected at this site, suggesting few if any bats roosted at this location.

6 ASSESSMENT OF RISK TO BIRDS AND BATS

The prediction of impacts to birds and bats from the construction and operation of various types of solar facilities is somewhat speculative in nature as no systematic studies detailing the impacts to birds and bats from these types of facilities have been made publicly available to date. The following section discusses potential risks by referring to known information regarding impacts to birds from other types of facilities (e.g., wind) as well as presenting some information that is beginning to become available from a number of new and existing solar facilities where efforts have been made to collect data regarding impacts to birds. This emerging information appears to confirm that bats are not at risk for significant mortality during the operation of PV projects since they do not tend to collide with stationary (or slowly tracking) objects. This appears to be supported as no bats were found during formal wildlife fatality monitoring at three major PV facilities in California where reports are available (HT Harvey 2014c; Althouse & Meade 2014; WEST 2016).

Indirect Impacts

Indirect impacts include changes to the landscape with unintended and often unforeseen consequences to bird populations. Indirect impacts associated with habitat loss, land alterations and Project development on existing bird populations within the vicinity of the Project are not easily assessed or determined. Potential indirect impacts include:

- territory abandonment, nest and roost site abandonment;

- increased opportunities for predators of special status species;
- habitat fragmentation;
- human presence, noise and light;
- dust and hazardous materials; and
- altered hydrology

Territory abandonment, nest and roost site abandonment

Most wildlife species are susceptible to visual and noise disturbances caused by the presence of humans and construction equipment. Such disturbances can result in the alteration of species' behavior. Noise and visual disturbance caused by construction and vehicles would have the potential to cause nest abandonment or habitat avoidance directly adjacent to and within the proposed Project footprint. Birds avoiding habitat in the vicinity of the Project site may opt for less suitable habitat which could increase stress on these birds as a result of increased energetic costs. This would also place additional stress on available resources through increased density of birds in off-site areas.

Without the inclusion of avoidance and minimization measures (see Section 7), nest and roost site disturbances and territory abandonment could occur due to direct nest removal during vegetation removal activities.

Predation risk to special status species

The Project may indirectly result in mortality to wildlife through an increased risk of predation. Though some predators may avoid areas with human activity, some predator species such as ravens and coyotes are attracted to human activity. Installation of fencing and transmission towers create additional perching structures from which ravens and raptors may hunt for prey. Construction, operation, and maintenance of the Project would result in trash and debris that would further attract species such as ravens and coyotes. To avoid or minimize human impacts a Worker Environmental Awareness Program (WEAP) and trash abatement program will be implemented (see Section 7.2).

Habitat fragmentation

The permanent fencing of the Project area would possibly reduce access for terrestrial species resulting in habitat fragmentation. This fragmentation could cause wildlife to rely more heavily on habitat within the surrounding area for foraging, shelter, and nesting opportunities. This could have an indirect effect on wildlife inhabiting areas adjacent to the Project area. Wildlife inhabiting adjacent areas could be faced with increased competition as a result of the displaced individuals relocating into their home ranges.

Human Presence, Noise and Light

Indirect impacts to wildlife species would result from human presence, noise, and light in the Project site. Increased levels of noise and human activity could be detrimental to many wildlife species. Noise from construction activities could temporarily discourage wildlife from foraging and nesting immediately adjacent to the Project site. Many bird species rely on vocalization during the breeding season to attract a mate within their territory. Noise levels from certain construction, operations, and decommissioning activities could reduce the reproductive success of nesting birds.

The most common wildlife responses to noise and human presence are avoidance or accommodation. Avoidance would result in displacement of wildlife from an area larger than the actual disturbance area. The total extent of habitat lost as a result of wildlife avoidance response is impossible to predict since the degree of this response varies from species to species, and can even vary between different individuals of the same species. Also, after initial avoidance of human activity and noise producing areas, certain wildlife species may acclimate to the activity and begin to reoccupy areas formerly avoided.

Artificial lighting impacts on wildlife species may include disorientation from and attraction to artificial light, impact-related mortality due to disorientation, and effects on the light-sensitive cycles of many species (Saleh 2007). Lighting plays a substantial role in collision risk because lights attract nocturnal migrant songbirds, bats, and major bird kill events have been reported at lighted communications towers (Manville 2001). Bright night-lighting close to the ground can attract bats and flying insects and disturb wildlife (e.g., nesting birds, foraging mammals).

Impacts associated with human presence, noise, and light would be reduced through implementation of mitigation measures for protection of wildlife and other resources (see Section 7.2).

Dust and Hazardous Materials

Direct habitat loss and degradation both inside and outside of the Project site could also occur if project activities resulted in release of dust or hazardous materials, resulted in modification of soil erosion or sedimentation rates, or introduced or encouraged the growth of noxious weeds. Hazardous material and pollutant releases could occur as a result of the Project. Materials released could include fuels and other materials used by work crews as part of routine construction and maintenance activities. Hazardous materials could also be released if construction-related excavation were to disturb areas that have existing environmental contamination. Hazardous materials release could impact biological resources by injuring or killing vegetation and wildlife through either short-term acute exposure or long-term chronic exposure. Soil erosion from site grading and use of heavy equipment, which affects vegetation and soil properties, could have an adverse effect on wildlife foraging and burrowing potential to lands outside of the Project boundaries. Noxious weeds could impact wildlife species by displacing native vegetation species necessary for forage or cover.

Impacts associated with dust and hazardous materials would be reduced through implementation of mitigation measures for dust control and the management of hazardous materials.

Altered Hydrology

Biological resources could potentially be impacted if the Project were to modify the availability or quality of surface water and/or groundwater. Although the Project would use groundwater, the size of the aquifer, depth to groundwater (23 to 64 feet), and implementation of erosion controls and spill control and countermeasure plans suggest that the Project would not impact wildlife through groundwater depletion or impacts to groundwater quality.

The Project could potentially have an indirect effect on wildlife habitat adjacent to the Project site, if the Project were to modify down gradient sedimentation or erosion rates. This could occur as a result of the removal of soil-stabilizing vegetation or modification of onsite precipitation infiltration rates.

Impacts associated with modification of down gradient sedimentation and erosion rates would be reduced through implementation of mitigation measures for the protection of wildlife and other resources.

Habitat Loss

Construction of the Project will result in some habitat loss for avian species. The bird assemblages documented using the BSA, which includes area surrounding the Project that will not be developed, are typical of the open grassland, oak savannah woodland, and riparian habitats of the inner Coast Ranges of central California. A majority of the Project will be constructed in level areas that have been historically disked and dryland farmed for hay and grain production. A small portion of the Project will be constructed in woodland and forest habitat (11.75 ac; <1.0% of the Project), 77% of which has been identified as non-native ornamental woodland. There are large expanses of woodland and forested habitat types both adjacent to and further outside of the Project. Sparse residential settlements and small farms are located south and east of the BSA. The BSA is vacant and is currently a working landscape that includes cattle ranching. Potential causes of impacts to the surrounding area during construction could result from noise generated by construction equipment and machinery, artificial lighting, and possibly dust blown from the construction site. Any effects of habitat loss will be minimized and offset by the general avoidance and minimization measures outlined in Section 7. Additionally, the planned acquisition of off-site lands for long-term conservation will serve to preserve habitat and further offset habitat loss.

Electrocution potential

The potential for electrocutions depends of the arrangement and spacing of energized and grounded components of poles and towers that are sometimes used for perching, nesting and other activities (APLIC 2012). Research has found that nearly all electrocutions occur on smaller, more tightly spaced residential and commercial electrical distribution lines that are less than 69 kilovolts (APLIC 2012).

All transmission and sub-transmission towers and poles will be designed to be avian safe in accordance with the suggested practices outlined in, “Reducing Avian Collisions with Power Lines: State of the Art in 2012” (APLIC 2012).

Collision Risk

Siting in High Risk Areas

Based on a review of sources of avian mortality at three existing utility scale PV solar projects in California, fatality rates for solar arrays, while preliminary, are not high in relation to other anthropogenic mortality (WEST 2014). While concern over wind projects is primarily focused on raptor and bat mortality, few fatalities of those groups have been found at PV facilities. Overall, songbird fatalities appeared in the largest numbers at the PV facilities surveyed, which is consistent with their prolific population levels relative to other avian species. The observed mortality is spread out among species, with no species appearing to account for a large percentage of the fatality finds at all facilities.

Avian mortality concerns are typically elevated when projects are sited in high use areas for bird species, bird groups or taxa considered at risk from the particular mortality source. For example, concern over levels of raptor mortality at wind projects are elevated at sites with high raptor nesting, high prey base, topography that is believed to increase risk, and other factors. Although the Project site is located in an area of relatively high eagle use, the collision risk for raptors from a solar project, consisting of relatively low profile, unmoving or slowly tilting panels, is much lower than a wind project. Historically, raptor fatalities have been an issue of special concern at wind facilities. In North America, raptors compose up to 8% of fatalities and wind facilities, and 6% regionally. As a function of energy output, PV facilities are not expected to pose risk to raptors in the same way as wind energy facilities because PV facilities do not possess the density of tall structures found at wind facilities. As expected, a study of three PV facilities where avian fatality monitoring data is available, few raptor fatalities were associated with the solar facilities. Raptor fatalities at the three solar facilities composed just over 1% of all fatalities (range: 0-3%), and included fatalities potentially attributed to overhead power lines, which would be present at any utility-scale power facility (WEST 2014).

Waterfowl and waterbird collision risk with tall structures such as unmarked transmission lines is often elevated near wetlands, playas and other suitable habitat; however, as noted above there are relatively few waterfowl/waterbirds that utilize the Project site, and the 230-kV transmission line would be designed following the most recent APLIC guidelines for placing and installing bird flight diverters, to minimize avian collisions. Concerns over potential risk of collision for migrating songbirds with structures is often elevated when projects are located in high migration areas such as the Texas Gulf Coast, near significant migration stopover areas. However, night migration in the more arid western United States is known to be much less dense than in the eastern one-half of North America (Gauthreaux et al. 2003). As a result, we know of no large-scale fatality events at communication towers in the western United States, yet there are dozens reported from the eastern part of the country (Shire et al. 2000).

In evaluating avian issues at three utility scale solar project in the region, Walston et al. (2016) found there was considerable variability in mortality rates for bird carcasses with known project-related causes of death ranged from 0.50 to 10.24 birds/MW/year. Within the southern California study region, avian mortalities at utility scale solar facilities were within the range of mortalities estimated for utility-scale wind energy facilities. The lower end of avian mortality was from the California Valley Solar Ranch Project in San Louis Obispo County (0.5 birds/MW/year), the closest utility scale solar site to this Project site that could be representative of the level of risk of migrating songbird collision with Project infrastructure (Walston et al. 2016).

Vehicle and equipment collisions

Equipment and vehicles could collide with slower-moving species, species in subsurface burrows, and ground-nesting birds resulting in injury or mortality. Some species of birds go into a state of torpor and become immobile during periods of cold weather (Fletcher el al. 2003), increasing the potential for impacts from vehicles or equipment. For most bird species, direct impacts would be limited to areas within the Project footprint or immediately adjacent to it. Active bird nests in shrubs or near the ground would be vulnerable to crushing during ground-disturbing activities.

During the construction phase, an increase in vehicle traffic from construction personnel, biologist and other project-related persons, potentially poses an increase risk to birds that inhabit remote desert regions. Birds nesting adjacent to project access roads are more likely to be impacted due to an increase in the number of vehicles using the road.

Due to a decrease in project personnel and habitat alterations, these types of risks will be lessened during the operations and maintenance phase, compared to the construction phase. Mitigation measures described in Section 7.2 would avoid and minimize this risk.

Height of Structures

A risk factor for avian collision mortality is the height of structures within a development. For songbirds, height of structures has been a very important risk factor, with taller structures (buildings, communication towers) typically affecting more birds than shorter structures (Kerlinger et al. unpublished; Gehring et al. 2011, Kerlinger et al. 2012). Particular dangers associated with buildings are the presence of windows and certain lighting regimes known to attract birds (Klem et al. 2009). Very tall structures represent greater risk to birds because most night migrating birds fly at heights between 1,350 and 6,560 feet (Kerlinger 2001), generally occurring in higher densities at greater heights above ground level (AGL). In a study by Gehring et al. (2011) and Kerlinger et al. (unpublished), the number of birds killed at communication towers was found to be positively correlated in a non-linear fashion with tower height. As the height of structures associated with the Project will be relatively low (10 to 13 feet), risk of collision will also be low accordingly. The northern half of the site will have underground electrical collection lines that daylight adjacent to the Project substation. The southern half will have above ground electrical collection lines on typical wooden poles.

Light Attraction

In most studies to date, poor weather has been associated with large-scale mortality events that have occurred at tall structures such as communication towers (Manville 2000, Kerlinger 2010, Longcore et al. 2012, 2013), as well as street lights, lighthouses, water towers, ski lifts, and other tall, lit structures. In addition, large-scale fatality events have even been reported to occur at natural gas compressor stations that are equipped with bright flood lights. These events usually occur in inclement weather (fog, light rain, light snow, low ceiling) when navigational cues are obscured and as a result, attracted to the lights of facilities and structures, birds become disoriented and remain in the lighted zone where they circle the structures at risk of collision with the tower and its guy wires, and collisions with each other, or possible exhaustion (Gauthreaux and Belser 2006). Fortunately, recent studies have demonstrated that avian collisions with manmade structures can be reduced dramatically with the adoption of certain lighting regimes that do not attract birds (Gehring et al. 2009, Kerlinger et al. 2010, Patterson 2012). Further, most birds (approximately 90%) that die after being attracted to communication towers by lighting are killed when they collide with the guy wires that support those towers (Gehring et al. 2011). As described in Section 7, California Flats will minimize new lighting, and any lighting associated with the Project shall be designed to limit the lighted area (e.g., using shielding and/or downcast lights) to the minimum necessary.

"Lake Effect Hypothesis"

The concern over deaths at solar facilities of waterbirds or waterfowl is centered around the hypothesis that these species may potentially mistake the extensive solar arrays for water features on which the birds can land, usually at night. Such collisions which also occur at structures like parking lots and train yards (usually a black cinder surface), both of which resemble water bodies at night, often do not result in direct mortality because the angle of collision is relatively shallow. Such birds sometimes cannot take off after collisions because they are adapted to take off from water, not dry land. These birds can perish due to exposure to the elements and/or predators.

Finally, as noted in Section 5.3.3, the baseline avian surveys showed a low number of waterfowl/waterbird species using the California Flats area; even when drought conditions lessen it is still expected that relatively few of these aquatic-based birds would use the Project site in the absence of the project. However, there remains uncertainty in whether birds on migration might be attracted to the project post construction. Waterfowl or waterbirds have not been found in high numbers at the California Valley Solar Ranch site, a large solar project to the south of the Project that might be representative of avian risk for local utility scale solar projects (Walston et al. 2015).

Potential Risk to Special Status Species

Special status species were evaluated for their potential to occur within the BSA and included special status species for which focused surveys were conducted or sightings were recorded during general or other species-specific wildlife surveys. The subsequent section describes a risk assessment for these species. Those species that were not specifically surveyed for, or are considered to have a low potential for occurrence and were not observed during surveys were eliminated from further analysis. Detailed risk reduction and conservation measures are thoroughly described in Section 7.

Golden Eagle

Adult golden eagles may easily range a mile or more from their nest sites in search of prey, and their breeding-season home ranges often extend across more than ten square miles (Kochert et al. 2002). The available data suggest that adult eagles most often forage within 0.6–1.9 miles of their nest site while provisioning chicks (Marzluff et al. 1997, Hunt 2002). That said, the nearest-neighbor analysis indicated that the approximate average territory of golden eagles nesting in the Project area encompasses a radial area of only 1.05–1.5 miles, which translates to nesting territory sizes of 3.5–7.1 square miles. These territory sizes suggest that the Project area supports a relatively high density of nesting golden eagles. The highest known density of nesting golden eagles is located in central California in the northern Diablo Range, in oak savannah and woodland habitat similar to that found in the vicinity of the Project (Hunt and Hunt 2006). In that study area, extensive radio-telemetry research demonstrated home-range sizes that are similar to those that the Project-related surveys suggested for the population nesting in Cholame Valley and the southern Diablo Range (Hunt et al. 1995, 1999; Hunt 2002). Elsewhere in the western U.S., population densities have ranged from 11–97 square miles/pair (Kochert et al. 2002).

Given the initial projections of nesting territory sizes and apparent density of nesting eagles in Cholame Valley and the adjacent hills, it appears unlikely that the golden eagles nesting in the Cholame Hills, in the eastern and southern portions of the Diablo Range, and in the northern Temblor Range would routinely, if ever, travel onto the Project site to provision their chicks. Instead, foraging on the Project site during the nesting season appears possible only for eagles occupying the confirmed and potential territories located in the eastern half of Cholame Valley and the adjacent western foothills of the Diablo Range. There is, however, a reasonable likelihood that the foraging home ranges of two to five golden eagle territories overlap the access road area (Figure 4). Regardless, the oak and pine woodlands and interspersed savannas that characterize Cholame Valley and the adjacent foothills of the Cholame Hills and Diablo Range provide ideal nesting and foraging habitat for golden eagles and even an atypical (see, for example, Boal et al. 2006) pair of bald eagles (possibly two). The ground squirrels, jackrabbits, and feral pigs found in the region provide a variety of food resources for the eagles.

The availability of suitable, natural nesting substrates clearly constrains most nesting golden eagles to the wooded and cliff/outcrop areas located primarily outside the Project site. The electrical transmission line that crosses the Diablo Range and the Project site from northeast to southwest is a possible exception (Figure 1). During both 2013 and 2014, although there were several active red-tailed hawk and common raven nests on the transmission towers, no active golden eagle nests were observed on this transmission line within the survey area. Surveys conducted for a nearby project located on the Carrizo Plain revealed several active golden eagle territories centered on transmission-tower nests (HTH 2012). Therefore, the potential exists for golden eagles to nest on the existing transmission towers in the Project vicinity.

Burrowing Owl

The grassland, rolling foothill habitats and abundant California ground squirrel burrow systems in the Project vicinity provide suitable foraging, nesting, and sheltering opportunities for resident, wintering, and transient owls. Therefore, nearly the entire Project site currently provides suitable foraging and breeding habitat for burrowing owls. However, risk of collision with Project infrastructure should be low. Monitoring at several solar facilities where burrowing owls are known to occur, have yielded no carcasses of the species exhibiting injuries suggesting collision with stationary objects was the cause of mortality.

California Condor

The Project site and access road lie within the historic and current range of the California condor, and most of the 3,000-acre Project currently provides potentially suitable foraging habitat for the species. The mountain ranges within the region provide conditions favorable to condor movement, and mortality of California ground squirrels, mule deer (*Odocoileus hemionus*), feral pig, pronghorn (*Antilocapra americana*), and other wildlife provides suitable foraging opportunities within the Project site and along the access road/Hwy 41 improvement areas.

The condor release locations closest to the Project are the Bitter Creek National Wildlife Refuge, approximately 80 miles southeast, and Pinnacles National Monument, approximately 62 miles north of the Project site. The Project site and access road do not occur within any designated critical habitat for California condors, the nearest being the East Unit of the Hi Mountain-Beartrap Condor Area approximately 35 miles south of the Project (USFWS 1977). Recent global positioning system (GPS) daytime tracking data indicate that captive-released
California condors periodically occur in the mountain ranges that border the Project site to the west, north, and east, and condors were recorded in the vicinity of the Project site in 2005 and 2006 (California Condor Wind Energy Work Group 2011, USFWS 2011a). Given the current distribution of condors, condors are unlikely to forage within the Project site and along the access road/Hwy 41 improvement areas. The solar generation facilities are not planned in an area that is expected to bisect a high-use flight path for the species. No condors were observed during nearly two years of BUC and eagle use surveys conducted for the Project. Although there is suitable roosting and nesting habitat for California condors in the surrounding mountain ranges, the Project site contains no such habitat.

Other Special Status Avian Species

<u>Swainson's Hawk</u>

Swainson's hawk is a state-listed (threatened) raptor species that breeds in much of western North America. Within California, nesting occurs in the Central Valley, Great Basin and Mojave and Colorado Deserts. Regular nesting also occurs in the high desert between the Tehachapi Mountains and Lancaster. This species winters in southern South America with a migration route of over 20,000 miles (Woodbridge 2008). Arrival at breeding areas generally occurs from late February to early May depending on geographical characteristics of the breeding area (Woodbridge 2008). Swainson's hawks prey on a wide variety of small vertebrates to crayfish and insects, although breeding success appears to be tied to availability of small mammals. In the Central Valley, nest sites are associated with riparian forest vegetation, whereas in the Great Basin, nest sites can be found within trees located in uplands.

The BSA is 20 miles from the nearest documented nesting records for this species, although moderately suitable nesting habitat is present in the riparian and oak woodland portions of Cholame Valley. This species was observed once in the spring during the 2013 avian use surveys, a migrant flying at an altitude over 492 feet; one individual Swainson's hawk was also observed incidentally as part of the 2014 eagle use surveys. One of the main objectives of the raptor nest survey effort was to search for nesting Swainson's hawks within 5 miles of the Project site. No

Swainson's hawks were detected during the nest search effort. Overall, this species is expected to have a relatively low potential for occurrence within the Project Site during the breeding season. Risks from the Project would generally be expected to be reduction of foraging habitat during migration. Potential for impacts to the species would be further reduced through implementation of mitigation measures for protection of wildlife and other resources, as described in Section 7.

Northern Harrier

The northern harrier is a State Species of Special Concern. Many California populations are resident, and migrating individuals may winter in California from sea level up to 10,000 feet elevation; others migrate through to Central and South America (MacWhirter & Bildstein 1996). Habitat includes fresh and saltwater wetlands, coastal dunes, grasslands, deserts, meadows, and crop lands, but they are rarely found in wooded areas. This species breeds in areas up to 5,700 feet above sea level, and builds nests on the ground, in upland fields or marshes. Northern harriers prey on a variety of small vertebrates and invertebrates, although they predominantly feed on small mammal, mainly microtus, species.

The BSA is within the edge of the documented breeding range for this species and nesting habitat is present in the BSA (Shuford et al, 2008). Project-specific BUC surveys, eagle/raptor use surveys, and nesting raptor surveys were designed to detect species such as northern harrier. Observations of northern harriers occurred in spring (1 sighting) and fall (1 sighting) during the 2013 avian use surveys; both sightings involved one adult coursing low over grasslands. One individual northern harrier was observed incidentally during the 2014 eagle use surveys conducted to date. One northern harrier individual was documented in the 2013 raptor nest surveys, approximately 1.5 miles northeast of the Access Road/Hwy 41 improvements; no nests were observed.

Direct and indirect impacts to these species would be similar as discussed above for golden eagles. Direct impacts also would include the potential for direct take of nests and permanent reduction of potential foraging and nesting habitat associated with development of the Project. Development of the Project would result in an incremental increase in noise and human presence, and these could cause an indirect impact to the northern harrier. The Project would also include gen-tie transmission line, which would present a potential collision hazard. Impacts to northern harrier would be reduced through implementation of mitigation measures for protection of wildlife and other resources, as described in Section 7.

Loggerhead Shrike

The loggerhead shrike is a State Species of Special Concern and a year-round resident in parts of the Southern California desert. It is typically found in open habitats with scattered shrubs, trees, posts, fences, utility lines, or other perches. As a predatory bird, its diet consists of insects, amphibians, small reptiles, small mammals, and other birds. Shrikes typically build nests three to ten feet above the ground depending on the height of the vegetation. During surveys, this species was observed within the BSA throughout the year (15 total observations), with suitable nesting and foraging habitat located within the Project Site.

Direct impacts would include the potential for direct take of nests and permanent reduction of potential foraging and nesting habitat associated with development of the Project. Development of the Project would result in an incremental increase in noise and human presence, and these could cause an indirect impact to the loggerhead shrike. The project would also include a gen-tie transmission line, which could present a potential collision hazard. Impacts to loggerhead shrike would be reduced through implementation of mitigation measures for protection of wildlife and other resources, as described in Section 7.

Short-eared Owls

The short-eared owl is a State Species of Special Concern. In California, it is a year-round resident in some areas; their populations are highly dependent on their prey's "boom or bust" cycles (particularly the California vole, *Microtus californicus*), and can vary dramatically. These owls nest on the ground, and require open country with sufficient microtine rodent prey species as well as herbaceous cover to conceal the nests. Suitable nesting habitat includes irrigated alfalfa or grain fields, marshes, old pastures and ungrazed grasslands. In the San Joaquin Valley and adjacent Coast Range valleys, nesting is generally episodic, usually after wet winters (Shuford et al, 2008).

The BSA is outside of, but relatively near (15 – 20 miles), the documented breeding range for this species and there is a lack of suitable grassland cover in the Project site (HTH 2013); overall, this species would have a relatively low potential for occurrence during the breeding season. Short-eared owls were seen incidentally during the 2013 raptor nest survey, and in November 2012 and April 2013 during visits to the site for the avian use surveys. Risks from the Project would generally be expected to be reduction of foraging habitat.

Impacts to short-eared owl would be reduced through implementation of mitigation measures for protection of wildlife and other resources, as described in Section 7.

Tricolored Blackbirds

The tricolored blackbird is a State Species of Special Concern, and is a permanent resident of California. Their range includes the Sacramento and San Joaquin valleys, coastal slope from Sonoma County to the Mexican border, and the foothills of the Sierra Nevada to Kern County. While many birds migrate extensively within this range, some blackbirds appear to reside within the Central Valley throughout the year. Nesting sites for this species have historically been located in marshes, where colonies of 20,000 to 30,000 nests have been documented. More recently, colonial nests have also been documented in blackberry and thistle, as well as in grain fields. The success of selected nesting sites depends on having a nearby source for abundant insect prey (primarily Coleopterans, Orhopterans and Hemipterans). Wintering blackbirds forage in agricultural fields and grasslands with low-growing vegetation (Shuford et al, 2008).

The BSA is within the documented breeding range for this species and some nesting habitat is present in some areas of Cholame Valley. Tricolored blackbirds were seen incidentally in the Project site in March 2013 and March 2014. The species is an expected winter resident and transient, due to the limited availability of potentially suitable breeding habitat in the immediate Project vicinity (HTH 2014). Risks to this species from development of this Project would generally be expected to be reduction of foraging habitat.

Impacts to the tricolored blackbird would be reduced through implementation of mitigation measures for protection of wildlife and other resources, as described in Section 7.

Grasshopper Sparrow

The grasshopper sparrow (*Ammodramus savannarum*) is a State Species of Special Concern that breeds in grasslands from the foothills of the Sierra Nevada and Cascade Range west and south to San Diego County (Shuford et al. 2008). The species is generally a summer resident of the state, occurring from March to September, with the breeding season extending from mid-March to August. The species is at least partially migratory, with rare winter sightings in California, generally occurring on the coastal slope of southern California (Shuford et al. 2008). The species nests on the ground in short to moderate height grasslands with patchy bare ground and/or sparse shrub cover, and they forage in dense grassland and low growing vegetation; in general, they are more likely to be found in large tracts of habitat (minimum of 75 to 250 acres) than in small tracts (Vickery et al. 1994; Herkert 1994). The CNDDB contains records of grasshopper sparrow observations approximately five miles south of the Project. While no grasshopper sparrows have been observed on the Project, there is suitable nesting and foraging habitat throughout the BSA. Risks to this species would include the potential for direct take of nests and permanent reduction of potential foraging and nesting habitat associated with development of the Project.

Impacts to grasshopper sparrows would be reduced through implementation of mitigation measures for protection of wildlife and other resources, as described in Section 7.

Bats

Four species of special-status bats are expected to roost and/or forage in the BSA; however, no roosting habitat occurs within the Project site. Although pallid bats were likely detected during acoustic surveys, and they have been documented in the region, they are expected to only forage, not roost, in the Project site. Numerous smaller cracks and crevices were observed in the rocky outcrop habitat in the BSA; these are likely suitable for only individual pallid bats or small congregations (i.e., two or three individuals). Although solitary roosting bats or small congregations of bats may roost in these outcrop areas or roost as maternity colonies in large riparian trees, these habitats are located outside the Project site, and would not be directly affected by the proposed activities. No roosting habitat occurs within the BSA for the western mastiff bat and the western red bat is expected to only winter or migrate through the BSA and then only within the small riparian area. Further, the Townsend's big-eared bat is considered mostly extirpated from the region but dispersed solitary males may occur occasionally in unused attics or other cavernous habitats within the BSA. The granary was the only building within the

Project site considered to potentially support roosting bats. However, because very little activity was detected at this site, the low activity levels suggest few if any bats roosted at this location.

The habitat assessment and acoustic surveys were conducted just after the high-activity season for bats (May through September) when data collection is optimal for assessing bat activity levels. Nevertheless, given the absence of high-quality roosting habitat and the fact that all roosting habitats occur outside the Project site, direct impacts on roosting bats are not expected to result from the Project. Because roosting habitat for pallid bats occurs immediately adjacent to the Project site, and because this species is expected to forage on the widespread high-quality foraging habitat that occurs throughout the Project site, a change in the foraging habitat within the Project site may result in indirect impacts to pallid bats. Prey species comprise primarily orthopterans (grasshoppers, crickets, etc.) and other ground-dwelling insects that pallid bats take mostly from the ground (Johnston and Fenton 2001). Although the ground disturbance was minimized at a nearby solar photovoltaic project, the California Valley Solar Ranch (CVSR) in San Luis Obispo County, preliminary acoustic results from that project suggest that pallid bats foraged less in completed solar arrays (activity = 0.12 calls/min) compared to the same areas before they were developed and compared to adjacent undeveloped conservation areas (activity = 0.19 calls/min) (H. T. Harvey & Associates 2013). Although pallid bats are expected to at least initially forage less in the Project site than adjacent undeveloped habitat, even a permanent decrease in pallid bat activity levels in the Project site is not expected to result in a significant impact to the pallid bat population of the region. Further, a reduction in optimal foraging habitat adjacent to maternity colonies could potentially result in a slight reduction in colony size for any colony located within three miles of the Project site. However, a potential small reduction in colony size would not be expected to result in a significant impact to the regional pallid bat population.

Good-quality foraging habitat for the western mastiff bat also occurs within the Project site. However, this species typically forages at 100 to 200 feet above ground level (Best et al. 1996). HTH (2013) reported that mastiff bat activity appeared unaffected by the development of solar arrays at CVSR, which suggests that mastiff bat activity may be unaffected within the Project site.

On a landscape scale, the addition of solar arrays to an area that previously had minimal structural attributes may affect bat activity in several ways. Bats are known to commute and forage along linear landscape elements (Verboom and Huitema 1997). At clearly demarcated edges, such as forest-field interfaces in early stages of succession, all bat species have been shown to increase their activity (Jantzen and Fenton 2013). Morris et al. (2010) found higher concentrations of flying insects on the leeward side of trees on windy nights. As such, it is possible that flying insects could similarly gather in higher concentrations at the leeward edges of the PV solar arrays on windy nights. As observed at CVSR, high frequency bats (California myotis, western small-footed bats, and canyon bats) that forage in situations with clutter (e.g., with shrubs and trees) are likely to take advantage of this effect and are expected to increase their activity at the leeward edges of the arrays (HTH 2013).

7 RISK REDUCTION AND CONSERVATION MEASURES

California Flats has developed the following risk reduction and conservation measures for the Project based on site-specific baseline avian and bat information. The project design features and conservation measures proposed herein represent California Flat's willingness to ensure the least harm to avian and bat species. The risk reduction and conservation measures presented in this document are being developed separate from the NEPA and CEQA processes, although mitigation measures adopted as part of those processes will coincide and be coordinated with measures proposed herein.

Risk Reduction Measures Implemented During Site Selection and Facility Design

California Flats sited the Project to avoid and minimize impacts to bird and bat species where possible, including the following macro-siting considerations:

- The Project is sited entirely within a working private ranch with a long history of cultivation. The majority (98%) of the Project site is composed of grassland, primarily California Annual Grassland.
- The Project is sited in an area without substantial riparian habitats or other features known to attract large concentrations of resident or migrating birds or bats. Less than 1% of the Project site is composed of riparian or ephemeral wetland habitats.
- The Project is sited outside designated critical habitats, Audubon Important Bird Areas, and important migratory pathways or stopover sites.
- The Project is sited immediately adjacent to existing transmission infrastructure with additional capacity such that minimal transmission gen-tie and system upgrades will be required.
- The Project site does not currently host avian nests used by species listed under the federal or state endangered species acts or the BGEPA, nor does it contain designated critical habitat for these species.

California Flats has made efforts during initial site selection and continues to make efforts during project design to micro-site infrastructure such that impacts to birds and bats are minimized. The following risk reduction measures have been incorporated into the design of Project facilities and have been committed to as part of the Final Environmental Impact Report (FEIR) developed by Monterey County Resource Management Agency (CMRMA, 2014).

- *Avoid and minimize impacts to wetlands (Mitigation Measure B-3(a) of the August 2014 DEIR).* Impacts to wetlands and other waters shall be avoided to the extent feasible. In consultation with a wetland ecologist, the project shall be designed, constructed and operated to avoid and minimize impacts to wetlands and other waters to the extent feasible, which may include minor changes to the panel layout and roadway configurations to avoid wetlands. General Project staging and laydown activities shall not occur within wetlands during construction. To avoid unnecessary egress into wetlands, all wetlands in the project impact area shall be clearly shown on Project plans and the limits marked with highly visible flagging, rope, or similar materials in the field. Access allowed within these features for the purposes of construction in and near such features (e.g., road crossings, pile placement, trenching) shall be clearly delimited on Project plan sets, and these allowed work limits shall also be staked in the field, to prevent construction personnel from causing impacts to areas outside of work limits. Where necessary, silt fencing or other measures may be used to protect adjacent wetlands from sediment transport or other indirect impacts that could result from adjacent construction. During the operation of the solar facility, maintenance activities shall not be staged within wetlands. Wetlands and other waters within construction areas that are to be avoided shall be fenced or flagged for avoidance prior to construction, and a biological monitor shall be present to ensure compliance with off-limits areas. All jurisdictional wetlands and waters shall be clearly shown on Project plan sets.
- *Avoid and minimize impacts wherever feasible by providing appropriate setbacks between Project improvements and avoided riparian and stream habitats (Mitigation Measure B-2(e) of the August 2014 DEIR).* As discussed above, some improvements near and within riparian habitats and streams would be necessary to construct road and fence crossings, stabilize banks, and construct other Project improvements. In other locations, where complete avoidance of reaches of perennial and intermittent streams is proposed, Project activities and Project work limits shall include an average 50-foot setback from the top of bank or the outer dripline of the riparian canopy of the avoided stream reaches. The 50-foot average shall apply to the avoided reach length. Although the average setback must be at least 50 feet over the length of the avoided reach, in some isolated locations it may be necessary to place structures within 50 feet of the avoided drainage. In these cases, a minimum 25-foot setback shall be observed from avoided perennial or intermittent riparian habitat in all locations (i.e., work limits may come no closer than 25 feet from the top of bank or the outer canopy dripline in any specific area along the avoided reach). Where existing roads occur parallel to and within 50 feet of avoided perennial or intermittent streams, it will be impossible to maintain a 50-foot average setback or even a 25-foot minimum setback, because even to realign the road, work near the avoided streams would be required. In these cases, Project activities and Project work limits shall be set back 10 feet from the top of bank. All work that must occur within the 50-foot setback shall be monitored by an authorized biologist to ensure direct impacts to sensitive habitat are minimized, and all impacts to special status species are avoided. Riparian setbacks and all riparian habitat to be avoided by the Project shall be fenced or flagged before construction occurs in adjacent areas. A biological monitor shall be present to ensure compliance with off-limits areas.

- *Avoid or minimize impacts on oak woodlands (Mitigation Measure B-2(d) of the August 2014 DEIR)).* If oak woodlands occur in or adjacent to (i.e., within 25 feet of) the Project impact area, an International Society of Arboriculture (ISA)-certified arborist shall establish a buffer of 25 feet from the driplines of native trees in the oak woodland habitat. No ground-based construction activities, including trimming of trees, shall be allowed within the buffer unless monitored by an ISA-certified arborist. All buffers shall be marked using highly visible flagging or fencing.

General Biological Measures Implemented During Construction and Operation

Construction of the Project will occur over a period of 12-24 months, with an expected operational life of 30 to 40 years. The following general biological measures will be implemented during construction and operation (as specified) to avoid or minimize risk to avian and bat species:

- *Prepare and Present a Worker Environmental Awareness Program (Mitigation Measure B-1(gg) of the August 2014 DEIR))*. California Flats shall retain a qualified biologist to prepare a Worker Environmental Awareness Program that shall be presented to all construction personnel and employees before any ground-disturbing activities commence at the Project site. This presentation shall explain to construction personnel how best to avoid the accidental take of special-status species during construction. The program shall consist of a brief presentation explaining endangered species concerns to all personnel involved in the Project. The program shall include a description of special-status species potentially on the Project site and their habitat needs; an explanation of the status of the species and their protection under the ESA, CESA, BGEPA, MBTA, and the California Fish and Game Code; specific mitigation measures applicable to special-status species; and the penalties for take.

  The program shall also explain to construction personnel how to avoid impacts to jurisdictional waters, including wetlands. The program shall include a description of jurisdictional waters on the site, specifically permitted impacts to jurisdictional waters, measures to protect waters to be avoided, and maps showing the location of jurisdictional waters and permitted impacts. The program shall be recorded electronically, and all future facility employees shall be required to review the recording before the initiation of work on the Project site.

  The Worker Environmental Awareness Program shall be implemented by California Flats before the start of ground disturbance and shall be continued through the construction phase for all construction personnel. A separate Worker Environmental Awareness Program shall be implemented by California Flats before project operation, for all permanent project employees. This program shall include all the information above, as applicable to project operations.

- *General Avoidance Measures and Construction Best Management Practices (Mitigation Measure B-1(ff) of the August 2014 DEIR).*
  - Prior to ground disturbance, all permanent and temporary disturbance areas shall be clearly delineated by stakes, flags, or another clearly identifiable system.

1. To minimize disturbance of areas outside the project site, all construction and operation vehicle traffic shall be restricted to established roads, construction areas, and other designated areas. These areas shall be included in pre-construction surveys and, to the extent possible, shall be established in locations disturbed by previous activities to prevent further impacts.
2. Construction and operation vehicles shall observe a 20 mile-per-hour (MPH) speed limit during daylight hours within Project areas, except on county roads and state and federal highways. During limited nighttime activities, all construction and operation vehicles shall observe a 10 MPH speed limit. Speed limit signs shall be installed at the project site entrance from the driveway, every one mile along the project site access road, and at the end points of the driveway upon initiation of site disturbance and/or construction. One electronic speed monitoring sign shall be placed in both directions, at the approximate midpoint of the driveway.
   a) Due to the length of the approximately 5.6-mile-long driveway, USFWS recommended 20 MPH speed limits would be prohibitively slow and would negatively impact construction duration. Therefore, vehicles utilizing the access road (or “driveway”) will observe a 25 MPH speed limit during daylight hours (7 AM–5 PM between 1 October and 31 May; and 7 AM–7 PM between 1 June and 30 September) and will observe a 20 MPH speed limit during the hours of 5 AM–7 AM and 5 PM/7PM–9 PM. During limited nighttime activities (9 PM–5 AM) within the driveway, all construction and operation vehicles shall observe a 10 MPH speed limit.
3. All construction pipes, culverts, or similar structures greater than four inches in diameter, or greater than 1.5 inches in diameter within areas where CTS or CRLF may be present, stored or stacked on the project site for one or more overnight periods shall be either securely capped before storage or thoroughly inspected for wildlife before the pipe is subsequently moved, buried, capped, or otherwise used.
4. Materials that could provide shelter/nesting habitat for birds during the nesting season may be covered with netting or treated with other exclusion methods, where feasible and appropriate, to prevent birds from constructing nests. In addition, materials such as wooden pallets, wooden power poles, and metal tubing, providing nesting and shelter habitat for

birds during the nesting season and artificial refugia for other special-status species shall be thoroughly inspected before use.

5. If encountered, wildlife within the project site shall be allowed to escape unimpeded, removed by a qualified biologist and placed in a designated safe area away from construction activities, or left in place when required by regulations, policies, permits, and/or conditions of approval. If wildlife removal by a qualified biologist is required, the qualified biologist shall be approved or permitted by CDFW and USFWS, as and if required by law, prior to removing such species.

6. To prevent entrapment of special-status wildlife, all excavations (e.g., steep-walled holes, or trenches) more than 6 inches deep shall be covered with plywood or similar materials when not in use or fitted with at least one escape ramp constructed of earth dirt fill, wooden planks, or another material that wildlife could ascend. All excavations more than 6 inches deep shall be inspected daily for entrapped wildlife before construction activities begin and once immediately before being covered with plywood. Before excavations are filled, they shall be thoroughly inspected for entrapped wildlife. Any wildlife discovered shall be allowed to escape unimpeded before field activities resume or shall be removed from excavated areas by a qualified biologist and released at a safe nearby location.

7. Avoidance and minimization of impacts on sensitive biological resources within active construction areas shall be aided by flagging or fencing.

8. Dust suppression shall occur during construction activities when necessary to meet air quality standards and protect biological resources.

9. Disturbance of ponds and in-stream pools shall be avoided to the extent practicable. When feasible, and to the extent practicable, all in-stream work shall occur during the dry season.

10. To the extent practicable, existing mammal burrows shall be preserved in place.

11. All general trash, food-related trash items (wrappers, cans, bottles, food scraps, cigarettes, etc.), microtrash (nails, bits of metal and plastic, small construction debris, etc.), and other human-generated debris scheduled to be removed shall be stored in animal-proof containers and removed from the site on a regular basis (weekly during construction, and at least monthly during operations). No deliberate feeding of wildlife or domestic animals shall be allowed.

12. To minimize potential for attracting predators that could impact special status animal species, Project personnel shall monitor the project site for animal carcasses, including wild animals and livestock. Monitoring shall be conducted by California Flats on a weekly basis during construction and operation. During construction, any road kill within the project site or

Access Road shall be reported to designated onsite personnel. Any animal carcasses detected on the project site shall be removed and disposed of as quickly as possible to avoid attracting predators. The removal and disposal shall be conducted by an individual in possession of appropriate federal and state permits, if any are required.

13. New light sources shall be minimized, and lighting shall be designed (e.g., using shielding and/or downcast lights) to limit the lighted area to the minimum necessary.
14. Use of chemicals, fuels, lubricants, or biocides shall be in compliance with all local, state, and federal regulations. All uses of such compounds shall observe label and other restrictions mandated by the U.S. Environmental Protection Agency, California Department of Food and Agriculture, and other state and federal legislation. Use of first- and second-generation rodenticides shall not be permitted except for the limited use of zinc phosphide, or a rodenticide approved by the County, and only after other means of pest control (e.g. rodent traps) have proven to be ineffective.
15. To prevent harassment and mortality of listed, special status, and common wildlife species and destruction of their habitats, no domesticated animals shall be permitted on the project site, with the exception of grazing animals prescribed for vegetation management and trained working animals used specifically for livestock management or species surveys (e.g., horses, livestock working dogs, scent tracking dogs).
16. No firearms shall be allowed on the project site, unless otherwise approved for security personnel.
17. During construction, an annual written report shall be prepared describing the status of Project construction, as well as the compliance and current implementation status of construction-related biological mitigation measures and general biological measures. The report shall be submitted to the County no later than 15 February the following year.

- *Implement measures to reduce risk of wildland fire (Mitigation Measure HAZ-4(a) of the August 2014 DEIR).* Prior to the issuance of any construction permit, California Flats shall submit a Final Fuel Management Plan to the County of Monterey RMA – Planning Department for review and approval. The Final Fuel Management Plan shall be prepared in consultation with the Fire Protection District and/or Cal Fire. The Final Fuel Management Plan shall identify emergency access routes, vegetation management measures (e.g. grazing, disking, mowing), road maintenance requirements, fuel modification zones and defensible spaces around structure, applicable emergency response procedures (e.g. notification requirements), and vehicle restrictions during the fire hazard season. Fuel protection zones, including defensible spaces and firebreaks, shall be established and maintained throughout the duration of the project in accordance with state and County minimum clearances and fuel modification standards.

- *Implement biological construction monitoring (Mitigation Measure B-1(ee) of the August 2014 DEIR).* Before the start of ground disturbance or site mobilization activities, qualified biologists shall be retained by California Flats. California Flats shall ensure that each qualified biologist(s) has demonstrated expertise with the listed and/or special-status plants, terrestrial mammals, birds, reptiles, and invertebrates of the region, such as San Joaquin kit fox (*Vulpes macrotis mutica*), California red-legged frog (*Rana draytonii*), and burrowing owl. Expertise must include the ability to recognize listed/special-status and common species of the region, as well as sign, including scat, pellets, tracks, hair, fur, feathers, dens, and burrows. The qualified biologists shall also, as necessary, have the ability to monitor, relocate, handle, and collect species, as authorized by CDFW and USFWS through the use of a Memorandum of Understanding (MOU), scientific collecting/incidental take permit, and/or federal take permit. The qualified biologist(s) shall be present during initial ground-disturbing activities immediately adjacent to or within habitat that supports populations of listed or special-status species.

  If a listed or special-status species is encountered during Project construction, the following protocol shall be implemented:

  1. All work that could result in death, direct injury, disturbance, or harassment of the individual animal shall immediately cease and the qualified biologist shall be contacted; and

  2. The qualified biologist shall remove the individual animal to an appropriate relocation site outside the Project impact areas, or the individual animal shall be allowed to leave unimpeded.

  Construction shall resume, as directed by the qualified biologist(s), as soon as the individual animal either leaves or is removed from the area.

- *Restore temporarily impacted habitats to prevent loss or degradation of sensitive communities and to preserve habitat functions and values for special-status wildlife species (Mitigation Measure B-2(b) of the August 2014 DEIR).* Areas where temporary, construction-related impacts have taken place shall be restored in accordance with a Habitat Restoration and Revegetation Plan (HRRP). The plan shall prescribe restoration actions needed to treat disturbed soils and vegetation, in order to restore disturbed areas. Only areas that were graded (i.e., where the soil resources were removed and replaced) shall be subject to active restoration; however, the vegetation in the temporarily disturbed areas on the Project site and in the areas Access Road shall be monitored to ensure success, maintenance, and/or establishment of target habitat. California Flats shall contract a qualified restoration biologist, knowledgeable in grassland and wetland habitat restoration to develop the HRRP.

  The HRRP shall set forth trigger points to identify where restoration shall be required in response to construction-related impacts. It shall also explicitly detail the process or processes required to restore habitats. The HRRP shall, at a minimum, include the following Project-specific information and sections:

  1. <u>Soils and Seed Bank Management</u>

a) A soil baseline study shall be conducted, by a qualified restoration ecologist with soils expertise, to inform soil requirements relative to habitat restoration for temporarily disturbed areas of the site. The results of this study shall be included in the HRRP and will be used to inform the development of a topsoil harvest and stockpiling plan outlined in the HRRP, and will outline methods for preserving the seed bank present in the removed topsoil.

b) The HRRP shall include details for topsoil salvage, if needed, and proper storage, and shall identify areas within the construction footprint where topsoil is present, supports native vegetation or common non-native grasses characteristic of the grasslands on the site, does not support dense weed infestations, and can be salvaged and stockpiled for later replacement following ground-disturbing activities. The soil baseline study shall characterize topsoil by its depth to impervious layer, nutrient levels, texture, organic matter, permeability, and water-holding capacity.

c) The HRRP shall also identify areas where topsoil stockpiling and replacement would not be warranted due to low development of the existing seed bank and organic material. The harvesting, stockpiling, and spreading of topsoil and seed bank shall also be monitored by a qualified restoration ecologist with a soils background.

d) The HRRP shall require that at least 6 inches of topsoil be salvaged from the areas identified in the plan. These stockpiles shall not be mixed with spoil material, trash, materials such as road base or aggregate, or topsoil containing heavy weed seed banks. The allowable duration for stockpiling and management of stockpiles that will maintain healthy soil conditions shall be stipulated in the HRRP. The HRRP shall stipulate BMPs to discourage erosion of the topsoil stockpiles, including planting cover crops, roughening the pile, using fiber rolls, employing temporary stabilization measures, or other measures, as determined by the potential for erosion of the pile from rain and wind.

e) All redistribution of stored topsoil shall be completed prior to final site inspection (for the close of Project construction work).

f) Soils temporarily disturbed by trenching activities shall be replaced immediately to the extent practicable following placement of cables, and the amount of time open trenches are left on site shall be minimized to the extent practical.

g) Areas where substantial soil compaction has occurred shall be treated with light ripping or other methods intended to rectify compaction, as recommended by the qualified restoration ecologist. The HRRP shall outline the methods for assessing whether substantial compaction requiring active restoration has occurred, based on information gathered in the soil baseline study.

h) No fertilization of disturbed soils shall be prescribed unless recommended by the qualified restoration ecologist. As appropriate, highly disturbed soils lacking topsoil replacement may be amended with certified weed-free mulch.

i) For wetlands and stream habitats where needs differ from the soil restoration needs in upland soils, the HRRP shall stipulate measures to completely restore fragile soils in wetlands and to maintain existing streambed substrate characteristics following restoration of these habitats after temporary disturbance.

2. <u>Temporary Disturbance Mapping</u>

   a) The HRRP shall include detailed figures showing the areas proposed to be temporarily disturbed during Project construction. Such figures shall be updated as needed to reflect design changes and areas requiring active restoration actions.

3. <u>Supplemental Restoration Actions</u>

   a) The HRRP will stipulate specific performance criteria that identify when areas require additional methods beyond topsoil replacement and soil restoration. In areas requiring active reseeding beyond topsoil replacement, the species composition proposed for reseeding shall be substantially similar to or improve on pre-construction vegetation community composition, excluding invasive non-native species and rare plant species. The latter may have very specific microhabitat requirements that may not be possible to replicate after disturbance. A range of seeding palettes will be stipulated in the HRRP, and these shall differ as needed between various habitat types. For example, native perennial grasses shall be required as a component of the palette for impacted areas of serpentine bunchgrass grasslands or Valley needlegrass grasslands. Non-native species that are dominant within and characteristic of disturbed habitats may be included, as long as they are not specifically prohibited by the project Vegetation and Invasive Species Management Plan (see measure B-2[c] below). The intent of the seeding palettes shall be to maintain or increase native species coverage, reduce establishment of damaging invasive species, and preserve current wetland vegetation types present on the site. A description of the preferred methods for planting (e.g., hydroseeding, drill seeding, aerial broadcast seeding, or others) within differing habitats or impact types shall be provided, as well as details regarding irrigation, if needed. If seed is to be collected for redistribution from onsite species, collection protocols and areas shall be outlined.

4. <u>Monitoring</u>

a) All areas subject to temporary disturbance and requiring restoration actions under the HRRP shall be monitored by a qualified restoration ecologist so that restoration success can be determined and relevant recommendations can be made for successful habitat establishment. Monitoring shall consist of both qualitative and quantitative assessment programs.

b) Both qualitative and quantitative monitoring shall be required in all restored areas for at least two years following construction. Failure to meet pre-defined success criteria after two years of at least average annual rainfall will trigger remedial actions; however, as vegetation growth is lower during below-average rainfall years failure to meet success criteria during years with lower than average rainfall will simply entail a longer monitoring duration until it can be determined that the restoration success requires remedial actions and the site is not simply being affected by below-average rainfall. Average rainfall is defined in this context as the 30-year average for the site (1981–2010), established by the Parameter-elevation Regressions on Independent Slopes Model (PRISM) Climate Group, or 13.12 inches per year (PRISM 2013). The actual annual rainfall must be measured using an onsite rain gauge, and if the actual measured precipitation does not meet this level by the end of the rainy season, these monitoring results will still be reported, but monitoring will continue until the monitoring data set includes at least two years in which this precipitation level is met or until success criteria are met in two monitoring years.

c) Qualitative survey results shall discuss species composition, growth and survivorship, germination success, invasive plant infestations, and areas where restoration was not successful in re-establishing adequate vegetation cover to prevent erosion and sedimentation-related impacts. Qualitative monitoring shall occur on a quarterly basis for the first year. This timing shall allow remedial actions to be identified and enacted as necessary following restoration to achieve success criteria in advance of the final success/failure determination. Monitoring reports shall be submitted to the County every six months (after two qualitative monitoring events) for the first year following restoration. Qualitative monitoring shall then occur once per year in conjunction with quantitative monitoring until two years of average rainfall have occurred or until successful restoration is achieved via attainment of the pre-defined success criteria.

d) Quantitative monitoring shall occur annually for years one and two, or longer until pre-defined success criteria are met in two years of monitoring as described above. As described above, failure to meet success criteria during below-average rainfall years will lengthen monitoring duration, but will not necessarily require the commencement of remedial actions until and unless it is determined in a year with normal precipitation these criteria are still not being met. In year one, quantitative monitoring shall take place in January, April, and July. In year two and in any subsequent years that this monitoring is required due to low rainfall and/or failure to meet success criteria, monitoring shall occur in May.

e) The HRRP will establish pre-defined success criteria for both qualitative and quantitative monitoring activities. A qualified restoration ecologist shall use baseline vegetation data from the impact areas or from reference areas to set comparative success criteria across the site. The success criteria will be defined separately for each habitat type. These criteria will: 1) identify the duration of monitoring sufficient to indicate that the restoration habitat is on a clear trajectory toward successful establishment if this differs from the minimum two years required (e.g., if a given habitat takes six years to reach full maturity, one might monitor it for three years to establish the restoration trajectory), 2) specify interim quantitative habitat performance criteria that can be used to track habitat development at intervals during the monitoring period-these may either be predetermined based on a vegetation survey of the impacted habitat or may be tied to reference sites, 3) specify final quantitative success criteria for each habitat that indicate that the habitat is likely to ultimately develop functions and values comparable to the impacted habitat, and 4) specify final qualitative and quantitative success criteria that demonstrate that the restoration areas exhibit minimal erosion and that invasive plant species cover does not exceed that of reference habitats.

f) Quantitative monitoring shall be conducted in one-square-meter quadrats and shall include the following data at a minimum:

   i. Species composition and cover data

   ii. Bare ground cover data

   iii. Canopy height

   iv. Hydric soil indicators (in wetlands)

g) These data shall be used to measure and report native species coverage, native and non-native species recruitment, and hydrology within restored wetlands, and to compare these to the pre-established success criteria. Based on these results, the restoration ecologist shall make specific recommendations for remedial actions, if required. Reports shall be submitted to the County twice annually for the first year of monitoring (by 31 January and by 31 July) and once annually by 31 January during all subsequent years of monitoring. Each HRRP monitoring report shall include the following information at a minimum:

i. The name, title, and company of all persons involved in restoration monitoring and report preparation

ii. Maps or aerials showing restoration areas, transect locations, and photo documentation locations

iii. An explanation of the methods used to perform the work

iv. An assessment of the treatment success

- *Manage Site Vegetation During Project Operations (Mitigation Measure B-2(c) of the August 2014 DEIR).* Before the construction permit is issued, California Flats shall retain a qualified restoration or plant ecologist with rangeland management experience to prepare a Project-specific Vegetation and Invasive Species Management Plan (PVIMP), to be administered during operation of the Project in the array fields and other applicable areas of the Project site. The comprehensive plan shall be intended to maintain acceptable fuel loads and prevent the introduction or spread of non-native invasive species associated with the disturbance resulting from the Project.

  The PVIMP shall be an adaptive management tool. Vegetation management strategies and weed control efficacy shall be evaluated over time. Modifications to the strategies used or to the techniques used to accomplish each strategy shall be implemented based on results, experience, and the latest research. If grazing is not feasible on the project site, comparable alternative methods of vegetation management (e.g., mowing) may be used.

  The PVIMP shall also describe BMPs to avoid the unintentional introduction of invasive species to and from the site, describe monitoring measures to ensure that any invasions are detected before they become substantial, and describe species-specific control measures that shall be implemented if invasions occur.

  The PVIMP shall be submitted to the County prior to the notice to proceed, and shall address the entire project site. This submittal shall further describe the process by which the PVIMP shall be implemented (e.g., the entity responsible for implementing it, funding mechanisms, and reporting procedures). The PVIMP shall include, but is not limited to, the following:

  1. detailed measures to promote the persistence of native grassland species, including listed and rare plant species in the vicinity of, but not removed by, the Project;

2. a description of exclusion fencing, if warranted to protect avoided riparian habitats and jurisdictional waters within the arrays;
3. in areas subject to grazing management, development of an RDM monitoring plan that shall inform adaptive management and the rates, timing, and duration of livestock grazing actions planned from year to year, determined by annual climatic patterns and the response of herbaceous vegetation to impacts from the solar panels and plant operations (e.g., panel washing);
4. a plan for adaptive strategies to manage grazing or other vegetation management actions to benefit native wildlife and vegetation and avoid or minimize the establishment of invasive weeds, to the degree practicable;
5. a description of alternate acceptable vegetation control methods and triggers for their use, including weed whacking, mowing, herbicides, and others;
6. a description of annual monitoring stipulated for weeds within the Project site and measures for controlling weeds, both prior to ground disturbance and annually during operation of the Project;
7. a plan for the use and application of herbicides, which may be prescribed only by a licensed Pest Control Advisor and applied only by a licensed applicator; specific prohibitions on herbicide use and application (e.g., no application of herbicides when winds are in excess of 10 MPH or within 50 feet of wetlands) including prohibition near amphibian habitat shall be included;
8. a detailed plan for the washing of all ground-disturbing equipment before it is transported to the site or is used at another site, and for washing equipment within the site if it has worked in infested areas before being used elsewhere on the site;
9. a detailed plan for preventing the spread of New Zealand mud snails within the site; the plan shall include thorough washing of equipment and the footwear of construction personnel, or drying for two weeks following work in wetted stream channels that may support the species; and
10. details for placing and maintaining an onsite wash station for washing heavy equipment that has worked in infested areas before moving elsewhere on the site, and performance criteria for the control and disposal of wash water and collected sediment; and treatment and disposal requirements for weed-infested topsoil.

Conservation Measures Implemented During Pre-Construction and Construction

California Flats is committed to the following species-specific, as well as more general, avian and bat conservation measures to be implemented during the period immediately prior to construction and throughout the construction phase. Additionally, the Lake and Streambed Alteration

Agreement (1600 Permit) issued by the CDFW requires non-disturbance buffers for nesting avian and roosting bat species within aquatic work areas and a 250-foot radius. The 1600 Permit notes further that due to special status designations and differing nesting periods, separate avian survey and avoidance requirements are required for burrowing owl, golden eagle, bald eagle, and white-tailed kite.

1. *Conduct Pre-construction Surveys for Nesting and Breeding Raptors and Other Birds (Mitigation Measure B-1(r) of the August 2014 DEIR).* Not less than 30 days prior to initiation of construction activities (incl. mobilization, staging and ESA fence installation) during the breeding season (1 February to 15 September), a qualified biologist shall conduct preconstruction surveys for raptors and MBTA/state regulated birds. The survey for the presence of nesting raptors, including golden eagles, shall cover all areas within of the disturbance footprint plus a 1-mile buffer where access can be secured. The survey area for all other nesting bird species shall include the disturbance footprint plus a 300-foot buffer. The surveys shall be repeated during the breeding season for each subsequent year of construction to ensure that ongoing construction activities avoid impacts to nesting birds.

   If active nests (nests with eggs or chicks) are located, the qualified biologist shall establish an appropriate avoidance buffer ranging from 50 to 300 feet based on the species biology and the current and anticipated disturbance levels occurring in vicinity of the nest. The objective of the buffer shall be to reduce disturbance of nesting birds. All buffers shall be marked using high-visibility flagging or fencing, and, unless approved by the qualified biologist, no construction activities shall be allowed within the buffers until the young have fledged from the nest or the nest fails.

   For golden eagle nests identified during the preconstruction surveys, an avoidance buffer of up to one mile shall be established on a case-by-case basis in consultation with the USFWS, and shall depend on the existing conditions and disturbance regime, relevant landscape characteristics, and the nature, timing, and duration of the expected development disturbance. The buffer shall be established between 1 February and 31 August; however, buffers may be relaxed earlier than 31 August if a qualified ornithologist determines that a given nest has failed or that all surviving chicks have fledged.

2. *Preconstruction Surveys for Burrowing Owl (Mitigation Measure B-1(l) of the August 2014 DEIR).* No more than 14 days before the start of initial ground disturbing activities, a qualified ornithologist(s) shall conduct focused, pre-construction, take-avoidance surveys for burrowing owls within all areas proposed for ground disturbance that contain suitable owl habitat (CDFG 2012). Preconstruction surveys shall be consistent with CDFW-recommended methods described in the Staff Report on Burrowing Owl Mitigation (CDFG 2012; Appendix B), and be conducted on foot such that 100% of the survey area is visible, and shall cover the entire limits of disturbances plus a 500-foot buffer. If the project is developed in phases, the preconstruction surveys shall be timed to coincide with the start of each phase, rather than the entire site being surveyed at one time. All observations of burrowing owl and sign of burrowing owl (including suitable burrows, pellets, whitewash)

shall be mapped on a site-specific aerial image. A report of the survey finds shall be submitted to the County prior to initiation of construction activities.

If suitable burrows for burrowing owls are identified during preconstruction surveys, mitigation measure B-1(m) shall be implemented.

Burrowing Owl Avoidance and Minimization Measures (Mitigation Measure B-1(m) of the August 2014 DEIR). If suitable burrows for burrowing owls are found during preconstruction surveys on the project site; burrowing owl occupancy shall be determined through up to three additional focused surveys on potential burrows during the morning and/or evening survey windows as defined in the Staff Report on Burrowing Owl Mitigation (CDFG 2012; Appendix B). If the burrows are determined to be unoccupied, they shall be hand excavated by a qualified biologist in the same manner as described under B-1(g).

If the presence of burrowing owls is confirmed, the following avoidance measures shall be implemented.

a) Occupied burrows shall not be disturbed during the nesting season (1 February through 31 August) unless a qualified biologist verifies, through noninvasive methods, that either (1) the birds have not begun egg-laying and incubation, (2) a previously active nest has failed and renesting is highly unlikely, or (3) all juveniles from the occupied burrow are foraging independently and capable of independent survival. Owls present after 1 February shall be assumed to be nesting unless evidence indicates otherwise. Nest-protection buffers described below shall remain in effect until 31 August or, based upon monitoring evidence, until the nest has failed or all juvenile owls are foraging independently as determined by a qualified biologist.

b) Site-specific, no-disturbance buffer zones shall be established and maintained between Project activities and occupied burrows, using the distances recommended in the CDFW guidelines (CDFG 2012; Appendix B):

Time of Year	**Level of Disturbance**		
	Low	**Med**	**High**
April 1 – Aug 15	200 meters	500 meters	500 meters
Aug 16 – Oct 15	200 meters	200 meters	500 meters
Oct 16 – Mar 31	50 meters	100 meters	500 meters

The appropriateness of using reduced buffer distances or burrow-specific buffer distances shall be established on a case-by-case basis by a qualified ornithologist who may consult with CDFW, and shall depend on existing conditions (e.g., vegetation/topographic screening and current disturbance regimes). If necessary, buffer distances shall be carefully reassessed and relaxed or modified, based on future development plans (e.g., increased or intensified construction activities), by a qualified biologist who may consult with CDFW. The buffer zones shall be clearly delineated by highly visible orange construction fencing, which shall be maintained in good condition through construction of project or until construction activities are no longer occurring in the vicinity of the burrow.

c) During the nonbreeding season (generally 1 September–31 January), a qualified ornithologist may passively relocate burrowing owls found within construction areas. Prior to passively relocating burrowing owls, a Burrowing Owl Exclusion Plan shall be prepared by a qualified biologist in accordance with Appendix E of the Staff Report on Burrowing Owl Mitigation (CDFW, 2012). The Burrowing Owl Exclusion Plan shall be submitted to the CDFW and County for review and approved by the County prior to implementation.

   The biologist shall accomplish such relocations using one-way burrow doors installed and left in place for at least two nights; owls exiting their burrows will not be able to re-enter. Then, immediately before the start of construction activities, the biologists shall remove all doors and excavate the burrows to ensure that no animals are present the burrow. The excavated burrows shall then be backfilled. To prevent evicted owls from occupying other burrows in the impact area, the biologist shall, before eviction occurs, (1) install one-way doors and backfill all potentially suitable burrows within the impact area, and (2) install one-way doors in all suitable burrows located within approximately 50 feet of the active burrow, then remove them once the displaced owls have settled elsewhere. When temporary or permanent burrow-exclusion methods are implemented, the following steps shall be taken:

a) Prior to excavation, a qualified biologist shall verify that evicted owls have access to multiple, unoccupied, alternative burrows, located nearby (within 250 feet) and outside of the projected disturbance zone. If no suitable alternative natural burrows are available for the owls, then, for each owl that is evicted, at least two artificial burrows shall be installed in suitable nearby habitat areas. Installation of any required artificial burrows preferably shall occur at least two to three weeks before the relevant evictions occur, to give the owls time to become familiar with the new burrow locations before being evicted. The artificial burrow design and installation shall be described in the Burrowing Owl Exclusion Plan per Appendix E of the Staff Report on Burrowing Owl Mitigation (CDFW, 2012).

b) Passive relocation of burrowing owls shall be limited in areas adjacent to Project activities that have a sustained or low-level disturbance regime; this approach shall allow burrowing owls that are tolerant of Project activities to occupy quality, suitable nesting and refuge burrows. The use of passive relocation techniques in a given area shall be determined by a qualified biologist who may consult with CDFW, and shall depend on existing and future conditions (e.g., time of year, vegetation/topographic screening, and disturbance regimes). *Conduct Pre-construction Golden Eagle Surveys (MM BIO-18).* Beginning in 2013, and continuing each year during construction, a qualified ornithologist shall conduct surveys for nesting golden eagles and monitor all occupied territories/nests located within 2 miles of the Project site and access road. This monitoring shall support implementation of appropriate no-disturbance nest buffers. The ornithologist shall monitor the success and productivity of all proximate nesting territories. These surveys shall follow guidelines outlined by USFWS (Pagel et al. 2010) and Driscoll (2010), and shall be scheduled to (1) enable accurate mapping of all occupied territories within 2 miles of the Project site and (2) generate estimates of nesting success and productivity, according to standards reflected in Steenhof and Newton (2007) and in the above references.

3. *Bat Preconstruction Surveys and Avoidance (Mitigation Measure B-1(q) of the August 2014 DEIR).* A qualified biologist shall conduct an acoustic survey during the maternity season (1 March to 31 July) before any grading or removal of trees, particularly trees 12 inches in diameter or greater at 4.5 feet above grade with loose bark or other cavities. An additional survey for non-maternity roosts shall be conducted not less than 30 days prior to the start of construction. If no active roosts are found, no further action shall be required.

   If active maternity roosts or hibernacula are found, the structure or tree occupied by the roost shall be fully avoided and not removed or otherwise impacted by Project activities during the maternity season. A minimum 100-foot ESA avoidance buffer shall be demarcated by highly visible orange construction fencing around active maternity roosts. No construction equipment, vehicles or personnel shall enter the ESA without clear permission from the qualified biologist. ESA fencing shall be maintained in good condition for the duration of the maternity season. The roost shall be removed only after the maternity season has ended, and shall be removed under the direction of a qualified biologist.

   If active non-maternity bat roosts (e.g., bachelor colonies, hibernacula) are found in trees scheduled to be removed or in rocky crevices within the grading footprint, the individuals shall be safely evicted (e.g., through installation of one-way doors) under the direction of a qualified bat biologist in consultation with the CDFW. In situations requiring one-way doors, a minimum of one week shall pass after doors are installed to allow all bats to leave the roost. Temperatures need to be sufficiently warm for bats to exit the roost, because bats do not typically leave their roost daily during winter months in coastal California. Eviction shall be scheduled to allow bats to leave during nighttime hours, thus increasing their chance of finding new roosts with a minimum of potential predation during daylight.

Conservation Measures Implemented During Construction and Operations

California Flats is committed to the following conservation measures to be implemented during the construction phase and remain in place throughout the duration of the Project, per Mitigation Measure B-1(s) of the August 2014 DEIR.

1. Cap Vertical Pipes and Piles. To prevent cavity-dwelling and -nesting birds from entering open vertical pipes and piles, all open vertical pipes and piles shall be capped or otherwise modified to prevent use by birds. Caps or other modifications shall be put in place before or immediately after pipe or pile installation. All caps or other exclusionary modifications shall be maintained for the duration of construction and operation. A qualified biologist shall periodically monitor the site to ensure that all pipes or piles are appropriately capped.

2. Avian/Power Line Collision Avoidance and Minimization. Install bird flight diverters in accordance with the Avian Power Line Interaction Committee (APLIC) guidelines for reducing avian collisions with power lines. California Flats shall construct the 230-kV transmission line in accordance with the applicable measures for installing bird flight diverters, of the most recent APLIC guidelines for minimizing avian collisions (Reducing Avian Collisions with Power Lines; APLIC 2012). Details of design components shall be indicated on all construction plans. California Flats shall monitor for new versions of the APLIC collision guidelines and update designs or implement new measures as needed during Project construction, provided these actions do not require the purchase of previously ordered transmission line structures. All bird flight diverters shall be maintained for the duration of construction and operation.

3. Avian Electrocution Avoidance and Minimization. Implement Project-specific design measures in accordance with the APLIC guidelines for minimizing avian electrocutions. California Flats shall construct and maintain all transmission facilities, towers, poles, and lines in accordance with applicable policies set forth in the most recent APLIC guidelines for minimizing avian electrocutions (Avian Protection Plan Guidelines; APLIC 2006). Specific APLIC guidelines to be incorporated into the design of the transmission lines to minimize avian electrocutions shall include the following:

    1. Design the tops of structures to be safe for perching raptors.
    2. Provide 60 inches separation between energized conductors and:
        i. energized conductors,
        ii. grounded or neutral conductors,
        iii. pole line hardware that could provide a perch or nesting place, and
        iv. overhead shield wires, including optical ground wire shield wire.
    3. Ensure that all exposed jumper cables are completely covered with a cover of a qualified insulation rating.
    4. Ensure insulation of all energized arresters with covers and insulated cables.

    Details of design components shall be indicated on all construction plans. California Flats shall monitor for new versions of the APLIC guidelines and update designs or implement new measures as needed during Project construction, provided these actions do not require the purchase of previously ordered transmission line structures.

In addition to Mitigation Measure B-1(s) as described above, California Flats will implement an avian fatality monitoring program at the start of operation and will continue for at least two years (see Section 8.0), will follow nest management practices for new bird nests discovered during operations (see Section 9.0), and will develop a Wildlife Incident Reporting System (WIRS) to be implemented for the life of the Project (see Section 10).

Compensatory Habitat Mitigation

San Joaquin Kit Fox and Other Grassland Species

To mitigate the permanent loss of potential San Joaquin kit fox habitat, California Flats shall provide compensatory mitigation acreage, adjusted to reflect the final Project footprint. For purposes of the compensatory mitigation strategy, the San Joaquin kit fox has been identified as an “umbrella species,” as its habitat requirements overlap with many other species potentially affected by the Project. Through the compensatory mitigation described below for both the general nested compensatory measures and the kit fox mitigation measures, California Flats shall provide mitigation habitat of equal or greater habitat value for kit fox and the following grassland-dependent species: American badger (*Taxidea taxus*), raptors and other special-status birds, golden eagle, San Joaquin coachwhip (*Coluber flagellum ruddocki*), coast horned lizard (*Phrynosoma blainvillii*), western spadefoot toad (*Spea hammondii*) upland habitat, and pronghorn. Therefore, discussion of this mitigation is included in the BBCS due to the overlapping benefits to grassland-dependent avian and bat species.

Nested Compensatory Mitigation (Mitigation Measure B-1(a) in August 2014 DEIR). California Flats shall provide conservation easements or funds for acquisition of conservation easements as compensatory mitigation to offset impacts to vegetative communities and listed or special status plants and wildlife. The compensatory mitigation shall incorporate the conditions specified in incidental take permits that could be issued by CDFW and USFWS for this project, but shall meet the minimum standards specified in this measure. Compensatory mitigation shall be provided at a ratio of not less than those specified in mitigation measures B-1(e), B-1(j), B-1(n), B-1(v), B-1(z), and B-1(cc). Compensatory mitigation for multiple species may be combined to mitigate for impacts to multiple species simultaneously (i.e. nested compensatory mitigation). Areas proposed for preservation and serving as compensatory mitigation for special status species impacts must contain verified extant populations of the special status species that would be impacted by the project. Compensatory mitigation areas shall have a restrictive covenant prohibiting future development/disturbance and shall be managed in perpetuity to encourage persistence and enhancement of the preserved target species. Compensatory mitigation lands cannot be located on land that is currently held publicly for resource protection. The compensatory mitigation areas shall be managed by a conservation lands management entity or other qualified easement holder.

California Flats shall either provide conservation easements or provide funds for the acquisition of such easements to a qualified easement holder as defined below. The CDFW and organizations approved by CDFW that meet the criteria below may be considered qualified easement holders for those species for which the CDFW has regulatory authority. To qualify as a “qualified easement holder” a private land trust must at a minimum have:

1. Substantial experience managing conservation easements that are created to meet mitigation requirements for impacts to special-status species;

2. Adopted the Land Trust Alliance's Standards and Practices; and

3. A stewardship endowment fund to pay for its perpetual stewardship obligations.

Other specific conditions for qualified easement holders may be outlined in incidental take permits that could be issued by CDFW and USFWS for this project.

The County shall determine whether a proposed easement holder meets these requirements. California Flats shall also be responsible for donating to the conservation easement holder fees sufficient to cover administrative costs incurred in the creation of the conservation easement (appraisal, documenting baseline conditions, etc.) and funds in the form of a non-wasting endowment to cover the cost of monitoring and enforcing the terms of the conservation easement in perpetuity. The amount of these administrative and stewardship fees shall be determined by the conservation easement holder in consultation with the County.

The primary purpose of the conservation easement(s) shall be conservation of impacted species and habitats, but the conservation easement(s) shall also allow livestock grazing when and where it is deemed beneficial for the habitat needs of impacted species. Conservation easement(s) shall be held in perpetuity by a qualified easement holder (as defined above), be subject to the management requirements outlined in the Habitat Mitigation and Monitoring Plan (HMMP; see measure B-1[b]), and be subject to a legally binding agreement that shall: (1) Be recorded with the County Recorder(s); and (2) Contain a succession clause for a qualified easement holder if the original holder is dissolved.

Land Acquisition Requirements. The following factors shall be considered in assessing the quality of potential mitigation habitat: (1) current land use, (2) location (e.g., habitat corridor, part of a large block of existing habitat, adjacency to source populations, proximity to potential sources of disturbance), (3) vegetation composition and structure, (4) slope, (5) soil composition and drainage, and (6) level of occupancy or use by all relevant species.

To meet the requirement that the mitigation habitat is of value equal to, or greater than, the Project site, the mitigation habitat must be either "suitable habitat" or "enhanced habitat":

Suitable Habitat. To meet the requirements for suitable habitat that provides equal or greater habitat value for special status animal species than the impacted habitat, the habitat must:

1. provide habitat for special status animal species, such that special status animal species populations can regenerate naturally when disturbances are removed;

2. not be characterized by (or adjacent to areas characterized by) high densities of invasive species, such as yellow star-thistle, or species that might jeopardize habitat recovery and restoration;
3. not contain hazardous wastes that cannot be removed to the extent that the site could not provide suitable habitat; and
4. not be located on land that is currently publicly held for resource protection.

Enhanced Habitat. If suitable habitat is unavailable, or in lieu of acquiring already suitable special status animal species habitat, California Flats may enhance potential habitat that:

1. is within an area with potential to contribute to habitat connectivity and build linkages between known San Joaquin kit fox populations;
2. consists of actively farmed land or other land containing degraded habitat that will support enhancement;
3. supports suitable soils, slope, and drainage patterns consistent with special status animal species requirements;
4. cannot be located on land that is currently held publicly for resource protection; and
5. does not contain hazardous wastes or structures that cannot be removed to the extent that the site could not provide suitable habitat.

Enhanced Habitat Standards. For enhanced habitat conditions to equal or exceed habitat conditions on the project site, the enhanced habitat shall meet the following habitat criteria. After five years, these sites must consist of annual grasslands, other grassland vegetation, suitable aquatic habitat, suitable foraging habitat (e.g. habitat is within 10 miles of known nesting golden eagles) or other habitat characteristics (e.g. suitable burrows for burrowing owls, small mammal burrows in upland habitat for CTS, etc.) that are consistent with the known ecology of the special status animal species to which compensatory mitigation is being applied.

Compensatory Habitat Mitigation for San Joaquin Kit Fox (Mitigation Measure B-1(j) in August 2014 DEIR). To mitigate for the loss of potential San Joaquin kit fox habitat from the installation of all new facilities, except the SDAs, California Flats shall provide compensatory mitigation acreage, adjusted to reflect the final Project footprint, at a 3:1 ratio (preserved habitat: affected habitat). The compensatory mitigation must provide equal or greater habitat value than the Project site.

To mitigate for the impacts to potential San Joaquin kit fox habitat within the SDAs, California Flats shall provide compensatory mitigation acreage, adjusted to reflect the final footprint of the SDAs in consultation with CDFW, but at a minimum of 2:1 ratio. All compensatory mitigation must comprise habitat of value equal to, or greater than, the Project site.

Compensatory mitigation areas for San Joaquin kit fox can be combined with mitigation for multiple species as outlined in measure B-1(a) for nesting mitigation. Compensatory mitigation for San Joaquin kit fox shall be consistent with the conditions outlined in the above measure B-1(a), and managed and monitored under the HMMP as outlined in mitigation measure B-1(b) (Section 7.5.5).

Streams and Riparian Habitat (Mitigation Measure B-2(j) in August 2014 DEIR)

Discussion of mitigation measures that will be utilized to offset impacts to stream and riparian habitat are included in the BBCS due to the overlapping benefit to avian and bat species that will utilize the preserved and enhanced habitat.

Perennial stream/channel wetlands and associated riparian habitat shall be preserved and enhanced to compensate for permanent impacts to riparian and stream habitats, in a manner that achieves no net loss in acreage or function, and should be consistent with the USFWS Recovery Plan for Upland Species of the San Joaquin Valley (USFWS 1998) if possible. Enhancement of the preserved habitat shall be site-specific, according to opportunities available at the preservation site and may include riparian vegetation plantings, weed removal, and alteration in grazing management such as changes in stocking, timing, or installation of riparian exclusion fencing.

Permanent impacts to perennial streams and the associated riparian habitat shall be mitigated at a 3:1 ratio (linear feet of stream and associated riparian corridor preserved and enhanced: linear feet of perennial stream and associated riparian corridor impacted); impacts to intermittent streams shall be mitigated at a 2:1 ratio (linear feet preserved and enhanced: linear feet impacted); and impacts to ephemeral streams shall be mitigated at a 1:1 ratio (linear feet preserved: linear feet impacted). The design, monitoring schedule, and success criteria for the mitigation site shall be described in a Project Wetland Mitigation and Monitoring Plan (described in detail in mitigation measure B-3(d) [Section 7.5.3], below) that demonstrates no net loss in acreage or function. Preserved riparian corridors, and any surrounding uplands above the top of bank within the area to be preserved, shall be placed in a conservation easement or similar legal mechanism and managed in perpetuity.

Wetlands (Mitigation Measure B-3(d) in August 2014 DEIR)

Discussion of mitigation measures that will be utilized to offset impacts to wetlands are included in the BBCS due to the overlapping benefit to avian and bat species that will utilize the created, preserved and enhanced habitat.

To compensate for permanent impacts to wetlands on site, offsite wetlands shall be created, preserved, and managed in perpetuity at a 2:1 mitigation ratio (acres created and preserved: acre impacted). Permanent loss includes all wetlands affected by permanent fill placement (which may occur, for example, from mass grading or new road or structure placement, including panel footing placement). In the areas of seasonal wetlands under solar panels (i.e., not the area affected by fill placement but the remainder of the wetland area under the array), some degradation of the wetland is expected; however, it is also anticipated that these areas would continue to provide residual wetland functions and values in at least a portion of the affected wetland. As such, these areas shall be mitigated through creation of offsite wetlands at a 1.5:1 ratio (acres created and preserved: acre impacted). Permanent impacts to wetlands within streams that will be affected by construction of road crossings (see Impact B-2 in the DEIR) shall be mitigated by creating off-site wetlands at a 1:1 ratio; these areas shall also be mitigated through preservation and management of riparian and stream habitat (see mitigation measure B-2[i] in the DEIR). By concurrently providing 1:1 wetland creation mitigation for such impacts, no net loss of wetlands will occur, and lost values and functions will be compensated (Table 4).

Temporary impacts to wetlands and other waters shall be mitigated through onsite restoration as described in mitigation measure B-2(b) (HRRP), if impacts are restored within a single year, with most restoration expected to occur at the onset of the rainy season to enhance germination success (i.e., areas impacted in a given year must be restored prior to 1 March of the following year to be considered temporary and require no additional mitigation). Areas of construction access-related temporary impacts that cannot be restored prior to 1 March the following year and would remain exposed during the dry season shall be restored the following fall. Compensatory mitigation for such long-term temporarily impacted areas shall be provided at the offsite location at a ratio of 0.5:1 of wetland creation (acres created and preserved off site: acres temporarily impacted for more than one rainy season). Impact areas left unrestored for two rainy seasons shall be compensated off site at a 1:1 ratio, and additionally shall be restored on site. Temporary impacts to groundwater-fed wetlands due to hydrological interruption from a new well(s) shall be determined per mitigation measure B-3(c) of the DEIR and shall be mitigated off site at a ratio of 1:1 if success criteria are met and the wetlands are restored to pre-Project function within three years of the date of well construction. If functions and values are lost for more than three years, the impacts shall be considered permanent, and compensatory mitigation shall be provided at a 2:1 ratio (Table 4). Permanent impacts to any streams fed by such wetlands shall be mitigated as per mitigation measure B-2(i). Table 4 below provides a summary of the various mitigation ratio requirements for each impact type. The permanent protection and management of the constructed mitigation wetlands shall be ensured through an appropriate mechanism, such as a conservation easement granted to a public or private entity authorized by Section 815.3 of the California Civil Code to acquire and hold conservation easements, deed restriction, or fee title purchase.

Table 4. Mitigation Ratios for Wetland Impacts (Ratios to Be Applied to Actual Impacts Determined from Construction Plans and Well Monitoring)

Impact Type	Wetland Type and Action	Mitigation Ratio (Acres Created and Preserved to Acres Impacted)
Permanent fill	Seasonal wetland and perennial marsh impacts due to fill placement and loss (including panel footing areas)	2:1
Permanent shading	Seasonal wetland impacts from solar panel shading and placement (not including panel footing areas)	1.5:1
Permanent fill for road crossings	In-stream wetland impacts from road crossing construction	1:1
Temporary access (unrestored for longer than one rainy season)	Seasonal wetland and perennial marsh impacts from construction access not restored before 1 March of year following impact (but restored before two rainy seasons)	0.5:1
Temporary access (unrestored for more than two rainy seasons)	Seasonal wetland and perennial marsh impacts from construction access restored after two rainy seasons	1:1
Temporary dewatering (less than three years)	Groundwater-fed wetlands temporarily dewatered by new construction wells for three years or less	1:1
Permanent dewatering (greater than three years)	Groundwater-fed wetlands temporarily dewatered by new construction wells for more than three years, or failure to meet success criteria after three years following construction of well	2:1

A Project Wetland Mitigation and Monitoring Plan (WMMP) shall be prepared by a qualified restoration ecologist and shall include, at a minimum, the following information:

1. wetlands and waters impacts summary (as described by MM B-48 and this measure) and habitat mitigation actions;
2. goals of the restoration to achieve no net loss;
3. a map depicting the location of the mitigation site(s) and a detailed description of existing site conditions; and
4. a detailed description of the mitigation design, including:
5. location of the new wetlands;
6. proposed site construction schedule;
7. description of existing and proposed soils, hydrology, geomorphology, and geotechnical stability, as well as results of applicable soils testing conducted at the mitigation site;

8. a detailed description of the steps required for site preparation and a conceptual grading plan—a formal package for plan sets, specs, and estimates for the grading and mitigation construction work shall be prepared based on the concepts set forth in the WMMP no fewer than fifteen days prior to starting work at the mitigation site;
9. a description of recommended soil amendments and other site preparation;
10. development of a planting plan including details on plant procurement, if necessary, propagation, allowable species for seeding and relative pounds/acre, and application;
11. maintenance plan for the created wetlands and riparian plantings;
12. a description of specific monitoring metrics, and objective performance and success criteria, such as delineation of created area as jurisdictional wetland per USACE methods within five years of construction, minimum riparian tree and canopy cover measures in the enhanced stream reaches within ten years of restoration, and others;
13. monitoring methods for vegetation and soils, and measures stipulating quantitative monitoring to occur once per year for at least five years following construction of the wetlands or until success criteria are met;
14. a list of reporting requirements and reporting schedule; and
15. a contingency plan for mitigation elements that do not meet performance or final success criteria within five years for created wetlands and ten years for riparian enhancement; this plan shall include specific triggers for remediation if performance criteria are not being met and a description of the process by which remediation of problems with the mitigation site (e.g., presence of noxious weeds) shall occur.

Native Oak and Riparian Trees (Mitigation Measure B-5(b) in August 2014 DEIR)

Discussion of mitigation measures that will be utilized to offset impacts to native trees are included in the BBCS due to the overlapping benefit to avian and bat species that would utilize the replacement plantings.

Native tree loss is not anticipated to occur. However, if the project results in unavoidable or inadvertent loss of protected trees, as identified by the ISA-certified arborist during monitoring of work within any Tree Protection Zones (see also mitigation measure B-5[a] of the DEIR), California Flats shall replace the lost protected trees (native trees 6 inches or more in diameter at breast height) at a 3:1 ratio (replacement trees: removed trees). Mitigation plantings may be integrated with the mitigation of impacts to riparian woodlands and oak woodlands on the project site. Replacement trees shall be chosen to correspond to the habitat impacted by the tree removal; for example, valley oaks and blue oaks may be planted to replace trees removed from mixed oak woodlands or riparian oak woodlands, and cottonwood or willow may be planted to replace trees removed from willow-cottonwood riparian woodland. Individual planting locations shall be predetermined and mapped by a qualified restoration ecologist. Oak, cottonwood, and willow replanting stock shall be grown from native seed stock gathered within 25 miles of the project site. The removal of oak trees shall be further mitigated by preserving existing mature oak woodland at a 2:1 ratio (canopy preservation area: canopy removal area).

Habitat Mitigation and Monitoring Plan (Mitigation Measure B-1(b) in August 2014 DEIR)

To ensure the success of compensatory mitigation sites required for compensation of permanent impacts to vegetative communities and listed or special status plants and wildlife, California Flats shall retain a qualified biologist to prepare a Habitat Mitigation and Monitoring Plan (HMMP). The HMMP shall be submitted to the County within 12 months after the issuance of the grading permit. The HMMP shall include, at a minimum, the following information:

1. a summary of habitat and species impacts and the proposed mitigation for each element;
2. a description of the location and boundaries of the mitigation site(s) and description of existing site conditions;
3. a description of any measures to be undertaken to enhance (e.g., through focused management) the mitigation site for special status species;
4. identification of an adequate funding mechanism for long-term management and identification of a conservation lands management entity to manage the conservation easement lands;
5. a description of management and maintenance measures intended to maintain and enhance habitat for the target species (e.g., weed control, fencing maintenance);
6. in areas subject to grazing management, compilation of a dedicated, site-specific managed grazing plan, prepared by a Certified Rangeland Manager, for grassland habitats within the mitigation site(s), employing Residual Dry Matter (RDM) monitoring, and a description of the adaptive management scheme for this plan;
7. a description of habitat and species monitoring measures on the mitigation site, including specific, objective performance criteria, monitoring methods, data analysis, reporting requirements, monitoring schedule, etc.; monitoring shall document compliance with each element requiring habitat compensation or management;
8. a contingency plan for mitigation elements that do not meet performance or final success criteria within described periods; the plan shall include specific triggers for remediation if performance criteria are not met and a description of the process by which remediation of problems with the mitigation site (e.g., presence of noxious weeds) shall occur;
9. a requirement that California Flats shall be responsible for monitoring, as specified in the HMMP, for at least three years post-construction; during this period, regular reporting shall be provided to the County;
10. reporting shall include:
    a) an annual monitoring report to be submitted to the County; and
    b) for any species listed under the ESA or CESA, demonstration that the compensatory mitigation and management (1) will fully mitigate for any take of a CESA-listed species as defined by CESA, (2) minimize and mitigate any take of an FESA-listed species to the maximum extent practicable as defined by ESA, and (3) ensure that impacts from the project are not likely to jeopardize the listed species continued existence as defined by ESA.

8 POST-CONSTRUCTION MONITORING

Appendix F provides details of the avian and bat fatality study to be conducted during the post-construction period of the project. This study will be implemented for two years post-construction by an avian survey team. Data and results of the study will be used to inform adaptive management decisions, if necessary, and serve as a basis for fatality comparisons across other regional renewable energy projects.

9 NEST MANAGEMENT

9.1 GENERAL NEST MANAGEMENT

During construction, the Project must follow the avian protection and nest avoidance measures outlined in Project's Conditional Use Permit (CUP) issued by Monterey County as well as those listed in the CDFW 1600 permit – see Section 7 for a discussion of these measures. In addition, off-site mitigation for avian species is outlined in the Project's Habitat Mitigation and Monitoring Plan (HMMP).

Documentation of active nests located on Project structures will occur opportunistically by operations staff and during fatality or nest monitoring (see Section 8.0). Any discovered active nests whose presence does not compromise facility operations or personnel safety (e.g., such as a nest that creates a fire hazard or potential for a short-circuit when near/on exposed and energized equipment), will be allowed to proceed undisturbed until an approved biologist confirms that all young have fledged or the nest has failed. Provisions for minimizing disturbance of such nests (e.g., non-disturbance spatial buffers) will necessarily depend on the species, nest location, and proximity to essential facility operations and activities, and will be developed in consultation with a qualified biologist. Typically, these buffers will be 50 to 300 feet based on the species biology; raptor nest buffers could be up to 1,640 to 5,280 feet depending on the species (e.g., as described in Section 9.2, golden eagles could require buffers up to 5,280 feet). Finally, the Project will follow the 2003 USFWS *Migratory Bird Permit Memorandum, Nest Destruction Guidelines* to avoid destroying nests.

If necessary, procedures for removing problematic active nests (e.g., such as a nest that creates a fire hazard or potential for a short-circuit when near/on exposed and energized equipment) during the breeding season or inactive nests outside of the breeding season will follow existing state and federal regulations and be done in accordance with standard practices outlined in APLIC guidance (APLIC 2006). For ongoing nesting issues, it may be appropriate to 1) encourage birds to nest in desired areas through the installation of nesting platforms, boxes, or tubes, or 2) discourage nest construction in undesired locations through the installation of plastic piping, triangles, model owls, and/or small spikes on Project facilities (see APLIC 2006).

9.2 GOLDEN EAGLE NEST MANAGEMENT

Golden eagles are known to nest in the general vicinity of the Project and may continue to do so in the future. Presumably if eagles continue to nest in the vicinity of the Project, they would be expected to be tolerant to the presence of the Project facilities and routine O&M activities. Nevertheless, eagle nest surveys will be completed for the first two nesting seasons after operations of the Project has begun to better inform future golden eagle nest management. At the beginning of the golden eagle nesting season (February-March), these surveys will be conducted from the ground to identify any active eagle nests within at least one mile of Project facilities; good faith efforts will be made to obtain permission from neighboring property owners to increase this distance to two miles.

The ground surveys to identify and assess eagle nests within at least one mile of Project facilities will follow the recommendations included in the USFWS's Interim Golden Eagle Inventory and Monitoring Protocols; and Other Recommendations (Pagel et al. 2010); good faith efforts will be made to obtain permission from neighboring property owners to increase this distance to two miles. These surveys will be completed by a qualified biologist from the fence line of the Project and on the land of neighboring property owners that allow access for this purpose in a manner that will allow for a good view of potential nesting habitat (and historic nest sites) that fall within at least one mile of the Project facilities. Surveys will be conducted during February and/or early March. Nests and nesting territories will only be designated as unoccupied after two ground observation periods have been completed that are separated by at least 30 days (e.g., the first period in early February, followed by a second period 30 days later in early March). Each of these observation periods will include a minimum of 4 hours of monitoring of eagle nests to confirm territory occupancy and/or nest activity. The qualified biologists conducting these surveys will have the equivalent of two season of intensive experience conducting survey and monitoring of golden eagles.

9.2.1 ROUTINE OPERATIONS AND MAINTENANCE ACTIVITIES

Routine O&M activities occur as needed and include module inspection, testing, maintenance, repair and replacement; equipment inspection, testing, maintenance, repair, and replacement; electrical production and facilities inspection and reporting, fence and security systems inspection, and module cleaning, as necessary. Most routine operations within one mile of any active onsite golden eagle nests can be performed outside of the nesting season. Other routine inspections and repairs occur throughout the year (e.g., once per month checks of major electrical equipment, biological surveys), and are typically completed with 2-4 workers in pickup trucks.

As discussed in Section 2, onsite personnel typically include a site manager/supervisor and 2 to 4 technicians depending upon the size of the power plant and technologies used. Upon assignment, onsite personnel receive thorough and specific training regarding permit conditions, environmental compliance and species-related requirements in effect during operations and maintenance.

Non-equipment site maintenance activities may also include vegetation management including mowing and grazing and the limited use of herbicides, biological surveys, fence and security systems maintenance and repair, road inspection and maintenance including re-grading and erosion repair, if necessary, and general upkeep of the O&M facility. In-array vegetation management, including grazing and mowing, is described in the Project Habitat Restoration and Revegetation Management Plan (HRRMP) (LSA, 2016). Except as needed to comply with regulatory requirements, mowing or road maintenance/re-grading will be performed outside of the nesting season. In the event mowing or road maintenance/re-grading must be completed during the nesting season within one mile of an active onsite golden eagle nest and inside the nest viewshed, and for road maintenance/re-grading also outside the nest viewshed, the Project will consult with USFWS biologists and ensure that a biological monitor is present.

Routine O&M activities generally utilize one to two vehicles or pieces of equipment with a minimum number of associated workers. This level of activity is consistent with ongoing ranching operations that have historically occurred in this area. The USFWS has provided general recommendations for eagle nesting and breeding protections (Appendix G). However, following discussions with the USFWS about unique site-specific conditions, it was decided that routine O&M activities, except as noted above for mowing and road maintenance/re-grading, would not routinely require buffers and would not require further consultation with USFWS biologists.

9.2.2 NON-ROUTINE OPERATIONS AND MAINTAINANCE ACTIVITIES

Non-routine O&M activities may periodically be required at the Project that involves more extended work activities and/or heavier equipment (see Section 2.0). Occasional non-routine repair or replacement of Project components (e.g., transformers, invertors, combiner boxes, etc.) may be needed. These non-routine repair or replacements – called “Corrective Maintenance” – may require larger machinery, such as cranes, boom trucks, excavators, or heavy-haul transport. All of these activities would be scheduled to avoid the active golden eagle nesting season whenever practicable.

If these non-routine O&M activities must occur within the one-mile radius of an historic or newly identified eagle nest in the area, a survey to confirm current nesting status will be completed. Consultation with USFWS will be conducted for non-routine O&M activities within one-mile of an active golden eagle nest, whether inside or outside of the viewshed. Finally, if deemed appropriate after consultation with USFWS, a biological monitor will be present during all non-routine O&M activities that are within one mile of an active eagle nest during the first two years of operations.

The biological monitor will have the authority to call for a Stop Work should the activity appear to be agitating the eagles or their nesting activities. If the golden eagles at the nest site appear to be habituated to or otherwise not disturbed by the activity, the nest monitor will document the eagle nest phenology, behavior of the eagles prior to and during the activities performed, and may determine that nest monitoring for this activity may no longer be necessary. In general, the biological monitor will also note the surrounding landscape topography, screening by topography or site infrastructure, and level of activity that result in a response from the eagles. These observations with be shared with the USFWS.

Any future modifications to this eagle nest management protocol during non-routine O&M activities will closely consider the level and type of activity, nest location and viewshed, and the stage of the nesting chronology. For example, on-site monitoring may lead to reducing the 1-mile restrictive buffer to 0.5-mile during the later stages of nesting (e.g., post-brooding, and post-fledging dependency periods).

9.2.3 EMERGENCY REPAIRS

Emergency repairs needed to keep the Project connected to the electrical grid and producing electricity as a result of major equipment malfunction, electrical grid malfunction, or a natural disaster (e.g., earthquake, fire, storm) will be conducted in an expedient manner with consideration of nesting eagles in the Project vicinity to the maximum extent practicable depending on the emergency.

10 ADAPTIVE MANAGEMENT STRATEGY

The Department of the Interior defines adaptive management as "an iterative decision process that promotes flexible decision-making that can be adjusted in the face of uncertainties as outcomes from management actions and other events become better understood" (Williams and Brown, 2012). California Flats has implemented adaptive management at the Project throughout pre-construction baseline data collection efforts and during project planning, siting, and design. Adaptive management measures will be implemented during construction and post-construction, as necessary. This adaptive management approach will include the following six key concepts described by Williams and Brown (2012):

1. problem assessment
2. design
3. implementation
4. monitoring
5. evaluation
6. adjustment

To facilitate meeting the BBCS objectives, California Flats will review the technical procedures of the monitoring studies, assess the scientific data and findings, and adjust various practices or measures, as necessary. California Flats will coordinate with the USFWS, CDFW and the County regarding the results of monitoring surveys and any proposed response action. This procedure does not replace regulatory authority or responsibility of these agencies.

The Project will submit survey results to the agencies in accordance with the post-construction monitoring program (see Appendix F). Based on results of post-construction monitoring, adaptive management measures could be considered based on an evaluation of certain relevant criteria:

1. take of an individual of a bird or bat species listed as endangered/threatened under the federal or state Endangered Species Act;
2. take of bald or golden eagles within the meaning of the BGEPA or
3. significant levels of mortality of unlisted species of birds or bats. Significance will be determined in coordination with wildlife agencies and will be based on the latest information available, including the most recent data on species' population sizes and trends. For example, even relatively high levels of mortality of common species may not be significant. Conversely, lower levels of mortalities of less common species may be of more concern, particularly if these species appear to be at risk (e.g., USFWS's Birds of Conservation Concern, California Species of Special Concern).

If impacts are determined to be at an unacceptable level, an assessment of why impacts are occurring will be conducted to aid in developing appropriate actions to further avoid, minimize or mitigate the impacts. If causation for impacts is unknown, California Flats will coordinate with wildlife agencies to determine the appropriate measures to implement in order to better assess causation. Potential adaptive management responses include but are not limited to:

1. additional monitoring to assess if impacts represent ongoing and significant risk;
2. modify prey-base or habitat to reduce ongoing risk (e.g., additional on-site carcass removal, increased frequency of vegetation management), as appropriate;
3. installation of bird deterrent devices that have been scientifically proven to be effective within solar arrays and/or along fence lines; or
4. additional anti-perching, anti-nesting, anti-electrocution, or flight diverter devices to transmission/collector lines or within substations/switchyard, as appropriate.

Post-construction Project-related impact assessment is highly complex, particularly with regard to relatively new technologies such as utility-scale solar PV projects. It is therefore critical for stakeholders and resource managers to incorporate statistically sound modeling into any iterative feedback cycle prior to implementation of additional or modified control measures (Williams and Brown 2012).

11 WILDLIFE INCIDENT AND HANDLING SYSTEM

In addition to the post-construction fatality monitoring study described in Section 8.0, California Flats will implement a Wildlife Incident Reporting System (WIRS) at the start of operations, and it will remain active for the life of the Project. The purpose of the WIRS is to standardize the actions taken by site personnel in response to wildlife incidents encountered at the Project and to fulfill the obligations for reporting wildlife incidents. The WIRS will be utilized by site operations and maintenance personnel who encounter dead or injured wildlife incidentally while conducting general facility maintenance activities. The WIRS is designed to provide a means of recording and collecting (but only if the appropriate permits such as a Special Purpose Utility (SPUT) permit have been previously obtained) fatalities at the Project to increase the understanding of solar panel and wildlife interactions. During the standardized post-construction monitoring studies, any carcass found incidentally by site operations and maintenance personnel will be reported to the contractor conducting the post-construction monitoring studies so that the contractor can process the carcass (see Appendix F). Additionally, injured wildlife found within the Project may be taken to the nearest appropriate wildlife rehabilitation facility (see Section 12). Any incident (i.e., mortality or injury) involving a federally listed threatened or endangered species or a bald or golden eagle must be reported to the USFWS within 24 hours of identification. California Flats maintains an ongoing commitment to investigate wildlife incidents involving company facilities and to work cooperatively with federal and state agencies in an effort to prevent and mitigate future bird and wildlife fatalities. It will be the responsibility of California Flats employees and subcontractors to report all avian incidents to their immediate supervisor.

After the formal monitoring program has concluded, operations and maintenance personnel will complete a wildlife incidental reporting form for all injured or dead wildlife that are found near Project facilities. This incident form will include, but not be limited to, the following information: date, time, weather, observer, location, habitat description, photographic documentation (including scale), and description of fatality (i.e., condition, any/all observations). Incident reports will be entered into a spreadsheet or searchable database. All incident reports will be reviewed for quality control issues by the site supervisor and periodically by California Flats' environmental manager. Upon request, California will also periodically provide summary reports of all incidental finds to the USFWS.

12 WILDLIFE REHABILITATION

If during operations, injured wildlife is found within the Project facility, a qualified biologist will be contacted to confirm the species and coordinate for the disposition of the injured animal. Common species may be left in place. However, any injured raptor or state or federal endangered or threatened species will be taken to the nearest appropriate wildlife rehabilitation facility. The wildlife facilities potentially contacted include, but are not limited to:

- Wild Rescue: Moss Landing, Monterey County; telephone (866) WILD-911
- SPCA of Monterey County: Monterey, Monterey County; telephone 831(373-2631 ext. 227
- Pacific Wildlife Care: Morro Bay, San Luis Obispo County; (805) 543-9453

Other potential wildlife rehabilitation facilities potentially contacted include those approved by the CDFW and include those listed at:

https://www.wildlife.ca.gov/Conservation/Laboratories/Wildlife-Investigations/Rehab/Facilities

Handling or transportation of injured wildlife will only be completed under the direction of a qualified biologist and with the appropriate permits and/or agency approvals. The transportation of migratory birds to a wildlife rehabilitation center is authorized under a Good Samaritan clause of the MBTA.

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Appendix A

2014 Final Biotic Report

H. T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

California Flats Solar Project
Monterey County, California
Biotic Report

Project No. 3308-01

Prepared for:

California Flats Solar, LLC.
222 S. Ninth Street, Suite 2870
Minneapolis, MN 55402

Prepared by:

H. T. Harvey & Associates

May 2013

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Contributors

Brian B. Boroski, Ph.D., Principal-in-Charge
Daniel G. Duke, J.D., Senior Regulatory Specialist, Division Head
Amy Sparks, J.D., Senior Regulatory Specialist, Project Manager
Kelly Hardwicke, Ph.D., Senior Plant Ecologist
Robert K. Burton, Ph.D., Senior Wildlife Ecologist
Jeff Seay, Senior Wildlife Ecologist
Jeff Zirpoli, M.S., Wildlife Ecologist
Ethan Barnes, M.S., Plant Ecologist
Élan Alford, Ph.D., Plant Ecologist

Section 1.0 Introduction

This report conveys the results of H. T. Harvey & Associates' (HTH's) biological review of the California Flats Solar Project (the Project) in Monterey County, California (Figure 1), conducted on behalf of the Project proponent, California Flats Solar, LLC. The purpose of this biological report is to describe the existing biological conditions on the proposed Project site, other areas that will be disturbed by project construction, and the surrounding area (identified as the "biological study area"). The information provided in this report is intended to provide Monterey County with sufficient information to describe the existing environmental setting and evaluate potential Project impacts on biological resources in accordance with the California Environmental Quality Act (CEQA). This Biotic Report supersedes the Preliminary Biotic Report (H. T. Harvey & Associates 2012a) provided in September 2012.

Affected sensitive biotic resources addressed in this report include 1) plant and wildlife listed or proposed for listing under the Federal Endangered Species Act (FESA) and/or California Endangered Species Act (CESA); 2) plants considered rare or endangered by the California Native Plant Society (CNPS); 3) wildlife considered Species of Special Concern by the California Department of Fish and Wildlife (CDFW); 4) oak woodlands regulated by the County of Monterey; 5) riparian habitats; and 6) wetlands and other sensitive aquatic resources. This report also addresses weeds listed by the California Invasive Plant Council (Cal-IPC) that may adversely affect sensitive biotic resources.

1.1 Project Description

California Flats Solar, LLC (the Project proponent), proposes to construct and operate a 280-megawatt (MW) alternating current (AC) photovoltaic (PV) solar energy project within an approximately 2562-acre site in southeastern Monterey County, California, near the borders of Monterey, San Luis Obispo, Kings, and Fresno counties. The proposed Project includes solar arrays, related structures, electrical equipment, and infrastructure improvements, including two substations and interconnection facilities that will provide an interconnect to the Pacific Gas & Electric Company (PG&E) owned Morro Bay–Gates 230-kilovolt (kV) transmission line, which currently transects the project site, and an operations and maintenance (O&M) facility. Project improvements will be located on approximately 1900 acres within the 2562-acre site. Primary access to the site will be provided from an existing private driveway off of California State Route 41 (Hwy 41). Improvements to this private driveway and portions of the Caltrans right-of-way off of Hwy 41 will be made as part of the Project. Emergency access to the proposed Project will be available from Turkey Flat Road. A complete description of the proposed Project is provided in the *California Flats Solar Project, Project Description*, Denise Duffy & Associates, Inc. (July 2012).

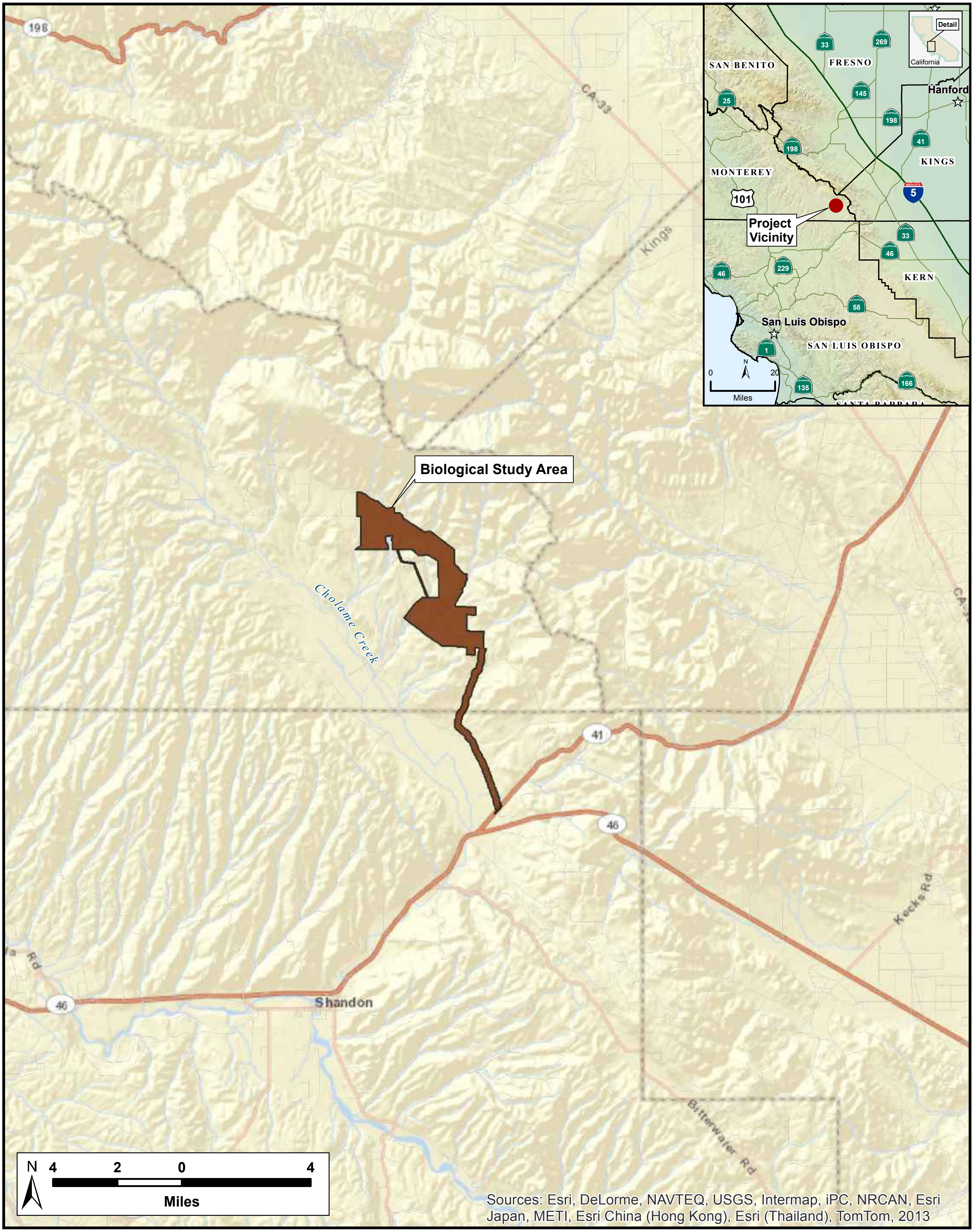
1.2 Environmental Setting

1.2.1 Biological Study Area

The Biological Study Area (BSA) for the Project, which is intentionally larger than the Project site and the area of Project improvements to frame the context of the assessment but limited by private property interests, comprises approximately 4872 acres in an unincorporated area of southeastern Monterey County and northeastern San Luis Obispo County, California, near the Kings County and Fresno County borders (Figure 1, inset). The BSA is located along the eastern rim of the Cholame Valley. The San Andreas Rift Zone trends northwest-southeast south of the BSA. The BSA is bounded by mostly undeveloped private land in all directions. Sparse residential settlements and small farms are located south and east of the BSA. The BSA is vacant and is currently a working landscape that includes cattle ranching. Most level areas of the BSA (i.e., the area north of the access road spur to Hwy 41) have been historically disked and dryland farmed for hay and grain production.

The BSA occurs on three U.S. Geological Survey (USGS) 7.5-minute quadrangle maps: The Dark Hole, Cholame Valley, and Cholame. Elevation ranges from 1180 feet National Geodetic Vertical Datum (NGVD) at the intersection with Hwy 41 to approximately 1860 feet NGVD along the northwest edge of the BSA. Topography within the BSA consists of steeply rolling hills along the lease area edge, with extensive alluvial terraces forming wide level plains. These plains and hills are bisected by a number of drainages that typically flow from north to south, with drainage eventually to the Cholame Valley. California annual grassland dominated by non-native grasses typical of the region but also supporting a healthy complement of native forbs is the predominant habitat on the BSA. Other habitats include wildflower field, serpentine bunchgrass grassland, valley needlegrass grassland, grassland riparian, interior coast range goldenbush scrub, willow–cottonwood riparian woodland, ornamental non-native woodland, blue oak woodland, valley oak riparian woodland, ephemeral stream, intermittent stream, perennial stream, perennial marsh, seasonal wetland, and developed/ruderal grassland.

To date, surveys that have occurred in the BSA include reconnaissance field surveys, wetland surveys and delineation, some species-specific surveys and assessments, and detailed habitat mapping. Surveys were conducted within this larger BSA to identify potential biological resources to assist in the placement of project elements, thus minimizing impacts to resources such as jurisdictional waters/wetlands and other biological resources.



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H. T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

elementpower

Figure 1: Vicinity Map
California Flats Solar Project, California - Interim Biotic Resources Report (3308-02)
May 2013

1.2.2 Project Site

Several terms are used in this document to refer to specific areas under analysis: BSA, Project site, Project site study area, access road, access road study area, and Project vicinity. The definitions for each of these, as used in this document, are as follows:

- The "BSA" is the approximately 4872-acre area subject to biological surveys, shown on Figure 1 and Figure 2 and described in Section 1.2.1. It includes both the "Project site study area" and the "access road study area." The BSA also includes a 220-foot corridor where a transmission line will be installed.
- The "Solar Development Area" (SDA) is defined as all areas that may be developed for solar energy generation, where the array infrastructure improvements (PV panels, inverters, etc.) and improvements needed to operate and maintain the energy-related facilities (internal array roadways, array fencing, lighting, etc.) are to be placed (Figure 2). The SDA is approximately 2031 acres and comprises multiple disjunct areas roughly approximating the extent of the proposed arrays (Figure 2), but larger than the approximately 1900 acres of planned improvements.
- The approximately 2562-acre "Project site" for the purposes of this report includes: 1) the approximately 2031-acre SDA; 2) additional infrastructure improvements and facilities related to the Project (substations, O&M facility, internal access roads connecting arrays, perimeter fencing, etc.); 3) all areas subject to temporary or construction-related impacts (staging, access, utility line trenching between arrays, etc.); and 4) a 100-foot[1] corridor surrounding the proposed transmission line between the two Project substations (Figure 2), which will encompass all impacts related to construction of the transmission line structures.
- The "Project site study area" is the portion of the BSA north of the access road and contains the Project site plus study buffers, and comprises approximately 4176 acres (Figure 2).
- The "Transmission Line Corridor" encompasses a proposed transmission line that will extend from a substation located in the southern portion of the Project site to a substation in the north-central portion of the site (Figure 2). Physical improvements within this corridor will occur within an approximately 100-foot-wide corridor, although biological surveys have been conducted in a wider 220-foot BSA corridor.

[1] A 500-foot wide utility easement will be required for the new high-voltage transmission line. Therefore, other Project documents may define the "Project site" with a 500-foot wide transmission line corridor. However, HTH surveys and impact assessments have been confined to a narrower corridor expected to encompass all impacts related to this improvement.

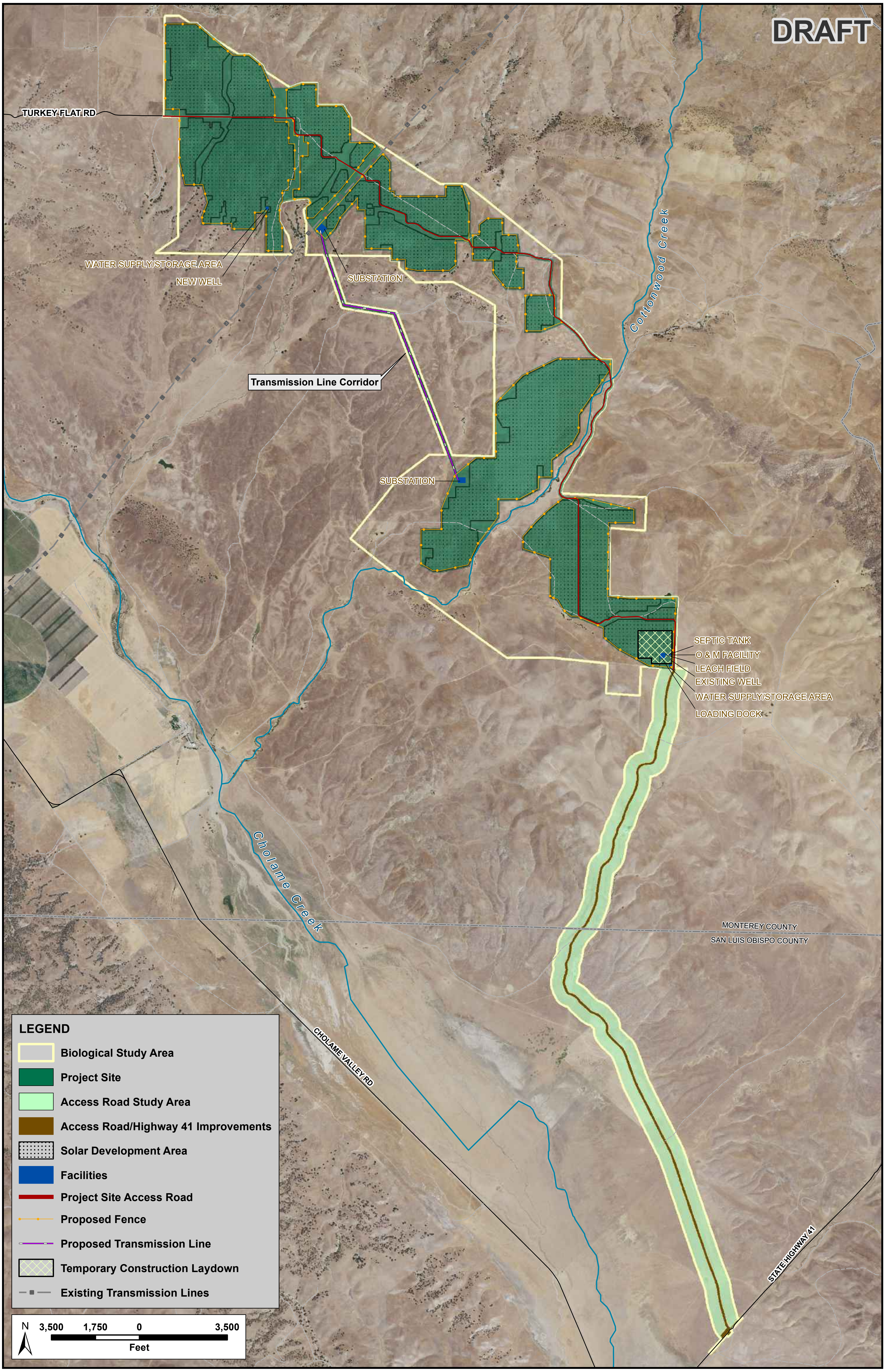

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Figure 2: Site Map

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- The "access road" is an existing private driveway extending from the Project site south into San Luis Obispo County to the junction with Hwy 41, as well as areas both north and south along Hwy 41 within California Department of Transportation right-of-way. Minor improvements would be made to the access road, such as minor widening, resurfacing, drainage crossing improvements, relocation of gates, etc. Hwy 41 would be improved to provide safe ingress and egress and sufficient turning pockets for construction traffic. The area subject to Project improvements associated with the access road and Hwy 41 (discussed in this document as the access road/Hwy 41 improvement areas) comprises approximately 53 acres.
- The "access road study area" is the portion of the BSA containing the existing access road and Hwy 41 improvements as well as a 1000-foot wide corridor surrounding these improvements (Figure 2). The access road study area comprises approximately 696 acres.
- The "Project vicinity" refers to the BSA and a 5-mile radius around the BSA.

Section 2.0 Methods

Prior to conducting surveys, HTH's biologists collected and reviewed published information about threatened, endangered, and other special-status species and habitats in Project vicinity (including the BSA and 5-mile radius). Information was obtained from the CDFW California Natural Diversity Database (CNDDB), National Wetlands Inventory, and technical publications. The CNPS's *Online CNPS Inventory of Rare and Endangered Plants* (CNPS 2013), the Consortium of California Herbaria (CCH 2013), *The Jepson Manual* (Hickman 1993), *The Jepson Manual, Second Edition* (Baldwin et al. 2012) and Calflora (2012) also provided information about the distribution and habitats of vascular plants.

The CNDDB (2013) was queried for special-status species records from The Dark Hole, Cholame, and Cholame Valley U.S. Geological Survey 7.5-minute quadrangles containing the BSA and the 12 surrounding quadrangles: Curry Mountain, Kreyenhagen Hills, Avenal, Parkfield, Garza Peak, Cholame Hills, Tent Hills, Shandon, Orchard Peak, Shedd Canyon, Camatta Canyon, and Holland Canyon quadrangles. For purposes of this assessment, "special-status species" include plants and animals listed, proposed for listing, or candidates for listing as threatened or endangered under the FESA or the CESA; animals listed as "fully protected" under the California Fish and Game Code (Section 3511); animals designated as "Species of Special Concern" by the CDFW; plants ranked as rare or endangered by the CNPS; and trees subject to the County of Monterey's Preservation of Oak and Other Protected Trees ordinance.

2.1 Reconnaissance-Level Surveys

On 19 and 24 August 2011, R Burton, H Clark, E Barnes, and C Wilkinson of HTH conducted reconnaissance field surveys of portions of the BSA to identify biotic habitats, evaluate botanical and wildlife resources, and assess habitat suitability for special-status plant and animal species that may occur within the Project site. On 19 August 2011, the HTH biologists were accompanied by O Sage of Sage Agricultural Services, who has been involved in long-term management of the Project site and surrounding ranch. Additional surveys for jurisdictional waters, listed branchiopods, habitats, and special-status plants and wildlife were performed within the entirety of the BSA by HTH's biologists E Barnes, B Boroski, P Boursier, R Burton, H Clark, K Hardwicke, J Seay, J Smith, A Sparks, J Wilkinson, and J Zirpoli and others on numerous dates from November 2011 through April 2013. The surveys included observations of soil types, topography, vegetation types, special habitat features such as standing dead trees (snags), current land use, habitat condition, jurisdictional waters, reconnaissance surveys for special-status plants and habitats capable of supporting these species, habitats and vegetation alliances, reconnaissance surveys for special-status amphibians, and assessments of suitable habitat for federally listed branchiopods. Direct and indirect evidence of wildlife was identified and habitat suitability for special-status wildlife was assessed. Plant species observed within the BSA were identified and recorded (Appendix A). Invasive weeds, which have the potential to negatively affect special-status species and natural resources, were also noted. These collective observations allowed us to evaluate the potential for threatened, endangered, and other special-status species to occur within the BSA and the Project vicinity to determine the nature, location, and condition of any surface waters, wetlands, and/or other jurisdictional waters within the BSA.

2.2 Wetland and Potential Jurisdictional Waters Delineation

HTH surveyed the BSA for areas that may meet the physical criteria and regulatory definition of "Waters of the United States" (jurisdictional waters) during 2012. The purpose of the field surveys was to identify the extent and distribution of jurisdictional waters such as wetlands and other waters occurring within the BSA under conditions existing at the time of the survey.

To this end, the vegetation, soils, and hydrology of the BSA were examined during extensive surveys in the winter and spring of 2012 following the guidelines outlined in the *Routine Determination Method* in the Corps of Engineers 1987 Wetlands Delineation Manual (Environmental Laboratory 1987). During this time period, the site received 2 sets of moderate to heavy rains, after which time wetland delineators were able to monitor the site for dry down and areas of extended soil saturation or inundation. Additional area in the vicinity of the Transmission Line Corridor and new areas within the Project site that had been added to the preliminary Project design since the original spring delineation field effort were surveyed for jurisdictional waters in July and August of 2012.

These surveys (both surveys in winter and spring over the main portion of the BSA as well as the July and August surveys for additional areas) were conducted according to methodology prescribed in the Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Arid West Region (Version 2.0) (Regional Supplement USACE 2008), consistent with the 2012 Final Map and Drawing Standards for the South Pacific Division Regulatory Program (USACE 2012). The techniques prescribed here were followed to document site conditions relative to hydrophytic vegetation, hydric soils, and wetland hydrology. Wetlands were identified based on the typical three-parameter approach, where an area was considered to be a potential jurisdictional wetland if it simultaneously supported a hydrophytic vegetation community, hydric soils, and had clear indicators of wetland hydrology as described in the Regional Supplement. Such areas are depicted on Figures 3a–3d as the habitats labeled seasonal wetlands and perennial marshes.

Drainages were assessed for the lateral limits of jurisdiction relative to guidance issued in A Field Guide to the Identification of the Ordinary High Water Mark (OHWM) in the Arid West Region of the Western United States: A Delineation Manual (USACE 2008). For the current study, identification of the OHWM in the field was based on observation of a suite of natural geomorphic field indicators that have formed during channel forming events. These features included bank shelving, sediment deposition, scour holes, staining of rocks and culverts, change in soil particle size distribution, exposed roots, flattened vegetation, stepped channel bed morphology, and scour holes downstream of obstructions, among other factors.

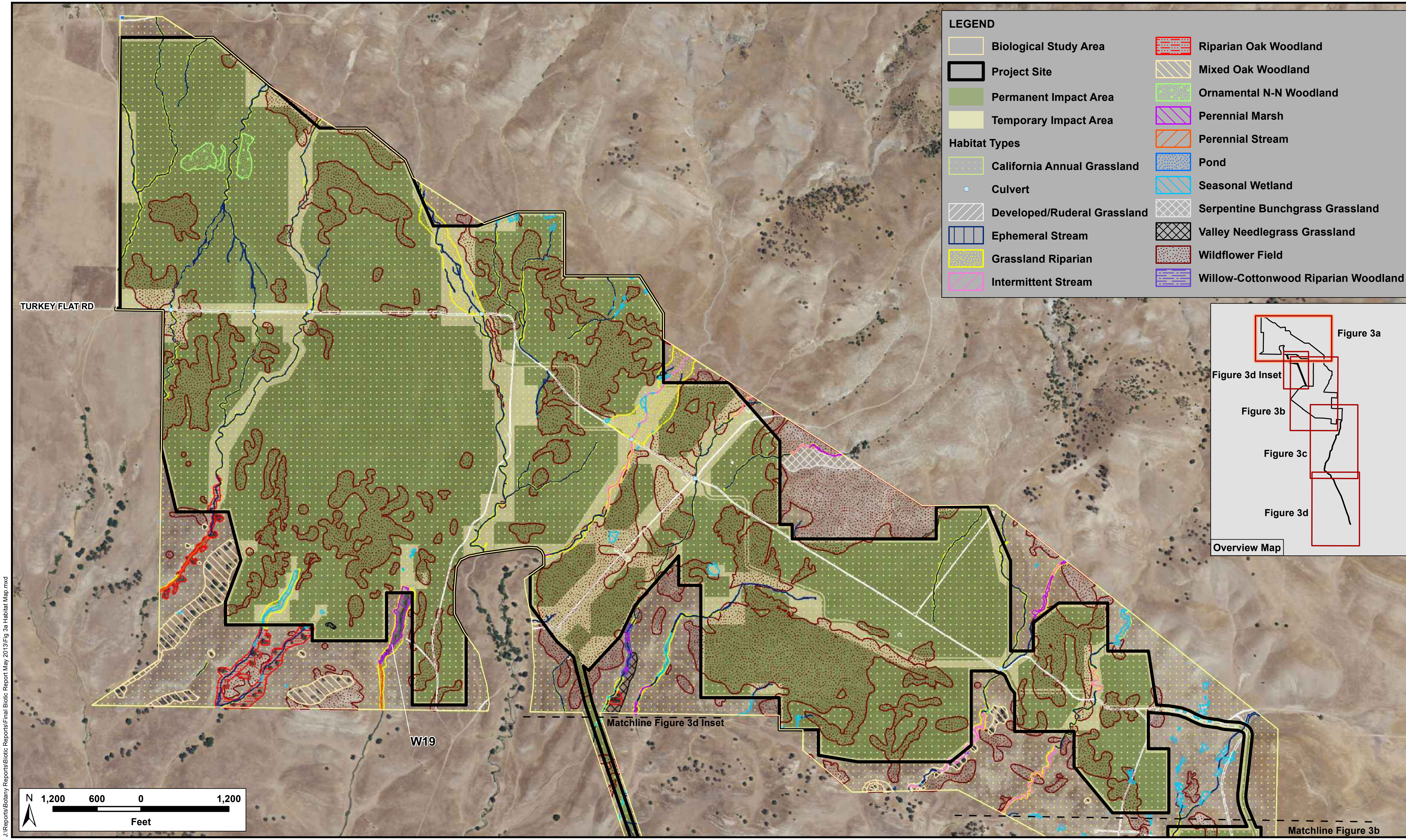

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Figure 3a: Habitat Map

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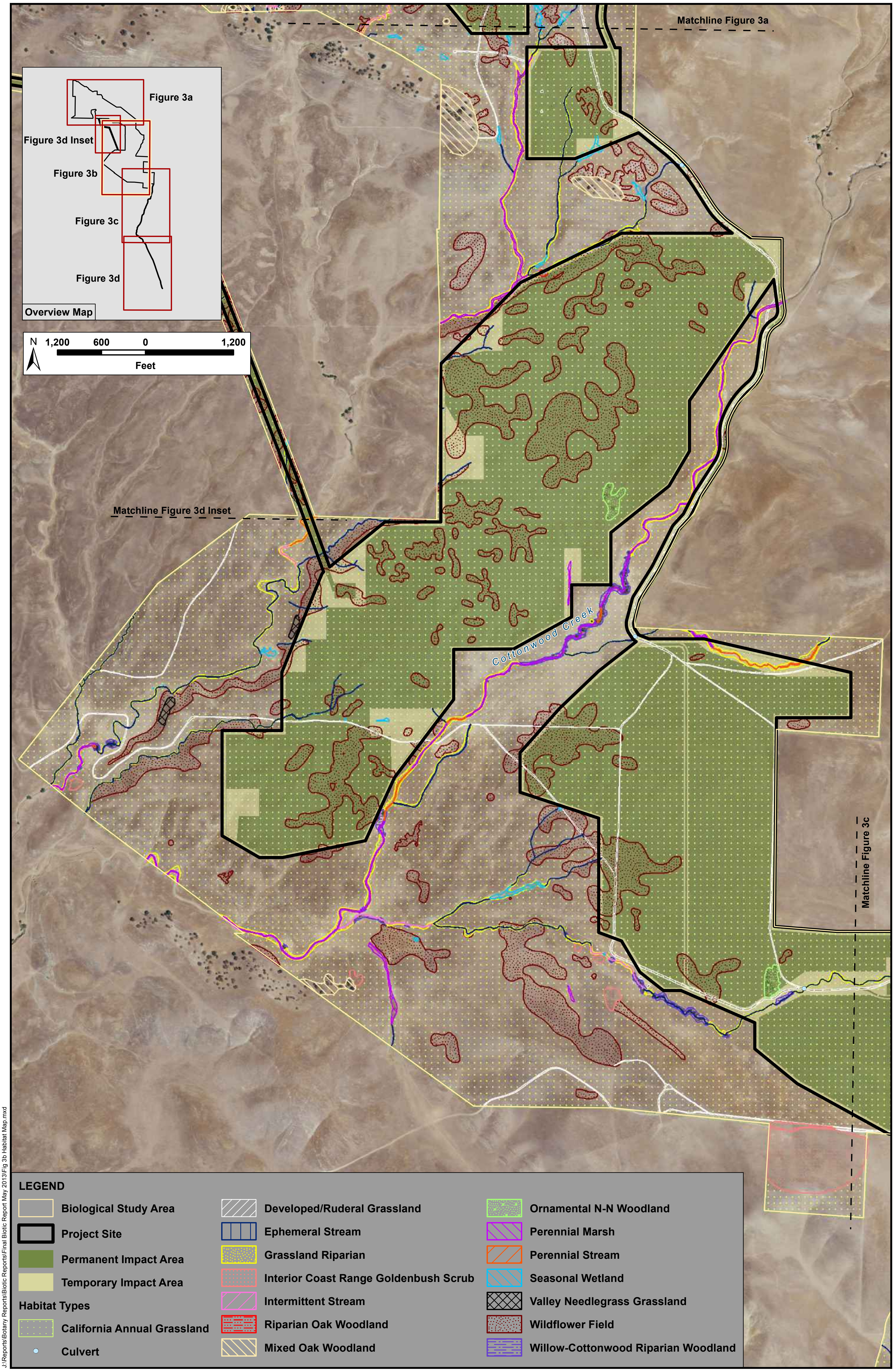

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Figure 3b: Habitat Map

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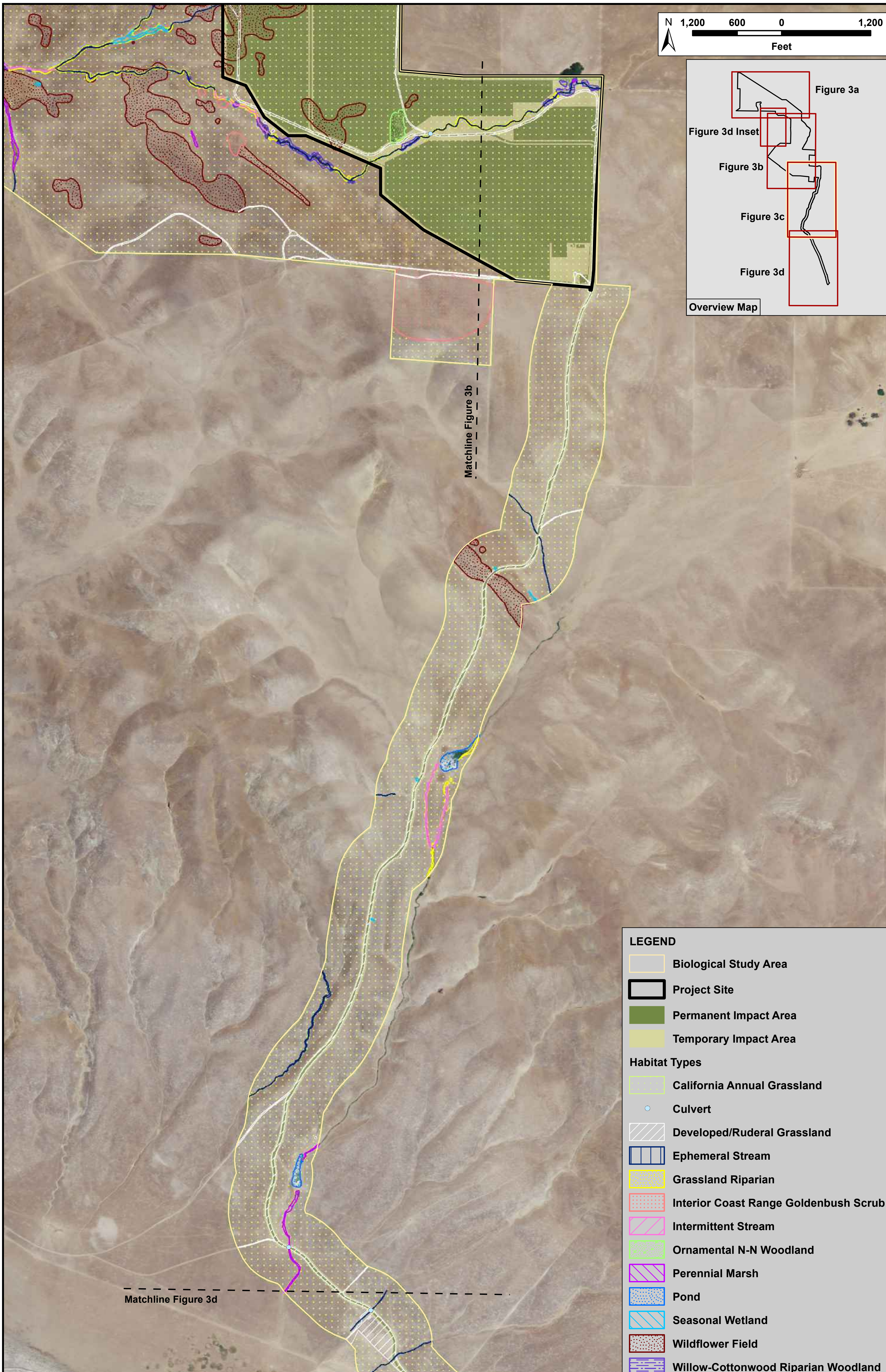

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Figure 3c: Habitat Map

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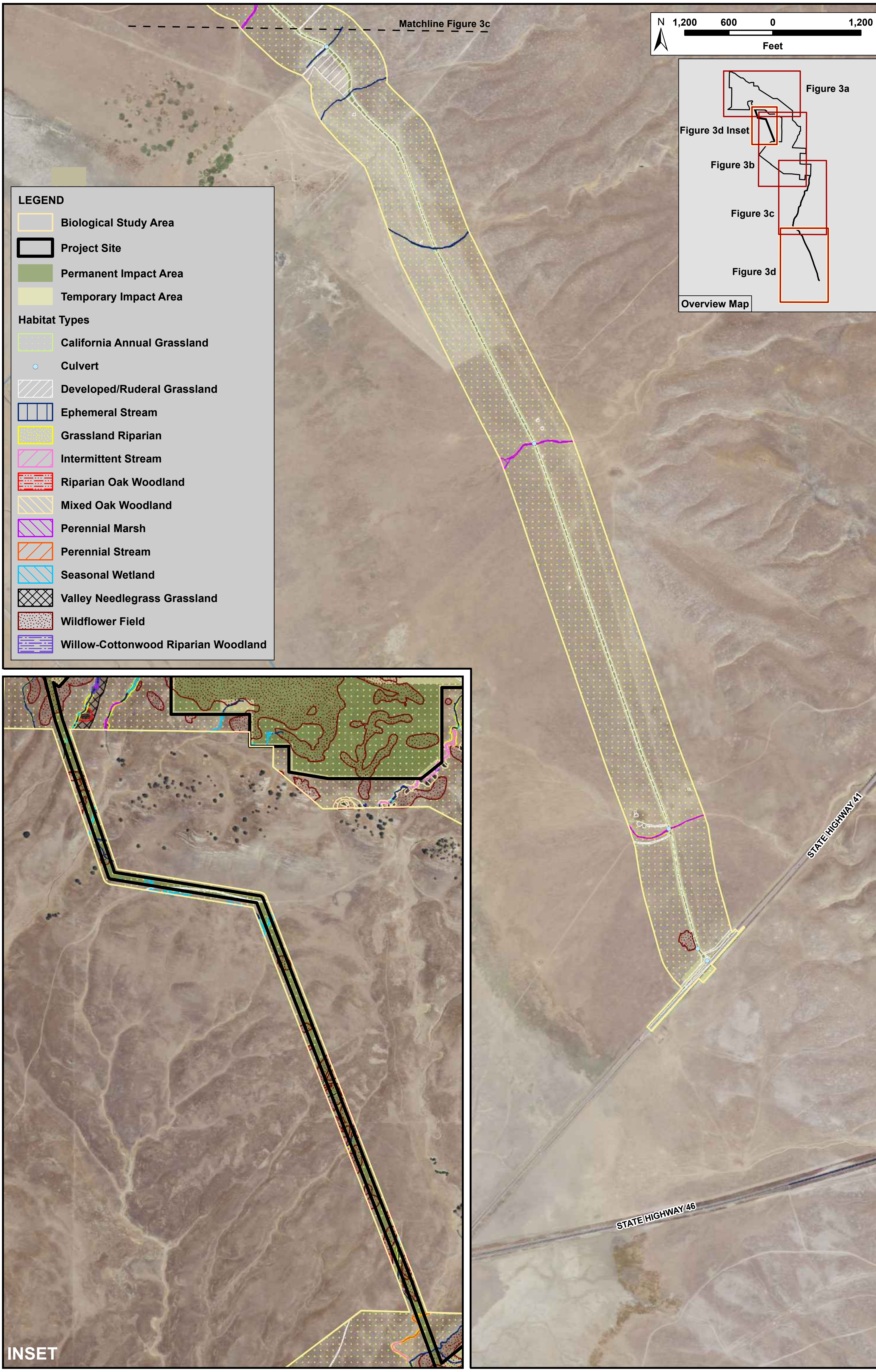

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Figure 3d: Habitat Map

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Drainage reaches not supporting vegetated wetlands and marshes, but that could be considered potential jurisdictional "other waters" due to the presence of an OHWM are depicted as the habitat types ephemeral stream, intermittent stream, perennial stream, and culverts (Figures 3a–3d).

The BSA has been extensively surveyed for jurisdictional waters and the results are depicted in Figures 3a–3d, but the USACE has not yet verified the delineation, and all such features are therefore considered potentially jurisdictional. Potentially jurisdictional waters shown on these figures include: ephemeral stream, intermittent stream, perennial stream, pond, perennial marsh, seasonal wetland, and culverts within or connecting these waters. Based on HTH's field review, and the connectivity of the drainages within the BSA to Cholame Creek and eventually, the Salinas River, the USACE is unlikely to conclude that any of the potentially jurisdictional waters are isolated. As such, all areas on the map shown as seasonal wetlands, perennial marsh, ephemeral, intermittent, and perennial streams, are assumed to be waters of the United States/State.

2.2.1 Riparian Habitat

HTH also surveyed the BSA for riparian areas. Riparian habitat extends beyond the OHWM within the bed of drainages out to include the banks of the drainage as well as any associated riparian canopy. Riparian habitats are depicted on Figures 3a–3d and include willow–cottonwood riparian woodland, valley oak riparian woodland, and grassland riparian. The grassland riparian category depicts grassy areas within the top-of-bank for drainages that have no associated riparian canopy.

While jurisdictional waters and wetlands were surveyed using sub-meter GPS data capture, other habitat types within the BSA were mapped over an aerial photograph (NAIP 2005) and checked for accuracy during field surveys.

2.3 Vegetation and Rare Plant Surveys

In April and early May of 2012, HTH plant ecologists surveyed the entire BSA for biotic habitats (Figures 3a–3d). During these intensive surveys, meandering transects were used to closely inspect vegetation alliances, soil substrates, landforms, and topography to determine habitat boundaries as well as areas suitable for rare plant occurrence[2].

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[2] Although not necessary to conduct a CEQA analysis of the Project, the Project proponent is conducting protocol-level plant surveys to determine whether FESA or CESA permits may be necessary. Full protocol-level surveys were not conducted in 2012 due to the low rainfall received by the site during the 2011–2012 rain year. The site received just over 7 inches of rain, or about 59% of the long-term average of 13.42 inches per year (PRISM Climate Group 2013). Full protocol-level plant surveys are currently being conducted in the spring and early summer of 2013. As of May 2013, the site has received approximately 7 inches of rain during the current 2012–2013 rain year, which is close to the amount received over the prior 2011–2012 rain year. These surveys are being conducted in accordance with guidance from the CNPS and CDFW (CDFG 2009a),

2.4 Vernal Pool Surveys

Wet-season protocol-level surveys for listed branchiopods were completed in winter 2011 through spring 2012. K Hardwicke, an HTH biologist holding a Recovery Permit with the U.S. Fish and Wildlife Service (USFWS) under Section 10(a)(1)(A) of the FESA, monitored the BSA for areas of ponding beginning in December 2011. The BSA was visited repeatedly through the 2011–2012 wet season per USFWS protocol (USFWS 1994). During each survey, the biologist recorded shape, size, depth, and water chemistry data on each of the ponded areas and swept the areas with nets to capture any resident branchiopods. Surveys began two weeks after these habitats were inundated and upon receiving approval from the USFWS on 23 November 2011, with approval for a revised study area including the access road issued on 23 January 2012. These surveys continued every two weeks thereafter until a) the habitat dried or b) the habitat had been continually ponded for 120 days. All features were assessed for their suitability and ability to support listed branchiopod, and habitat was considered suitable if it was observed to pond, or may be able to pond at least eight consecutive days in years of normal rainfall, supports seasonal rather than perennial ponding, and is not subjected to steady or rapid water currents such as in flowing drainages. No listed branchiopod species were detected during these surveys.

Due to the poor rain year in 2011-2012, additional wet-season surveys by B Helm and HTH biologists K Hardwicke, M Wacker, and C McClain were authorized by the USFWS on 3 January 2013. This survey effort included additional areas within the Transmission Line Corridor and the updated configuration of the Project site (updated between the close of the 2012 wet-season surveys and summer 2012). The second year of wet season surveys concluded in April 2013, at which point all potentially suitable habitat had dried. Once again, no listed branchiopod species, or large branchiopod species of any kind, were detected during the 2013 wet season surveys.

Protocol-level surveys for listed branchiopods typically either include two seasons of wet-season surveys or one season of wet-season surveys and an additional season of dry season surveys (USFWS 1994). Due to the precipitation patterns during the 2011–2012 wet season, a dry season protocol-level survey for dormant cysts

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and are intended to determine presence or absence of the target rare plant species that may occur on the site, which will inform any future CESA and FESA permitting efforts. Surveyors will cover the entire Project site on foot on regularly spaced transects, with repeat visits to ensure all plants are identifiable and surveyed for during their published blooming periods, and when known populations of the target species are identifiable. These surveys are floristic in nature, recording all plant species that occur on the site to a level sufficient to determine whether each plant is a rare species or not, which is typically the variety or subspecies level for most taxa. Known, offsite reference populations for target species will also be visited throughout the survey period to ensure that the target species are detectable in that general area, in that year, and at that approximate time within the blooming season. In addition to protocol-level surveys of the Project site, focused rare plant surveys will be conducted in the remainder of the BSA, which will provide additional information regarding the local botanical resources in the context of the larger region.

of listed branchiopods was conducted. B Helm of Helm Biological Consulting surveyed all suitable seasonal wetland habitat on the site in November and December 2012 as part of dry season protocol. Samples generated by this effort are currently being analyzed to identify branchiopod populations that are only detectable during years with average or above-average rain fall, and even historic populations of branchiopods.

Both of these latter surveys included the additional areas within the Transmission Line Corridor and the updated configuration of the Project site (updated between the close of the 2012 wet-season surveys and summer 2012).

2.5 Reptile and Amphibian Surveys

In April 2012, reconnaissance-level surveys of the Project site and access road were conducted for California tiger salamander (*Ambystoma californiense*) and California red-legged frog (*Rana draytonii*). All potential wetland features were visited with the focus on assessing the potential for the habitat conditions to support the two species. Biotic habitats adjacent to the Project site and access road were also assessed by viewing these habitats from the Project site and/or access road, and reviewing background material prior to and following the fieldwork. No aquatic habitat suitable for California tiger salamander was detected on the Project site or access road; however, potential breeding habitat, in the form of ponds, was detected adjacent to the northwest corner of the Project site and along the access road. Aquatic surveys (USFWS 2003a) by a qualified biologist (i.e., biologist approved by USFWS and CDFW) for California tiger salamander are currently underway.

Aquatic habitat consistent with that which supports California red-legged frogs was detected on the Project site and along the access road. Therefore, in August 2012, a California red-legged frog survey according to the *Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog* (USFWS 2005) was conducted and California red-legged frogs were detected on the Project site. Breeding season surveys for California red-legged frog are currently underway to determine if red-legged frog breeding habitat is present on the Project site and access road, and if present, where this habitat is located.

In addition to the tiger salamander and red-legged frog surveys described above, focused surveys for western spadefoot (*Spea hammondii*), during appropriate rainfall temperature regimes to determine the occurrence of spadefoot on the Project site were conducted.

2.6 Mammalian Surveys

In order to characterize the occurrence and status of mammalian species on the Project site and access road, HTH mammal experts conducted full coverage ground surveys to identify and map suitable habitats, to identify and map burrows and dens suitable for these species, and to identify and map other indirect evidence (e.g., scat, tracks) of the presence of these species. In addition, nocturnal wildlife activity was documented with motion sensing camera stations placed throughout the site and with spotlight surveys conducted along existing access routes.

HTH conducted the full coverage walking ground surveys for burrowing mammals and burrowing owls (*Athene cunicularia*) over 10 days in November 2012. The locations of all signs of special-status and other wildlife species were documented, including such evidence as potential dens, prey excavations, burrow systems, scat or white wash, tracks, and direct observations. Camera station surveys (390 camera-trap nights) were conducted during two sessions in October and November 2012. Twenty cameras were deployed during the first session and 19 were deployed during a second session. Cameras were deployed without bait at a density of more than eight cameras per 640 acres (1 square mile). All photographs were evaluated and all wildlife, domestic, and feral species were identified to the lowest possible taxonomic level. Additionally, spotlight surveys were conducted over three nights in November and December 2012 by two teams comprising two surveyors each. Surveyors searched from both sides of the vehicle with high output spotlights. Animals were identified using high-powered binoculars or spotting scopes. A list of all mammal species identified during the surveys can be found in Appendix B.

A large number of burrows were identified as those of an unconfirmed species of kangaroo rat, although it is highly probable these were excavated by Heerman's or narrow-faced kangaroo rats. To identify the kangaroo rat to species, trapping surveys are proposed for late spring 2013 when temperatures would promote successful trapping.

Additional focused surveys for San Joaquin kit fox are proposed. These surveys will include scat detecting scent dog surveys across the Project site and access road, and a larger survey area, to assess the kit fox distribution and density in the vicinity of the Project site and access road. Concurrent with the scent dog surveys, additional spotlighting surveys would occur within the survey area.

2.7 Avian Surveys

1) Avian species observed on the Project site and access road during all surveys, including wetland and burrowing animal surveys, have been recorded. A list of species observed to date is included in Appendix C. Avian specific surveys are currently underway. These surveys would include large-plot bird activity surveys, grassland songbird surveys, and nesting surveys for raptors, including golden eagles (*Aquila chrysaetos*) and California condors (*Gymnogyps californianus*). These surveys began in spring 2013, and will be completed in late 2013 to inform any future CESA, FESA or Bald and Golden Eagle Protection Act review efforts.

2.8 Summary of Additional 2013 Surveys

To assist the Project proponent with its CESA and FESA permitting efforts, the Project proponent will complete a wildlife corridor analysis and conduct the following additional surveys in 2013:

- Focused special-status mammal trapping surveys
- Protocol-level special-status plant surveys (underway)
- 2013 wet-season listed branchiopod surveys (underway)
- Dry-season listed branchiopod surveys (underway, samples in analysis)
- California red-legged frog breeding season surveys (underway)
- California tiger salamander larval surveys (underway)
- Focused surveys for western spadefoot toad (during surveys for California red-legged frog and California tiger salamander)
- Winter bird surveys
- Nesting and breeding bird surveys, including nesting raptors and golden eagles (underway)
- Wildlife corridor analysis
- Scent dog surveys for kit fox
- Additional spotlighting surveys

Section 3.0 Results

3.1 Soils

A total of 33 different soil types and complexes underlie the BSA (Figure 4). Table 1 lists the names of each soil type along with the texture class and drainage classification, as determined by the National Resource Conservation Service (NRCS 2012). Two of these soil series or complexes, Fluvents, and Stony and Salinas Clay Loam, 0 to 2% slopes are considered hydric. However, inclusions within soil series or complexes associated with certain landforms such as basins and drainages may also be hydric (NRCS 2012). The BSA extends into both the soil survey areas for Monterey County (SCS 1978, soil symbols lettered) and San Luis Obispo County (SCS 1983, soil symbols numbered) (Table 1).

Soils within the BSA are dominated by well-drained clay loams interspersed with frequent clays. Some of the heavier clays are considered to be hydric by the NRCS (Table 1). Even within most clay soils on the site, there is a lack of a restrictive layer and the soils drain freely. In many areas, frequent large cobbles occur within the profile, accelerating drainage. Some soils within the steeper portions of the BSA, including soils from the Climara and Montara series, are serpentine.

Table 1. Soil Type, Texture, Drainage Classification, Hydric Soil Status and Acreage for 33 Different Soil Types Occurring within the Biological Study Area[1]

Soil Symbol	Soil Name	Soil Texture	Drainage Classification	Hydric	Acreage
AaC	Alo silty clay, 2 to 9% slopes	Silty clay	Well drained	No	8.10
AaD	Alo silty clay, 9 to 15% slopes	Silty clay	Well drained	No	4.83
AaE	Alo, silty clay, 15 to 30% slopes	Silty clay	Well drained	No	4.05
AaF	Alo silty clay, 30 to 50% slopes	Silty clay	Well drained	No	1.70
Ab	Alo-Millsholm complex	Silty clay/ loam	Well drained	No	38.10
AyD	Ayar silty clay, 5 to 15% slopes	Silty clay	Well drained	No	676.51
AyE	Ayar silty clay, 15 to 30% slopes	Silty clay	Well drained	No	124.65
AyF	Ayar silty clay, 30 to 50% slopes	Silty clay	Well drained	No	43.95
Ck	Climara-Montara complex	Clay/Clay loam	Well drained	No	50.27
CnC	Cropley silty clay, 2 to 9% slopes	Silty clay	Well drained	No	230.56
DdB	Dibble silt loam, 9 to 15% slopes	Silt loam	Well drained	No	11.59
DdE	Dibble silt loam, 15 to 30%slopes	Silt loam	Well drained	No	28.69
Fa	Fluvents, stony	Sandy loam/ sand/cobbles	Excessively drained	Yes	50.82

Soil Symbol	Soil Name	Soil Texture	Drainage Classification	Hydric	Acreage
GdF	Gaviota sandy loam, 30 to 75% slopes	Sandy loam	Excessively drained	No	81.74
LhE	Lopez shaly loam, 15 to 30% slopes	Shaly loam	Excessively drained	No	16.28
MbG	McCoy-Gilroy complex, 30 to 75% slopes	Clay loam/ gravely loam	Well drained	No	0.04
MhG	Millsholm loam, 30 to 75% slopes	Loam	Well drained	No	23.29
MoA	Mocho silty clay loam, 0 to 2% slopes	Silty clay loam	Well drained	No	223.43
MoC	Mocho silty clay loam, 2 to 9% slopes	Silty clay loam	Well drained	No	385.02
Mp	Montara-Rock outcrop complex	Clay loam/ rock	Well drained	No	52.92
NaD	Nacimiento silty clay loam, 9 to 15% slopes	Silty clay loam	Well drained	No	171.00
NaE	Nacimiento silty clay loam, 15 to 30% slopes	Silty clay loam	Well drained	No	132.05
NaF	Nacimiento silty clay loam, 30 to 50% slopes	Silty clay loam	Well drained	No	217.19
PcC	Parkfield clay, 2 to 9% slopes	Clay	Well drained	No	1665.01
RaC	Rincon clay loam, 2 to 9% slopes	Clay loam	Well drained	No	14.52
SbA	Salinas clay loam, 0 to 2% slopes	Clay loam	Well drained	Yes	40.05
Xc	Xerorthents, loamy	Loam	Well drained	No	150.35
114	Balcom-Nacimiento association, moderately steep	Fine loam	Well drained	No	82.83
122	Capay silty clay	Clay	Moderately well drained	Yes	26.02
173	Mocho clay loam, 0 to 2% slopes	Clay loam	Well drained	No	48.35
174	Mocho clay loam, 2 to 9% slopes	Clay loam	Well drained	No	151.32
189	Rincon clay loam, 9 to 15% slopes	Clay loam	Well drained	No	3.05
195	San Emigdio fine sandy loam, 2 to 9% slopes	Sandy loam	Well drained	No	114.16
	Total				4872.45

[1] Source: Soil Survey Staff, Natural Resources Conservation Service, United States Department of Agriculture. Web Soil Survey. Available online at http://websoilsurvey.nrcs.usda.gov/. Accessed 7 May 2012.

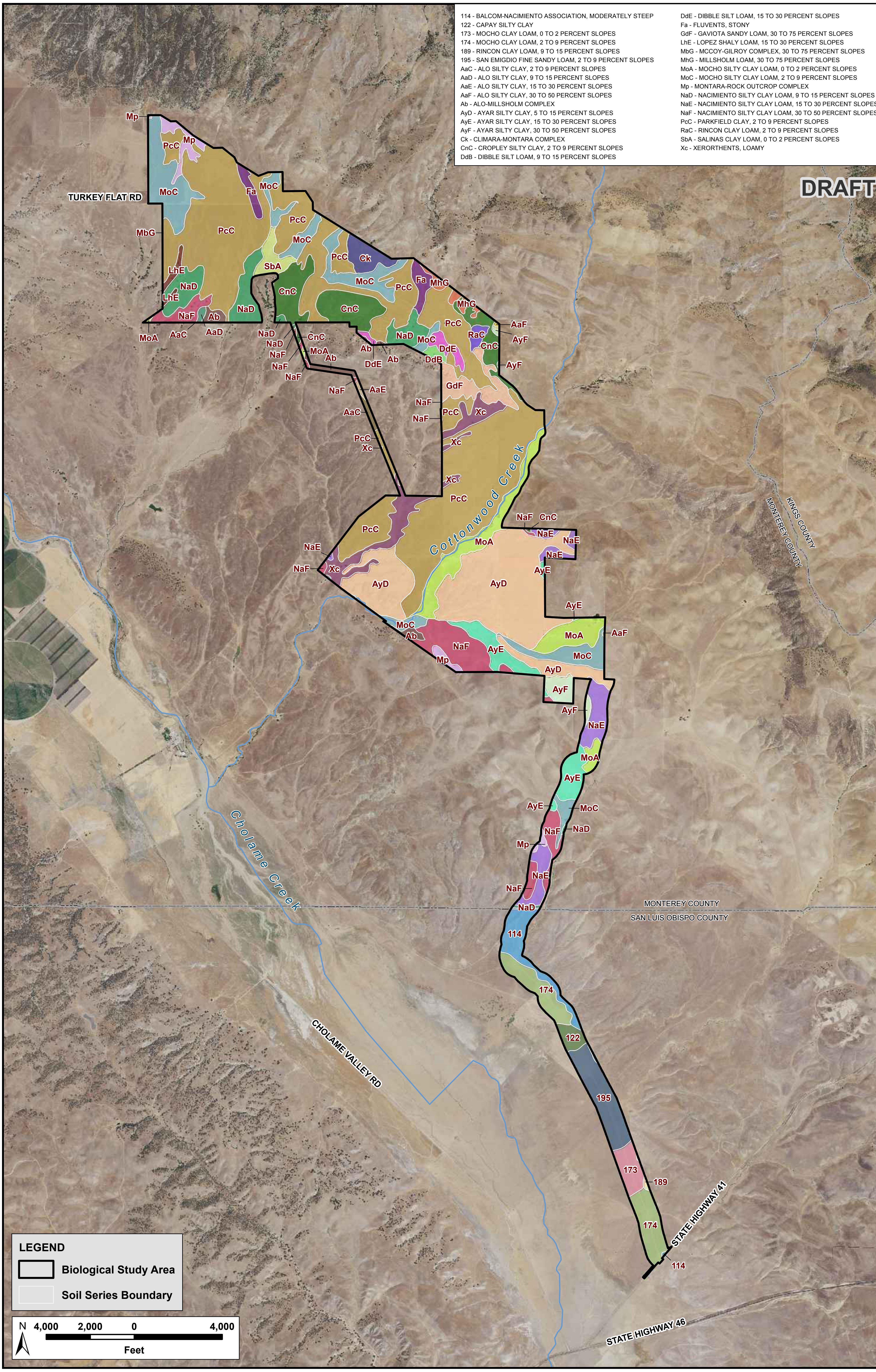

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Figure 4: Soils Map

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3.2 Biotic Habitats

Five community types occur on the Project site and the access road/Hwy 41 improvement areas, while six community types occur within the larger BSA. The five communities occurring on the Project site and access road/Hwy 41 improvement areas include grasslands, woodlands (including oak woodlands) and forests, aquatic, wetland, and developed/ruderal grassland. Shrublands occur within the larger BSA, but not within the Project site or access road/Hwy 41 improvement areas. Within the community types, 16 habitats are characterized and habitat subgroups are described. These habitat types were developed using a combination of described habitats and vegetation alliances as per Holland (1986) and Sawyer et al. (2009). The 16 habitats include California annual grassland, wildflower field, serpentine bunchgrass grassland, valley needlegrass grassland, grassland riparian, interior coast range goldenbush scrub, willow – cottonwood riparian woodland, ornamental non-native woodland, mixed oak woodland, riparian oak woodland, ephemeral stream, intermittent stream, perennial stream, perennial marsh, seasonal wetland, and developed (Figures 3a–3d). Acreages and the percent of the total land area of communities and habitats on the Project site as well as the access road/Hwy 41 improvement areas are listed in Table 2. Table 3 shows the habitat acreages within the BSA.

Table 2. Natural Community and Biotic Habitat Acreages within the California Flats Solar Project Site and the Access Road/Highway 41 Improvements

Habitat	Project Site	Access Road/Hwy 41
Grasslands	**2515.05**	**30.73**
California Annual Grassland	1937.71	30.49
Wildflower Field	540.58	0.21
Serpentine Bunchgrass Grassland	0.01	0.00
Valley Needlegrass Grassland	0.14	0.00
Grassland Riparian	36.61	0.03
Shrublands	**0.00**	**0.00**
Interior Coast Range Goldenbush Scrub	0.00	0.00
Woodlands and Forests	**11.75**	**0.00**
Willow–Cottonwood Riparian Woodland	1.54	0.00
Ornamental Non-native Woodland	9.08	0.00
Mixed Oak Woodland	0.17	0.00
Riparian Oak Woodland	0.96	0.00
Aquatic	**5.32**	**0.03**
Ephemeral Stream	4.75	0.03
Intermittent Stream	0.37	0.00
Perennial Stream	0.20	0.00
Pond	0.00	0.00

Habitat	Project Site	Access Road/Hwy 41
Wetland	**4.49**	**0.07**
Perennial Marsh	0.60	0.04
Seasonal Wetland	3.89	0.03
Developed/Ruderal Grasslands (includes culverts)	**25.56**	**22.27**
Total (all acreages are approximate)	**2562.18**	**53.10**

Table 3. Natural Community and Biotic Habitat Acreages within the California Flats Solar Biological Study Area

Habitat	Total Acres in BSA	Percent of BSA Total
Grasslands	**4673.77**	**95.9**
California Annual Grassland	3844.06	78.9
Wildflower Field	746.63	15.3
Serpentine Bunchgrass Grassland	4.61	0.1
Valley Needlegrass Grassland	3.60	<0.1
Grassland Riparian	74.87	1.5
Shrublands	**27.44**	**0.6**
Interior Coast Range Goldenbush Scrub	27.44	0.6
Woodlands and Forests	**69.62**	**1.5**
Willow–Cottonwood Riparian Woodland	9.50	0.2
Ornamental Non-native Woodland	9.08	0.2
Mixed Oak Woodland	38.43	0.8
Riparian Oak Woodland	12.61	0.3
Aquatic	**15.68**	**0.3**
Ephemeral Stream	10.05	0.2
Intermittent Stream	2.27	<0.1
Perennial Stream	0.98	<0.1
Pond	2.38	<0.1
Wetland	**21.83**	**0.5**
Perennial Marsh	12.02	0.3
Seasonal Wetland	9.80	0.2
Developed/Ruderal Grasslands (includes culverts)	**64.13**	**1.3**
Total (all acreages are approximate)	**4872.45**	**100**

3.2.1 Grasslands

The vegetation of grassland communities on the Project site and along the access road is dominated by grasses and forbs with less than 5% cover by tree and shrub species. In the BSA, the grassland community is dominated by California annual grassland, with smaller patches of habitats supporting a higher complement of native forb and grass species, such as wildflower fields, serpentine bunchgrass grasslands, and valley needlegrass grasslands. Grassland riparian in the BSA is typically quite similar to the surrounding California annual grasslands; however, it is in a special geomorphic position and is located within the steep banks of drainages within the BSA. The vast majority (95.9%) of the BSA contains some form of grassland habitat, and the Project site is even more heavily dominated by grasslands, with 98% of the Project site covered in grassland habitat types. The access road study area is 95% grasslands.

Photo 1. Grassland Community.

California Annual Grassland. California annual grassland is the single most common habitat type on the Project site, access road/Hwy 41 improvement areas, and BSA. Within the BSA, California annual grasslands comprise approximately 3844 acres. Of this area, approximately 1937.71 acres are within the Project site, and 30.49 acres are associated with the access road/Hwy 41 improvements (Photo 1, Tables 2 and 3). As the major habitat, the California annual grassland is found across the BSA (Figures 3a–3d), with the other habitats located in a mosaic pattern within the grassland landscape. The vegetation is dominated by non-native Mediterranean grasses such as soft chess brome (*Bromus hordeaceus*), wild oats (*Avena fatua*), ripgut brome (*Bromus diandrus*), and red brome (*Bromus madritensis*). Other weedy, non-native species are common, such as redstem filaree (*Erodium cicutarium*), black mustard (*Brassica nigra*), and yellow starthistle (*Centaurea solstitialis*). The California annual grasslands are currently grazed, were disked in many areas in the past, and contain limited dirt or gravel roads.

Although the California annual grassland is the chief habitat component of the Project site, access road/Hwy 41 improvement areas, and the wider BSA, the grasslands are diverse, with different herbaceous species and associations forming a variety of floristic alliances in different locations. Wild oats dominate areas of the California annual grassland, especially areas that have been previously disked and are on somewhat clayey to very clayey soils. The wild oats occur both as monocultures and in areas with more diversity, with soft chess brome and redstem filaree as co-dominants. Significant native annual species in the wild oat co-dominated areas include valley popcornflower (*Plagiobothrys canescens*) and also tend to support the CNPS-ranked species, round leaved filaree (*California macrophylla*). Loamier soils are dominated by soft chess brome with a variety of native and non-native species such as redstem filaree, blow wives (*Achyrachaena mollis*), Douglas's silverpuffs (*Microseris douglasii*), and Chilean lotus (*Acmispon wrangelianus*). The relative mixture of these co-dominant

Photo 2. *Centromadia pungens* herbaceous alliance.

species and other native components varies in different locations. Along outer floodplains, benches, and slightly more mesic areas foxtail barley (*Hordeum murinum*) is the dominant grass species (comprising up to 80% of the ground cover in some areas) along with common tarweed (*Centromadia pungens*, Photo 2). Two types of areas dominated by more native species also occur in the California annual grassland. These areas were either on even terrain dominated by small fescue (*Festuca microstachys*), or on hillslopes or grassy areas with an abundance of Menzie's fiddleneck (*Amsinckia menziesii*).

Photo 3. *Centaurea melitensis* herbaceous alliance.

Some areas on the site are dominated (greater than 90% relative cover) by tocalote (*Centaurea melitensis*) mixed with soft chess brome and other non-native brome species (Photo 3). The alliance occurs in disturbed locations throughout the BSA, with larger stands found in the south. One large stand found north of the road in the southeast corner of the site is co-dominant with black mustard (*Brassica nigra*). Similarly, other areas are dominated by the perennial invasive species, Russian knapweed (*Acroptilon repens*). This noxious weed is capable of creating dense monocultural stands. Other weed-dominated alliances observed within the BSA included sites characterized by black mustard and/or wild mustard (*Hirschfeldia incana*) dominance (30–50% relative cover). Several of these stands were observed in the central area of the Project site intermixed with stands of wild oats, soft chess brome, and redstem filaree, but little native herbaceous component. Finally, large areas within the BSA are characterized by a dominant cover of medusa head (*Elymus caput-medusae*). These stands are most often observed in the northwest portion of the BSA on flats and in swales. Medusa head is one of the most threatening invasive annual grass species and is rated with high ecological risk by the Cal-IPC Inventory for its ability to outcompete native species and form a persistent litter layer that inhibits germination and survival of other species (Cal-IPC 2006). The stands occurred among grasslands otherwise dominated by non-native brome species and wild oats, with little native herbaceous cover.

Wildflower Field Habitats. Wildflower fields are the second most abundant habitat type after California annual grassland. Within the BSA, Wildflower fields comprise approximately 746.63 acres. Of this area, approximately 540.58 acres are within the Project site, and 0.21 acres are within the access road/Hwy 41 improvement areas (Table 2, Figures 3a–3d). These habitats are found on areas with harsh or poorer soils, and on steep slopes and rock outcrops and terraces throughout the BSA where the cover of non-native grasses is reduced. While the same non-native grasses found in the California annual grassland are still common in these areas, the wildflower field habitat contains a much higher diversity and density of native annual species. One sided blue grass (*Poa secunda* ssp. *secunda*), a native perennial bunchgrass, is intermittently dispersed in the habitat. Other significant species include goldfields (*Lasthenia californica*), coastal tidytips (*Layia platyglossa*), and California poppy (*Eschscholzia californica*). Wildflower fields containing goldfields, coastal tidytips, blow wives, small fescue, and patchy distributions of yellow pincushion (*Chaenactis glabriuscula*) also occurred on flatter topographies as well. Wildflower fields located on heavy clay soils were characterized by high densities of the CNPS-ranked species round-leaved filaree, Paso Robles navarretia (*Navarretia mitracarpa*), adobe navarretia (*Navarretia nigelliformis*), blow wives, Chilean lotus, Douglas' silverpuffs, and dye popcornflower (*Plagiobothrys infectivus*).

Other moderate slopes mapped as wildflower fields supported a mixture of co-dominant goldfields, dotseed plantain (*Plantago erecta*), slender cottonweed (*Micropus californicus*), and small fescue. This alliance occurs on loams and serpentine derived substrates, and is more abundant on infertile soils with less frequent disturbance. Serpentine is an ultramafic rock which possesses chemical factors that limits plant growth in the derived soils. The soils have high nickel, chromium, and cobalt levels with low levels of potassium, phosphorus, and calcium/magnesium ratios. These areas did not support large concentrations of valley needlegrass (*Stipa pulchra*), however, and were thus not mapped as serpentine bunchgrass grasslands despite the serpentine influence.


Photo 4. Shale rock outcrop.

Some areas mapped as wildflower fields supported rock outcrops and associated species. The shale rock outcrops that occur across the BSA are mostly bare ground with diverse native component adapted to the microclimate (Photo 4). Many of these areas, due to the steeper topography, are only on the periphery of the actual Project site, or are located outside the Project site. Associated native species included high densities of annual buckwheat, gilia (*Gilia sp.*), tarplant (*Deinandra* sp.), and cryptantha (*Cryptantha* sp.). Non-native species include bromes and wild oats common throughout the BSA, as well as goldentop grass (*Lamarkia aurea*), which was observed only on these outcrops. The shale rock outcrops also often contain patches of *Poa secunda* grassland with a diverse native species component including clarkia (*Clarkia* sp.) and slender cottonweed. Additionally, a steep outcrop of serpentine with shallow, skeletal soils occurs north of Turkey Flat Road in the center of the BSA, extending off the site to the north (Figure 3a). Extensive bare ground (more than 50% relative cover) occurs at the outcrop, yet the area supports a diverse assemblage of native species at low densities, with scattered patches of higher densities in more developed soil. Associated native species include California poppy, coastal tidytips, dotseed plantain, and false spikeflower, but few native bunchgrasses. In this area, the non-native annual grasses occur sporadically at low concentrations (less than 30%), and are often stunted.

Species composition in wildflower fields can fluctuate from year to year depending on the amount and timing of precipitation (Sawyer et al. 2009). For example, goldfields and dwarf plantain become less abundant in drier years. Some of the wildflower fields contain a significant cover of geophytes. The species is currently undetermined, but is most likely dwarf brodiaea (*Brodiaea terrestris*) or blue dicks *(Dichelostemma capitatum*). These geophytes most frequently occur where feral pigs (*Sus scrofa*) turn soil in their search for food. These areas are considered to have relatively high habitat suitability for supporting special-status plants compared to other grasslands within the Project site study area.

Serpentine Bunchgrass Grassland Habitats. Serpentine bunchgrass grassland covers approximately 4.61 acres in the northern portion of the BSA. Of this area, approximately 0.01 acre is within the Project site, none is present within the access road/Hwy 41 improvement areas (Photo 5, Tables 2 and 3, Figures 3a–3d). This habitat supports a high diversity of native species which is very similar to areas mapped as wildflower fields, but these areas also support a significant (10% or more) complement of native bunchgrasses. Again, some of these areas are associated with rock outcrops (Photo 5). Many non-native species such as red brome do not thrive in the soil conditions and are only found in low concentrations and are often stunted. Native species that occur here include one sided bluegrass, purple needlegrass (*Stipa pulchra*), dotseed plantain, yarrow (*Achillea millefolium*), and cream cups (*Platystemon californicus*).


Photo 5. Serpentine bunchgrass grassland.

Valley Needlegrass Grassland Habitats. Valley needlegrass grassland occurs in the BSA (Figures 3a–3b) and covers approximately 3.60 acres (Table 2); however, this high-quality grassland type is largely absent from within the Project site and access road/Hwy 41 improvement areas. Only 0.14 acres are mapped within the Project site and none occurs in the access road/Hwy 41 improvement areas (Table 2, Figures 3a–3d). This alliance contains more than 10% relative cover of purple needlegrass as a characteristic or dominant species in the herbaceous layer. These areas are found on steep northwest facing slopes and small, scattered patches on hilltops that contain a significant cover of widely spaced purple needlegrass on rocky soils. Non-native grasses such as soft chess brome and red brome are common here as well as numerous native forbs such as soap plant (*Chlorogalum pomeridianum*), silver blush lupine (*Lupinus albifrons*), and chia *(Salvia columbariae*). The relative cover of native grasses and forbs in this habitat is again greater than in the areas mapped as California annual grassland.

Grassland Riparian Habitats. Grassland riparian habitat covers approximately 74.87 acres of the BSA. Of this area, approximately 36.61 acres are within the Project site, and 0.03 acre is within the access road/Hwy 41 improvement areas. The habitat is associated with the beds and outer banks of drainages and is tracked along ephemeral, intermittent, and perennial streams throughout the BSA. These drainages are subject to intermittent flooding in the winter months that often deposit and scour sediment within the riparian system leaving areas with deep, rich soils and other areas with very little soil and many exposed cobbles. Two larger areas of grassland riparian were mapped in locations with high outer banks, alluvial soils, and a wide, included floodplain containing braided ephemeral and intermittent stream channels. The dominant non-native species in the grassland riparian habitats are foxtail barley and in wetter areas, seaside barley (*Hordeum marinum* ssp. *gussoneanum*). The native perennial grass species associated with this habitat type include blue wildrye (*Elymus glaucus*) and salt grass. Common tarweed, a native annual forb and facultative species, is also present in the grassland riparian habitat.

3.2.2 Shrublands

Interior Coast Range Goldenbush Scrub Habitats. Interior coast range goldenbush scrub habitat is concentrated in the southern portion of the BSA and covers approximately 27.44 acres and is absent from the Project site and access road/Hwy 41 improvement areas (Photo 6, Tables 2 and 3, Figure 3a–3d). This is the only shrub-dominated habitat type within the BSA and is relatively uncommon. This habitat is characterized by widely spaced stands of 2- to 3-foot tall alkali goldenbush (*Isocoma acradenia*), which are located on hillsides where the soils are well-drained. The area between the shrubs is dominated by non-native grasses such as soft chess brome, rattail fescue (*Festuca myuros*), and red brome, as well as native species such as small fescue, Menzie's fiddleneck, one-sided blue grass, common popcornflower, and common monolopia (*Monolopia lanceolata*). Burrowing mammal activity is often abundant in these areas.

Photo 6. Interior Coast Range Goldenbush Scrub.

3.2.3 Woodlands and Forests

Forest and woodland habitats comprise approximately 69.62 acres of the BSA and 11.75 acres of the Project site, but are not present in the access road/Hwy 41 improvement areas (Tables 2 and 3, Figures 3a–3d). These areas support tree-dominated vegetation with an herbaceous understory component. The main habitat types within the forest and scrub communities are riparian canopies including willow–cottonwood riparian woodland and riparian oak woodland, and upland woodland communities including ornamental non-native woodland formed from old orchard and ornamental tree plantings, and mixed oak woodland.

Mixed Oak Woodland. Oak woodlands support the greatest species richness of any vegetation type in the state and they are considered important habitats (Barbour et al. 2007). Vegetation of oak woodland communities within the BSA contains deciduous oak species as the dominant species in the tree cover. Grasses and forbs are present in the understory underneath an open tree canopy.

Photo 7. Mixed oak woodland habitat.

Within the BSA, mixed oak woodland comprises approximately 38.43 acres. Of this area, approximately 0.17 acre is within the Project site, and none is present within the access road/Hwy 41 improvement areas (Tables 2 and 3, Figures 3a–3d). This difference is explained by the tendency for this habitat type to occur on hillcrests and slopes above drainages, where oak woodlands are patchily distributed, primarily in the northern extent of the BSA in steeper areas than what are generally observed within the Project site (Figures 3a–3b). The one exception is a small oak woodland near the south-central border of the Project site (Figure 3a). The oak woodlands in the BSA are characterized by an open tree canopy that is dominated by one of two species of widely spaced oak trees, primarily blue oak (*Quercus douglasii*) and a lesser complement of valley oak (*Quercus lobata*, Photo 7). The majority of the oaks in this habitat are mature, medium to large trees, forming stands at heights of 30 to 70 feet. Typical for the region, sprouting and establishment of young trees is limited, but the widely spaced oaks provide ample light for new seedlings. The blue oaks tolerate poorer soil quality than valley oaks and are found on rockier, thinner, and less fertile soils, such as slopes and hilltops, and valley oaks, which prefer deeper soils, occur on toeslopes, hillsides, and bottomland areas. However, these two species occur mixed together in the oak woodland habitat in some areas.

Beneath the oak trees, the vegetation mainly comprises annual grassland species such as soft chess brome, rip gut brome, and Menzie's fiddleneck. In sunny openings on the hilltops and steep hillsides, the understory is generally composed of rocky soils with vegetation that is sparsely distributed. These areas support a high component of native species such as one-sided blue grass, buckwheat, and goldfields. Soil moisture beneath the trees is preserved for longer periods in the spring supporting a lush understory that grows larger and stays green longer than the surrounding grasslands.

Riparian Oak Woodland. Approximately 12.61 acres of riparian oak woodland are present in the BSA associated with many of the ephemeral, intermittent, and perennial drainages in the northern portion of the BSA. Of this area, approximately 0.96 acre is within the Project site, and none is present within the access road/Hwy 41 improvement areas (Photo 8, Tables 2 and 3, Figures 3a–3d). Widely spaced stands of large valley oaks characterize the habitat. The trees, generally occurring just upslope from the drainage channel on both sides of the floodplain, are likely supported by groundwater from the adjacent drainages, and as such are larger than the trees within the mixed blue and valley oak woodland habitat located upslope on hillsides and hilltops. Many of the large trees are old and senescing with large, dead branches that have fallen beneath them. There is no apparent seedling recruitment.

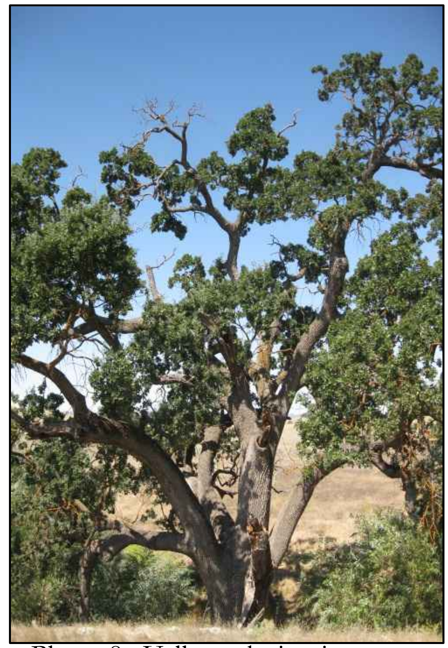


Photo 8. Valley oak riparian woodland.

The riparian oak woodland within the BSA was dominated by valley oak and to a lesser extent blue oak, and contained a very small fraction of red willow (*Salix laevigata*). The canopy of the large oak trees provides shade to the drainage channel bed, banks, and surrounding hillsides. This results in cooler temperatures and retention of soil moisture for longer in the year than the surrounding areas. As a result, livestock and wildlife congregate in these cool areas next to the drainages, leaving areas of bare ground beneath the trees. Where the ground is not bare, lush growth of non-native annual grass species such as soft chess brome, rip gut brome, and foxtail barley occurs. In addition, Menzie's fiddleneck and shade tolerant forbs such as dwarf nettle (*Urtica urens*), horehound (*Marrubium vulgare*), and bedstraw (*Galium* sp.) grow beneath the trees. In the openings between trees, upland vegetation is consistent with both the surrounding California annual grassland habitat and the drainage type that the riparian oak woodland occurs within.

Willow–Cottonwood Riparian Woodland.

Photo 9. Willow–cottonwood riparian.

Within the BSA, willow-cottonwood riparian woodland covers approximately 9.50 acres. Of this area, approximately 1.54 acres are within the Project site, and none occurs within the access road/Hwy 41 improvement areas (Tables 2 and 3, Figures 3a–3d). In most places, this habitat is characterized by moderately dense stands of mature red willow trees and shrubs which tolerate seasonal flooding and inundated soils (Photograph 9). There are also areas along perennial drainages that support cottonwood trees (*Populus fremontii*) which require available subsurface water and provide an overstory above the willows. The red willows grow approximately 15 to 30 feet tall, with many thick woody branches growing horizontally. The cottonwoods are taller and more upright in form, growing approximately 30 to 50 feet tall. These habitats were located on floodplains of low gradient perennial streams, ephemeral streams, and marshes. Most of the stands of red willows contain old and senescing trees with a large amount of dead wood. These are likely historic stands supported by deep roots reaching to groundwater. Little seedling recruitment was observed in most of these habitats. In one location in the southern portion of the Project site, a mature black walnut (*Juglans hindsii*) occurs in a forested reach along with the more common willows.

The understory vegetation in the willow–cottonwood riparian woodland is variable and depends on the hydrology and soil conditions in the associated drainage. For example, in perennial drainages supporting both red willows and cottonwoods, the understory is composed of native marsh species such as watercress (*Nasturtium officinale*) and iris-leaved rush (*Juncus xiphioides*); in the drier, more alkaline ephemeral drainages in the south, the understory vegetation comprises native and non-native species such as salt grass, common tarweed, and foxtail barley. In many places there is bare ground and sparse grassland vegetation beneath the senescing red willows where wildlife and livestock congregate. These areas may also support shade tolerant wetland vegetation such as dwarf nettles. The presence of red willows was not found to be a definitive indicator of wetland vegetation, however, and cottonwoods were always located in relatively mesic areas with some flooding.

Photo 10. Ornamental non-native woodland planted with tree of heaven.

Ornamental Non-Native Woodland Habitats. Ornamental non-native woodland habitats are located in 3 discreet patches in the north, central, and southern portions of the BSA and total 9.08 acres (Table 2, Figures 3a–3c). These locations are entirely within the Project site (9.08 acres), and this habitat is entirely absent from the access road/Hwy 41 improvement areas (Tables 2 and 3, Figures 3a–3d). The understory of these ornamental non-native woodlands is composed of species from the surrounding California annual grassland habitats such as foxtail barley and Menzie's fiddleneck with patches of bare ground.

Within the ornamental non-native woodland habitat type, three subgroups were identified. A tree-of-heaven (*Ailanthus altissima)* infestation occurs in the southeast portion of the Project site and is characterized by a moderately dense plantation of this invasive, non-native tree with an understory of dense foxtail barley (Photo 10, Figure 3b and 3c). The ornamental planting contains trees that are evenly spaced, of approximately the same age and height (10 to 20 feet), and provide limited shade as a result of their poor condition. The tree of heaven was observed recruiting from suckers and is also spreading into the surrounding California annual grassland habitat. Tree of heaven is rated as a moderate ecological risk by the Cal-IPC's Inventory (Cal-IPC 2006). Historic orchard plantings occur in the northwest portion of the Project site and are characterized by old, non-native fruit or nut trees (*Prunus sp.*) that were intentionally planted in orchards. As these orchards are not presently maintained, many trees are dead and the living trees are in a state of senescence with a large amount of dead wood. The understory of these ornamental non-native woodlands is composed of species from the surrounding California annual grassland habitats such as foxtail barley and Menzie's fiddleneck with patches of bare ground as a result of livestock and wildlife use. Finally, a centrally located ornamental woodland (Figure 3b) is the site of a long abandoned farmstead along the west bank of Cottonwood Creek. The site was planted with a mix of trees, including Peruvian pepper tree (*Schinus molle*), gum (*Eucalyptus* sp.), olive (*Olea europaea*), and two unidentified exotic tree species (Photo 11). The understory is characterized by the same annual vegetation as the surrounding California annual grassland. However, the forb and grass cover in the understory habitats is lower than in the surrounding grassland.

Photo 11. Mixed ornamental woodland.

3.2.4 Aquatic[3]

Non-wetland aquatic features comprise 15.68 acres of the BSA; 5.32 acres on the Project site and 0.03 acre of the access road/Hwy 41 improvement areas (Tables 2 and 3, Figures 3a–3d). The habitats associated with aquatic communities are parts of drainage networks that are located throughout the BSA. As such, the aquatic habitats support a variety of wetland indicator species as well as upland plants. The four habitats within the aquatic community include ephemeral, intermittent, perennial streams, and ponds.

[3] Approximately 37.52 acres of the aquatic resources located within the BSA are potentially jurisdictional waters subject to Section 404 of the Federal Clean Water Act, and include ephemeral, intermittent, and perennial streams, culverts, ponds, seasonal wetlands, and perennial marsh (Figures 3a–3d). Of these, 9.82 acres are located within the Project site and 0.11 acre occurs within the access road/Hwy 41 improvement areas.

Ephemeral Stream Habitats. These habitats occur on a total of 10.05 acres throughout the BSA. Of this area, 4.75 acres are located within the Project site and 0.03 acre in the access road/Hwy 41 improvement areas (Table 2 and 3, Figures 3a–3d). The features are generally on level terrain and carry drainage from upstream hillsides (Photo 12). Ephemeral streams compose the largest percentage of the total aquatic features in both the Project site and BSA. The dominant plant species in these streams, where they support vegetation, are upland species including soft chess brome*,* foxtail barley*,* valley popcornflower*,* and blow wives.

Photo 12. Ephemeral stream.

Two types of ephemeral streams have been observed. One type has cobble beds, incised edges, and low vegetative cover in the beds with denser vegetation occurring on the floodplains. Many of these reaches appear to have been affected by channel downcutting south of Turkey Flat Road. The other type of ephemeral stream is more shallowly incised and swale-like, with moderate to dense vegetative cover occurring within the bed that essentially matches the surrounding grassland. Some of the flatter features may function primarily as overflow or paleo-channels within floodplains of drainages with more regular current flow patterns. Water quality is expected to be good during rainfall events where it rapidly runs off or percolates into the soil. Stream flow during and immediately after precipitation events will occur, particularly after times of high rainfall. Depending on the rainfall patterns, this may correspond to significant amounts of water moving through the features at high velocities for short periods of time. Water depth in the ephemeral streams will be relative to precipitation patterns.

In most stretches of the ephemeral streams, ponding will not occur due to the well-drained nature of the alluvial soils within the beds of these features. Brief ponding may occur in reaches with supporting basin microtopography during precipitation events with the possibility of the water remaining for a short duration (up to two to three days) after the event. A few depressions in the bed of drainages may support ponding up to two weeks or more. In these areas, ponding is driven by surface runoff and, in some cases, augmented by seep hydrology. Additionally, plunge pools and areas of scour could potentially pond up to 12 inches of water throughout the rainy season. The small pools typically have a muddy to gravelly bottom and deep cow punches with little vegetation, surrounded by hydrophytes such as meadow barley (*Hordeum brachyantherum*). These pools are likely dry by mid-summer during most years.

Intermittent Stream Habitat. Within the BSA, these habitats cover approximately 2.27 acres. Of this area, approximately 0.37 acre is within the Project site. This habitat is absent within the access road/Hwy 41 improvement areas (Tables 2 and 3, Figures 3a–3d). They typically occur downstream of ephemeral streams where the slope increases and on steep hillsides, and form where a seasonal groundwater rise can augment run-off-based hydrology within these channels. The vegetation is dominated by annual upland and facultative plants (plants that are equally likely to occur in wetlands as in uplands) such as seaside barley, blue wildrye, Mexican rush *(Juncus mexicanus)*, and salt grass. Wetland areas (described separately below) are found in stretches of the intermittent streams and are typically fed by seeps found within the banks of these features, or by seasonal groundwater rise in some areas. Scattered valley oaks provide shade on some downstream reaches. A variety of substrates underlie the intermittent streams including cobble beds, dense vegetation, and bare soil or mud. At the time of the winter and spring surveys conducted in December 2011 through April 2012, up to 6 inches of trickling water was observed in some locations and flow in these features increases during and after precipitation events. In 2013, many of these streams have remained dry except for within limited reaches or after rain events, which indicates that active hydrology within these streams is annually as well as seasonally variable.

Perennial Stream Habitats. Within the BSA, these habitats comprise approximately 0.98 acre. Of this area, approximately 0.20 acre is within the Project site, and these habitats are absent within the access road/Hwy 41 improvement areas (Tables 2 and 3, Figures 3a–3d). These perennial streams may support perennial marsh vegetation (discussed separately below); however, the sections discussed here include areas where bare cobble rock, gravel, and mud form the bed substrate. Some sparse emergent wetland vegetation, such as iris-leaved rush, may establish in these areas. Green algae were also observed growing in the perennial streams. As with the other stream types, streams north of Turkey Flat Road tend to be less incised and downcut than reaches and streams to the south of the road. In most of the perennial streams on site, deep-channel incision (to 15 feet or more) limits wildlife and livestock access, and this along with the perennial flows result in higher water quality in the incised perennial reaches than in the less incised perennial and intermittent reaches. Precipitation events will alter flow rates, with flow slowing during summer months. For the majority of the seasons, ponding of water does not occur due to the active flows, although in-drainage pools depths may reach up to 2 feet in some areas.

Ponds. In the northwest corner of the BSA there is a seasonal pond (Figure 3a), and along the access road two perennially flooded ponds occur within the wider study area. All ponds within the BSA are excavated and dammed. Within the BSA, ponds cover approximately 2.38 acres. However ponds are absent within the Project site and access road/Hwy 41 improvement areas.

3.2.5 Wetlands

Wetland features represent 0.5% of the Project site, access road/Hwy 41 improvement areas, and the BSA (Tables 2 and 3, Figures 3a–3d). Like the aquatic features, wetland communities are parts of drainage networks that are located throughout the BSA. The wetland communities support a variety of wetland indicator species. Two habitats are found within the wetland community: perennial marsh and seasonal wetland.

Perennial Marsh Habitats. Within the BSA, approximately 12.02 acres of perennial marsh is associated with the major perennial streams, portions of perennial tributaries, and in some large spring-fed toeslope marshes. Of this area, approximately 0.60 acre is within the Project site and 0.04 acre is within the access road/Hwy 41 improvement areas (Photo 13, Tables 2 and 3, Figures 3a–3d). The vegetation of perennial marshes was dominated by both aquatic and emergent wetland species such as watercress, iris-leaved rush, yerba mansa (*Anemopsis californica*), and chairmaker's bulrush (*Schoenoplectus americanus*).

Photo 13. Perennial marsh.

The substrate of the marsh within the perennial streambeds is variable, and includes a range of fine textured mud, course gravel, and 3- to 5-inch cobble. As described above, water flow seasonally fluctuates in the perennial streams, and some of the perennial marsh found within the perennial streams may scour in heavy flows during some years. During the time of HTH's surveys (February through April 2012), the depth of water flowing in the vegetated portions of these streams was approximately 4 to 6 inches deep. At that time, the water was cool and clear.

Substrates within the large spring south of Turkey Flat Road (Figure 3a) and another large spring on the southern boundary of the BSA (Figure 3b) are composed of silty, mucky soils that contain a large amount of organic matter at various levels of decomposition. Access to the northern feature is restricted by a fence and the wetland vegetation is tall and well-developed. In contrast, the southern wetland is dominated by low-stature rushes (*Juncus* sp.). Water depth in these features ranges from 2 to 3 inches in the southeastern marsh to over 12 inches within the fenced southwestern marsh.

Seasonal Wetland Habitats. Seasonal wetlands comprise approximately 9.80 acres within the BSA. Of this area, approximately 3.89 acres are within the Project site and 0.03 acre is within the access road/Hwy 41 improvement areas (Tables 2 and 3, Figures 3a–3d). These areas retain water during portions of the year and have characteristic wetland vegetation, soils, and hydrology (Photo 14). Three seasonal wetland subgroups were apparent across the BSA. They include disked wetlands, alkali wetlands, and *Juncus* swales.

Photo 14. Seasonal wetland within a drainage swale.

In the topographically level grassland areas, there are a few, sparsely distributed previously disked seasonal wetlands that mainly occur in the northern section of the BSA. These features are in minor depressions and may contain large portions of bare ground along with seasonal wetland vegetation such as seaside barley, meadow barley, and adobe popcornflower as the dominant plant species. Sheet flow across the flat landscape can occur when precipitation is sufficient. Minimal ponding may occur in the features subsequent to precipitation events, but this wetland hydrology appears to have been somewhat disrupted by muting of the historic topography by prior disking activities. No true hardpan or claypan was encountered in these features, although a heavy clay layer compressed by prior disking (a "plow layer") was present in some areas approximately 8 inches down in the soil profile. Typically, the ponding in these features will likely be of a short duration, up to one week following precipitation events, and of negligible depth except in deeper areas of cow punch. Infiltration would occur rapidly for clay soils in most of these features and these wetlands are primarily supported by soil saturation rather than ponding. Some of these wetlands were found to contain the CNPS-ranked species hogwallow starfish (*Hesperevax caulescens*) and adobe navarretia (*Navarretia nigelliformis* ssp. *nigelliformis*) (Figures 3a–3b).

The alkali wetlands on the BSA are concentrated in the northeastern corner where alkaline minerals have accumulated in the foothills and valley floor, forming a wetland complex where surface and subsurface water drains into the BSA from watersheds to the northeast (Figure 3a). These wetlands were typically composed of relatively large areas of bare ground with a high diversity of native and non-native vegetation such as alkali heath (*Frankenia salina*), seaside barley, meadow barley, salt grass, and adobe popcornflower dominating the vegetative cover. The wetlands in this area appear to mainly be supported by seasonally high groundwater, as water rapidly percolates into the soils after precipitation events. Most of these features do not pond for a significant time following precipitation events, except where favorable landscape positions and clay soils allow ponding to occur from surface runoff. In most cases, however, these features are located on topographic landscape positions such as stream banks that are not expected to support ponding.

Wetlands within intermittent streams tend to be fed by groundwater rise and occur within the bed and banks of drainages. These wetlands are typically densely vegetated and dominated by a variety of perennial wetland species such as Mexican rush and other rushes (*Juncus* sp.), blue wildrye, meadow barley, yerba mansa, sedges (*Carex* sp.), and common tarweed. In moister areas, the wetlands contain a high diversity of these wetland species; while in drier areas, only subject to seasonal groundwater rise, the wetlands may be dominated by Mexican rush and upland species, such as soft chess brome. These wetlands are typically supported by a seasonally high water table, and do not occur in favorable landscape positions to pond water for a significant duration throughout the year. Within these densely vegetated wetlands; however, there are isolated seep outlets that may allow small areas of ponding (such as in cow punch) throughout the rainy season. The water is generally turbid due to livestock and wildlife use in these areas. Water from precipitation and/or groundwater typically flows through these areas during the rainy months, but rapidly percolates into the ground during the dry summer months when the groundwater table falls.

3.2.6 Developed

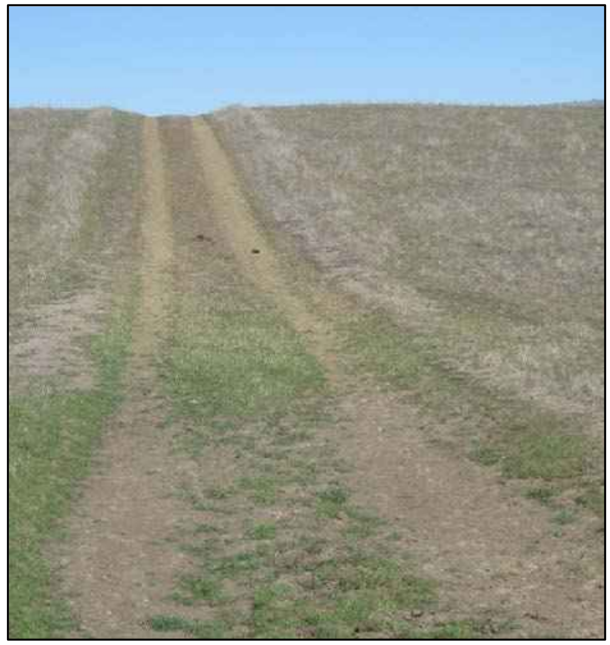


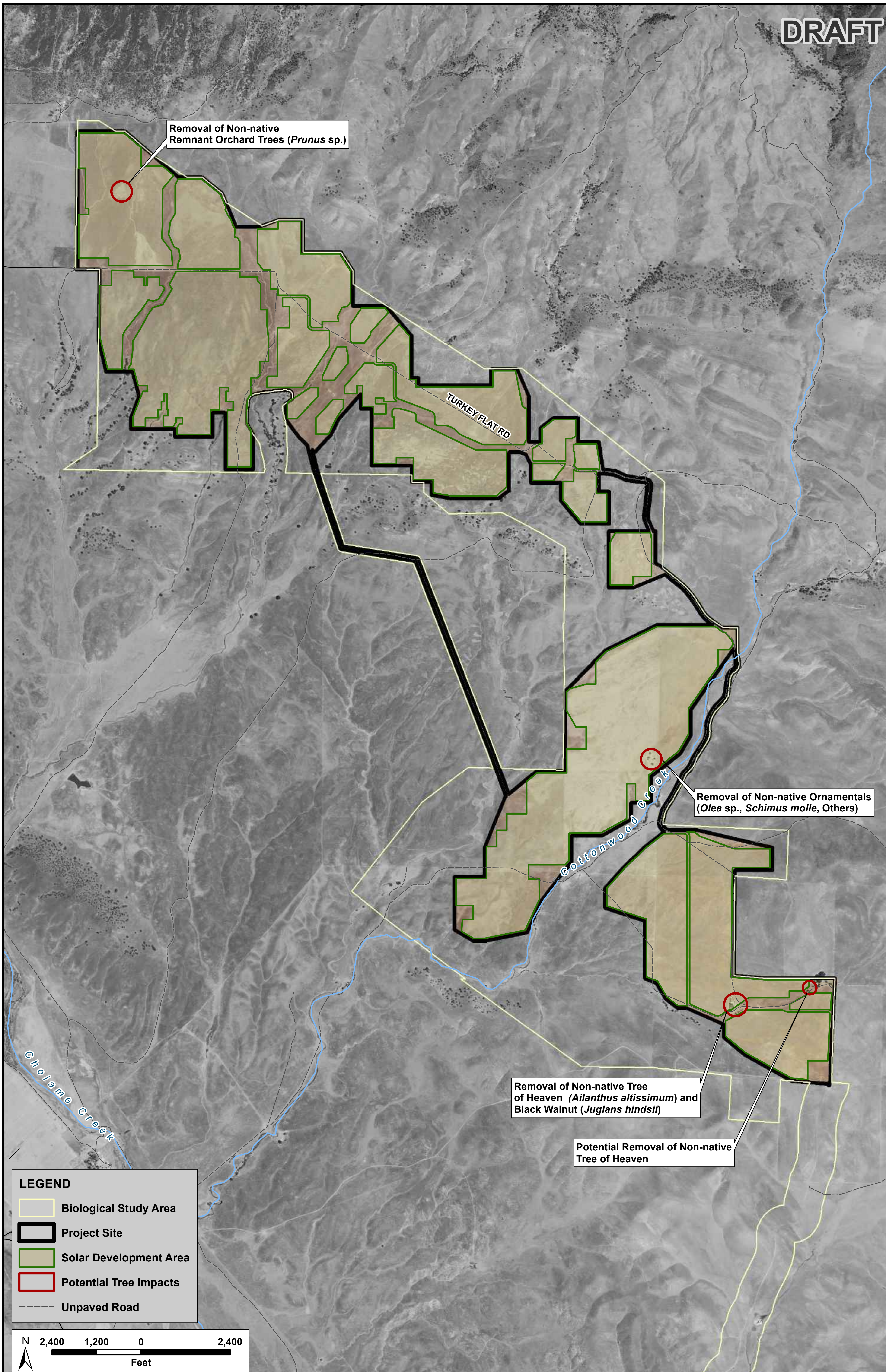
Photo 15. Developed community type.

Developed/Ruderal Grasslands. One of the most abundant community types within the Project site, access road/Hwy 41 improvement areas, and the BSA is developed/ruderal grassland habitat. It comprises 25.57 acres within the Project site, 22.28 acres within the access road/Hwy 41 improvement areas, and 64.13 acres within the BSA (Tables 2 and 3, Figures 3a–3d). Unpaved roads, including the access road, associated culverts, small buildings, windmills, rock-lined ditches, and storage tanks were the main developed components within the grassland habitat (Photo 15). These areas support very little vegetation and occur throughout the BSA. The habitat is capable of creating increased runoff from hard surfaces, such as buildings and the gravelly, compacted soil in roadbeds. Developed habitats and the habitats directly next to them have been subject to increased erosion from runoff. Plants along roadsides were more vigorous because of the increased water availability due to soil run-off. Disturbance adapted species occur adjacent to developed areas.

3.3 County Protected Trees

Monterey County Zoning Ordinance 21.64.260 calls for the protection and preservation of oaks and other types of native trees. While the BSA, Project site, and access road/Hwy 41 improvement areas are heavily dominated by open grasslands occurring on alluvial fans and terraces and within level valleys, some trees do occur within the BSA (Figure 5). Most trees within the BSA are mature natives and are associated with riparian drainage channels or hill slopes. Within the drainages, riparian woodlands are dominated by valley oaks, and red and arroyo willows. These drainages also support a lesser complement of blue oaks on drier, steeper riparian banks, and occasional Fremont cottonwoods in low channels with year-round flows or long periods of annual flow with high groundwater. Additionally, small patches of mixed oak woodlands occur on hillslopes within the BSA. These stands are not associated with drainage channels, but instead occur as open blue and valley oak woodlands with a grassy or bare rocky understory. Blue oaks are more common in these upland stands, and also tend to be associated with thinner, drier, and more exposed soils.

However, the vast majority, if not all of these native tree stands, are located peripheral to the Project site and the access road/Hwy 41 improvement areas in locations less suitable for solar field development and road improvements. Development will be concentrated on the grassy, level alluvial fans, terraces, and valleys. In these level areas, trees on the site are planted non-native ornamental and orchard trees and include: Peruvian peppertree (two to three trees), fruit and nut orchard trees (*Prunus* sp., 20 to 30 trees), olive (two to three trees), gum tree, black walnut, and tree-of-heaven (20 to 35 trees). These trees range from approximately 4 inches to 30 inches diameter at breast height (dbh) and have a crown height of 4 feet (for clonal tree of heaven saplings) to approximately 30 feet. Most of the orchard trees are in poor condition or dead. Similarly, some of the ornamental trees are naturally declining. Aside from these non-natives, no native trees will be impacted by the Project through heavy trimming or removal. The non-native trees that would be removed as part of this Project are not protected by Monterey County Zoning Ordinance 21.64.260.



H. T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

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Figure 5: Potential Tree Impacts

California Flats Solar Project, California - Interim Biotic Resources Report (3308-02)

May 2013

3.4 Special-Status Species

For purposes of this assessment, "special-status species" include plants and animals listed, proposed for listing, or candidates for listing as threatened or endangered under the FESA or the CESA; animals listed as "fully protected" under the California Fish and Game Code (Section 3511); animals designated as "Species of Special Concern" by the CDFW; and plants ranked as rare or endangered by the CNPS. Special-status plants and wildlife, their listing status, habitats, and potential to occur within the BSA area are identified in Table 4. Figure 6, Figure 7, and Figure 8 depict the distribution of CNDDB (2013) records of special-status plant, reptiles and amphibians, and wildlife species and critical habitat (respectively) in the vicinity of the BSA. Most of the 53 special-status plants and 32 special-status animal species known from the region and listed in Table 4 have at least some potential to occur within the BSA except for the yellow warbler (*Dendroica petechia*), Indian valley spineflower (*Aristocapsa insignis*), Hardham's suncup (*Camissonia harhamiae*), Hoover's eriastrum (*Eriastrum hooveri*), delicate blue cup (*Githopsis tenella*), San Antonio hill monardella (*Monardella antonina* ssp. *antonina*), and Mason's neststraw (*Stylocline masonii*). Expanded descriptions for all species in Table 4 with a potential to occur are included in Section 3.5 Special-Status Plants and Section 3.6 Special-Status Animals.

Table 4. Special-Status Plants and Wildlife, Their Status, and Potential to Occur within the Project Site and along the Access Road

Name	Status*	Habitat	Potential for Occurrence within the Project Site	Potential for Occurrence along the Access Rd/Hwy 41
Federally and State-Listed Species				
California jewel-flower *Caulanthus californicus*	FE, SE CNPS Rare Plant Rank 1B.1	Chenopod scrub, valley and foothill grasslands, often on sandy soil, pinyon-juniper woodland.	Unlikely. Only marginal habitat present due to lack of appropriate sandy soils.	Unlikely. Record approximately 9 miles to the east of the access road along Highway 41 (Figure 6), however only marginal habitat present due to lack of appropriate sandy soils.
San Joaquin woollythreads *Monolopia congdonii*	FE CNPS Rare Plant Rank 1B.2	Sandy substrates in chenopod scrub and valley and foothill grassland.	Unlikely. Only marginal habitat present due to lack of appropriate sandy soils.	Unlikely. Only marginal habitat present due to lack of appropriate sandy soils.
Longhorn fairy shrimp *Branchinecta longiantenna*	FE	Clear to turbid sandstone, grass or clay-bottomed vernal or seasonal pools.	Unlikely. Only marginally suitable seasonal wetland habitat present. No CNDDB records of occurrences within the county. Surveys to date have not detected the species.	Unlikely. Only marginally suitable seasonal wetland habitat present. No CNDDB records of occurrences within the county. Surveys to date have not detected the species.
Vernal pool fairy shrimp *Branchinecta lynchi*	FT	Clear water sandstone-depression pools and grassland swale, earth slump, or basalt-flow depression pools.	Unlikely. Only marginally suitable seasonal wetland habitat present, although critical habitat occurs approximately 10 miles southwest of the Project site (Figure 8). Surveys to date have not detected the species.	Unlikely. Only marginally suitable seasonal wetland habitat present, although critical habitat occurs approximately 10 miles west of the access road (Figure 8). Surveys to date have not detected the species.

Name	Status*	Habitat	Potential for Occurrence within the Project Site	Potential for Occurrence along the Access Rd/Hwy 41
California tiger salamander *Ambystoma californiense*	FT, ST, SSC	Vernal or temporary pools in annual grassland, or open stages of woodlands.	Possible. Suitable upland habitat present on the Project site. Four potential breeding ponds are located within 1.3 miles to the north and west of the Project site. A neighboring landowner provided a photo of an apparent California tiger salamander taken at a pond located 1.8 miles from the Project site. Although the photo appears to be of a California tiger salamander, the specimen was not field verified by a biologist and the photo was not taken during the course of a protocol-level survey or survey conducted by a biologist Larval surveys and aquatic habitat assessments currently underway.	Possible. Suitable upland habitat present along the access road/Hwy 41 improvement area. No detections to date during larval surveys at ponds along access road which contain marginal breeding habitat.
California red-legged frog *Rana aurora draytonii*	FT, SP, CSSC	Streams, freshwater pools and ponds with overhanging vegetation.	Present. Suitable habitat present, occurrence within the region is documented in the CNDDB, and presence confirmed through surveys.	Possible. Suitable habitat present and occurrence just south of Hwy 41 and Hwy 46 is documented in the CNDDB. Designated critical habitat present east of the access road.
Blunt-nosed leopard lizard *Gambelia sila*	FE, SE	Sparsely vegetated alkali and desert scrub habitats, in areas of low topographic relief. Seeks cover in small mammal burrows or under shrubs or other structures; they do not excavate burrows.	Unlikely. The tilled grassland habitats of the Project site are only marginally suitable. Species occurrence has been documented more than 10 miles from the Project site.	Unlikely. The tilled grassland habitats of the access road are only marginally suitable. Species occurrence has been documented more than 10 miles from the access road.

Name	Status*	Habitat	Potential for Occurrence within the Project Site	Potential for Occurrence along the Access Rd/Hwy 41
California condor *Gymnogyps californianus*	FE, SE	Nests in caves, crevices, behind rock slabs, or on large ledges on high sandstone cliffs. Prefers mountains, gorges, and hillsides, which create updrafts favorable for soaring. Feeds on large and medium-sized carrion.	Unlikely. Suitable foraging habitat present.	Unlikely. Suitable foraging habitat present.
Bald eagle *Haliaeetus leucocephalus*	SE, FP	Nests in large trees or on rocky outcrops generally situated near water bodies that support fish and/or waterfowl prey. Often still closely associated with aquatic habitats in winter, but may also scavenge and forage for a broader range of food resources in a variety of terrestrial habitats.	Present. Adult and subadult eagles detected within the BSA in February and March 2013. Active nest located 4.1 miles southwest of the Project site. Second pair of adults detected near possible inactive nest 4 miles northwest of Project site in March 2013. Also nests in several locations 20–30 miles west and southwest. Species' nesting distribution is currently expanding.	Present. eBird (NAS and CLO 2012) reports a variety of winter and early spring sightings in Cholame Valley in the vicinity of the access road. Active nest located approximately 4.7 miles west of the access road.
Swainson's hawk *Buteo swainsoni*	ST	Breeds in stands with few trees in juniper-sage flats, riparian areas, and oak savannah; forages in adjacent alfalfa fields, pastures, or grasslands.	Unlikely. The Project site is on the edge of this species current nesting range in central California. Nested historically in the area but not known currently. Suitable nesting and foraging habitat are present on the site.	Unlikely. The access road is on the edge of this species range in central California. Nested historically in Cholame Valley, but not known currently. Suitable foraging habitat is present along the access road, with nesting habitat located in larger riparian trees within the wider access road study area.
San Joaquin antelope squirrel *Ammospermophilus nelsoni*	ST	Western San Joaquin Valley from 200-1,200 feet elevation on dry, sparsely vegetated loam soils in broken terrain with gullies and washes.	Unlikely. Marginally suitable habitat is present, however evidence of this readily detected species was not observed during surveys.	Unlikely. Marginally suitable habitat is present, however evidence of this readily detected species was not observed during surveys.

Name	Status*	Habitat	Potential for Occurrence within the Project Site	Potential for Occurrence along the Access Rd/Hwy 41
Giant kangaroo rat *Dipodomys ingens*	FE, SE	Annual grasslands on the western side of the San Joaquin Valley. Requires level terrain and sandy loam soils for burrowing	Absent. Sub-optimal habitat is present, and no evidence of this readily detected species was observed during surveys.	Absent. Sub-optimal habitat is present, and no evidence of this readily detected species was observed during surveys.
San Joaquin kit fox *Vulpes macrotis mutica*	FE, ST	Desert alkali scrub, annual grasslands; may forage in adjacent agricultural habitats.	Present. The Project site is composed of suitable habitat and there are records of occurrences from the surrounding area. While studies suggest the species does not occur in high densities, the adjacent landowner has photo-documentation of kit fox within 200 feet of the Project site. Additionally, on 23 May 2013, an HTH biologist experienced with kit fox observed a canid onsite that may have been a kit fox. The fox was moving approximately 1000 feet away from the observer, which precluded definitive confirmation.	Present. The access road is within suitable habitat, there are records of occurrences approximately 1.5 miles southwest of the access road, and the species has been detected during surveys.
California Species of Special Concern				
Western spadefoot *Spea hammondii*	CSSC	Grasslands and occasionally valley-foothill hardwood woodlands; vernal pools or similar ephemeral pools required for breeding.	Possible. There are ephemeral wetlands and drainages in the Project site that may support western spadefoot breeding, and the nearest record is approximately 3 miles west of the Project site within the Cholame Valley.	Possible. There are ephemeral wetlands and drainages along the access road that may support western spadefoot breeding, and the nearest record is approximately 1.1 miles from the access road within Cholame Valley.

Name	Status*	Habitat	Potential for Occurrence within the Project Site	Potential for Occurrence along the Access Rd/Hwy 41
Western pond turtle *Emys marmorata*	CSSC	Occurs in and around a wide variety of permanent or nearly permanent aquatic habitats including canals, stock ponds, lakes, streams, and rivers. Basking and upland habitat as breeding habitat.	Present. Suitable habitat present where perennial water is present. The species has been detected in drainages within the Project site.	Present. Suitable habitat present where perennial water is present. The species has been detected in drainages adjacent to the access road.
Coast horned lizard *Phrynsosoma blainvillii*	CSSC	Found in a variety of habitats, most common in lowlands along sandy washes with scattered low shrubs. Requires open areas, bushes, patches of loose soil, and abundant supply of ants and other insects.	Possible. Moderately suitable habitat present on the Project site, and there is a record for the species within 3 miles south of the Project site.	Possible. Moderately suitable habitat is present, and there is a record for the species 2 miles west of the access road.
Silvery legless lizard *Anniella pulchra pulchra*	CSSC	Sandy or loose loamy soils with a high moisture content under sparse vegetation.	Unlikely. Only marginally suitable habitat is present, and the nearest records for the species are about 8 miles south of the Project site.	Unlikely. Only marginally suitable habitat is present, and the nearest records for the species are about 3 miles south of the access road.
San Joaquin coachwhip *Masticophis flagellum ruddocki*	CSSC	Valley grasslands and saltbush scrub habitats; open, dry areas with few or no trees.	Possible. Suitable habitat present.	Possible. Suitable habitat present.
Mountain plover (wintering) *Charadrius montanus*	CSSC	Winters in South and Central California in sparse, and/or short grasslands and plowed fields.	Possible. Suitable winter foraging habitat present and known to occur in Cholame Valley.	Likely. Suitable winter foraging habitat present and known to occur in Cholame Valley. The nearest record is approximately 2 miles west of the access road.
Northern harrier *Circus cyaneus*	CSSC	Forages in marshes, grasslands, and ruderal habitats; nests in extensive marshes and wet fields.	Possible. Suitable foraging habitat present.	Present. Suitable foraging habitat present. Observed foraging along the access road during surveys.

Name	Status*	Habitat	Potential for Occurrence within the Project Site	Potential for Occurrence along the Access Rd/Hwy 41
Burrowing owl *Athene cunicularia*	CSSC	Flat grasslands and ruderal habitats. Requires ground squirrel burrows.	Present. Species detected during wetland surveys, habitat mapping, and burrowing animal surveys within the Project site.	Present. Species detected during burrowing animal surveys along the access road.
Loggerhead shrike *Lanius ludovicianus*	CSSC	Nests in densely foliated shrubs or trees. Prefers open habitats with scattered shrubs, trees, posts, fences, utility lines, or their perches.	Present. Suitable nesting and foraging habitat present, known to breed in Cholame Valley, and observed during surveys.	Likely. Suitable nesting and foraging habitat present and known to breed in Cholame Valley.
Oregon vesper sparrow *Pooecetes gramineus affinis*	CSSC	Found in grasslands, agricultural lands, and open brushlands in valleys and desert regions.	Possible. Suitable winter habitat present and known to occur in Cholame Valley.	Possible. Suitable winter habitat present and known to occur in Cholame Valley.
Grasshopper sparrow *Ammodramus savannarum*	CSSC	Nests in relatively extensive patches of short to medium stature grassland with scattered open areas and shrubs.	Likely. Suitable nesting and foraging habitat present and known to occur in Cholame Valley.	Likely. Suitable nesting and foraging habitat present and known to occur in Cholame Valley.
Tricolored blackbird *Agelaius tricolor*	CSSC	Freshwater emergent wetland, annual grassland, agriculture, and valley foothill riparian.	Present. Suitable foraging habitat is present throughout the Project site, though only marginal nesting habitat is present in the riparian habitat. Several small groups (30 or less) were detected foraging on the site in March 2013.	Possible. Suitable foraging habitat is present.
Yellow warbler *Dendroica petechia*	CSSC (nesting)	Nests in wet, deciduous thickets, especially in willows, and in shrubby areas and old fields.	Absent. Nests along major river courses in Monterey County, but not known to occur in Cholame Valley or the project area and no suitable habitat present on site.	Absent. No suitable habitat present.

Name	Status*	Habitat	Potential for Occurrence within the Project Site	Potential for Occurrence along the Access Rd/Hwy 41
Long-eared owl *Asio otus*	CSSC	Nests from valley foothill hardwood habitat up to ponderosa pine habitats. Frequents dense riparian and live oak thickets near meadow edges, and nearby woodland and forest habitats, but also may be found in dense conifer stands at higher elevations. Forages over adjacent open areas.	Possible. Suitable nesting and foraging habitat present.	Possible. Suitable nesting and foraging habitat present.
Short-eared owl *Asio flammeus*	CSSC	A semi-nomadic species that nests on the ground in open, at least moderate stature ungrazed grasslands, marshlands, irrigated hay and grain fields, and old pastures.	Present. Potentially suitable nesting and foraging habitat present. Species detected on the Project site during burrowing animal surveys.	Possible. Potentially suitable nesting and foraging habitat present.
Pallid bat *Antrozous pallidus*	CSSC	Rocks, caves, trees, snags, bridges, and buildings for roosting. Grasslands, shrublands, woodlands, and conifer forests near water for foraging.	Possible. Suitable foraging and roosting habitat present and there are CNDDB records of this species approximately 4 miles from the Project site.	Possible. Suitable foraging habitat present and there are CNDDB records of this species approximately 2.2 miles from the access road.
Western mastiff bat *Eumops perotis californicus*	CSSC	Many open, semi-arid habitats, including conifer and deciduous woodlands, coastal scrub, grasslands, chaparral, etc.	Likely. Suitable foraging habitat is present, though roosting habitat is absent. There is a single CNDDB record of the species in the 9 quadrangles surrounding the Project site.	Likely. Suitable foraging habitat is present, though roosting habitat is absent. There is a single CNDDB record of the species in the 9 quadrangles surrounding the access road.
Tulare grasshopper mouse *Onychomys torridus tularensis*	CSSC	Hot, arid valleys and scrub deserts in the southern San Joaquin Valley. Requires abundant supply of insects for food.	Unlikely. The grassland habitats of the Project site are only marginally suitable.	Unlikely. The grassland habitats of the access road are only marginally suitable.

Name	Status*	Habitat	Potential for Occurrence within the Project Site	Potential for Occurrence along the Access Rd/Hwy 41
San Joaquin pocket mouse *Perognathus inornatus inornatus*	CSSC	Typically found in grasslands and blue oak savannas; requires friable soils.	Possible. Suitable habitat present.	Possible. Suitable habitat present.
American badger *Taxidea taxus*	CSSC	Large areas of open fields, meadows, shrublands, and desert scrub.	Present. Suitable habitat present, dens detected during burrowing animal surveys and individuals detected during spotlight surveys.	Likely. Suitable habitat present, and dens and individuals detected at Project site.
State Fully Protected Species				
White-tailed kite *Elanus leucurus*	SP	Nests in tall shrubs and trees, forages in grasslands, marshes, and ruderal habitats.	Possible. Suitable nesting and foraging habitat present, and known to occur in Cholame Valley.	Possible. Suitable nesting and foraging habitat present, and known to occur in Cholame Valley.
Golden eagle *Aquila chrysaetos*	SP	Throughout most of their range, golden eagles nest on cliffs and other elevated rocky substrates. In other areas, they nest in large, mature conifers, and in central California they frequently nest in large, mature oak and eucalyptus trees. Nesting occurs in association with open-country grassland, prairie, savanna, shrub steppe, desert, and montane habitats used for foraging.	Present. Detected foraging on the Project site on several occasions. One currently occupied nesting territory with an inactive nest within the Project site. One currently active nest located along the southwestern edge of the BSA. Several other occupied territories within 2 miles and a total of 23 confirmed or suspected nesting territories within 10 miles of Project site (at least 13 active in 2013).	Present. Detected foraging along the access road. Known to nest in many areas of Cholame Valley and nearby ranges and foothills.
Other Focal Corridor Species				

Name	Status*	Habitat	Potential for Occurrence within the Project Site	Potential for Occurrence along the Access Rd/Hwy 41
Tule elk *Cervus elaphus nannodes*	CS	Open semi-arid grasslands environments overlapping with rangelands, woodlands, and desert scrub.	Possible. None detected during surveys of the Project site. However, Tule elk were observed approximately 6 miles southwest of the Project site, and Tule elk have been documented west of Cholame Valley Road. No barrier to Tule elk movement exists between Cholame Valley Road and the Project site.	Possible. None detected during surveys of the access road/Hwy 41 improvement area. However, Tule elk were observed approximately 2 miles southwest of the Project site, and Tule elk have been documented west of Cholame Valley Road. No barrier to Tule elk movement exists between Cholame Valley Road and the access road/Hwy 41 improvement areas.
American pronghorn *Antilocapra americana*	CS	Open grasslands and shrub communities with good horizontal visibility, gentle slopes, and few obstacles to movement.	Present. Observed south of the Project site in the vicinity of the access road/Hwy 41 improvement area. Penrod et al. (2010) indicated pronghorn have been detected in the southern portion of the Project site. The Cholame Valley, to the west, was delineated as having habitat of medium-high or high suitability, and within the Project site there are areas with medium, medium-high, and high suitability as identified by Penrod et al. 2010.	Present. Observed adjacent to the access road/Hwy 41 improvement areas. The area to the west of the site was delineated as medium-high or high suitability, and within the access road/Hwy 41 improvement areas there are areas of medium, medium-high, and high suitability as identified by Penrod et al. 2010.
CNPS-Rare Plant Ranked Species				
Santa Clara thorn mint *Acanthomintha lanceolata*	CNPS Rare Plant Rank 4.2	Rocky substrate (often serpentinite) in chaparral, cismontane woodland, and coastal scrub.	Possible. Suitable rocky, serpentine habitat present.	Possible. Suitable rocky and possibly serpentine-influenced habitat present.

Name	Status*	Habitat	Potential for Occurrence within the Project Site	Potential for Occurrence along the Access Rd/Hwy 41
San Benito thorn mint *Acanthomintha obovata* ssp. *obovata*	CNPS Rare Plant Rank 4.2	Heavy clay, alkaline, and serpentinite substrates in chaparral, cismontane woodland, and valley and foothill grassland.	Possible. Suitable heavy clay and serpentine habitat present.	Possible. Suitable heavy clay and serpentine habitat present.
Douglas' fiddleneck *Amsinckia douglasiana*	CNPS Rare Plant Rank 4.2	Monterey shale and other dry substrate in cismontane woodland, and valley and foothill grassland.	Possible. Suitable shale habitat present, detected just south of the BSA in 2013.	Possible. Suitable dry rocky grassland habitat present.
Forked fiddleneck *Amsinckia furcata*	CNPS Rare Plant Rank 4.2	Cismontane woodland and valley and foothill grasslands.	Possible. Suitable grassland and woodland habitat present, detected just north of the BSA in 2013.	Possible. Suitable grassland habitat present.
California androsace *Androsace elongata* ssp. *acuta*	CNPS Rare Plant Rank 4.2	Chaparral, cismontane woodland, coastal scrub, meadows and seeps, pinyon and juniper woodland, and valley and foothill grassland.	Present. Detected during wetland surveys and habitat mapping.	Possible. Marginally suitable habitat is present, and species detected to the north in the Project site during 2013 wetland surveys and habitat mapping.
Oval-leaved snapdragon *Antirrhinum ovatum*	CNPS Rare Plant Rank 4.2	Clay or gypsum substrates, often alkaline, in chaparral, cismontane woodland, pinyon and juniper woodland, and valley and foothill grassland.	Possible. Suitable clay habitat present.	Likely. Suitable clay habitat present, several nearby records, including known record within 1 mile of access road within or possibly overlapping access road terminus at Highway 41 (Figure 6, CNDDB 2013).
Indian Valley spineflower *Aristocapsa insignis*)	CNPS Rare Plant Rank 1B.2	Sandy soils in cismontane woodland.	Absent. Suitable habitat not present, considered extirpated from Monterey County (Baldwin et al. 2012).	Absent. Suitable sand and woodland habitat not present, also considered extirpated from Monterey County (Baldwin et al. 2012).
Salinas milk-vetch *Astragalus macrodon*	CNPS Rare Plant Rank 4.3	Sandstone, shale, or serpentinite in chaparral, cismontane woodland, and valley and foothill grassland.	Possible. Suitable habitat present.	Possible. Suitable habitat present.

Name	Status*	Habitat	Potential for Occurrence within the Project Site	Potential for Occurrence along the Access Rd/Hwy 41
Crownscale *Atriplex coronata* var. *coronata*	CNPS Rare Plant Rank 4.2	Alkaline, often clay substrate in chenopod scrub, valley and foothill grassland, and vernal pools.	Possible. Suitable habitat present.	Unlikely. Only marginally suitable habitat present.
Lost Hills crownscale *Atriplex vallicola*	CNPS Rare Plant Rank 1B.2	Alkaline, often clay substrate in chenopod scrub, valley and foothill grassland, and vernal pools.	Possible. Suitable habitat present.	Unlikely. Only marginally suitable habitat present.
Western lessingia *Benitoa occidentalis*	CNPS Rare Plant Rank 4.3	Clay or serpentinite in chaparral, cismontane woodland, coastal scrub, and valley and foothill grassland.	Possible. Suitable clay serpentine habitat present.	Possible. Suitable clay serpentine habitat present.
Round-leaved filaree *California macrophylla*	CNPS Rare Plant Rank 1B.1	Clay soils in cismontane woodland and valley and foothill grassland.	Present. Detected during wetland surveys and habitat mapping.	Possible. Suitable habitat present, and detected within adjacent Project site.
La Panza mariposa lily *Calochortus simulans*	CNPS Rare Plant Rank 1B.3	Sandy, often decomposed granite, sometimes serpentinite, substrates in chaparrals, cismontane woodland, lower montane coniferous forest, and valley and foothill grassland.	Unlikely. Only marginally suitable habitat present, few sandy or decomposed granite areas.	Unlikely. Only marginally suitable habitat present, few sandy or decomposed granite areas.
South Coast Range morning-glory *Calystegia collina* ssp. *venusta*	CNPS Rare Plant Rank 4.3	Serpentinite or sedimentary substrate in chaparral, cismontane woodland, and valley and foothill grassland.	Present. Suitable serpentine habitat present, detected on the Project site in 2013.	Possible. Suitable serpentine habitat present.
Hardham's suncup *Camissonia hardhamiae*	CNPS Rare Plant Rank 1B.2	Sandy, decomposed carbonate, or disturbed or burned areas in chaparral or cismontane woodland.	Absent. Suitable habitat and substrate not present.	Absent. Suitable habitat and substrate not present.
Lemmon's jewel-flower *Caulanthus lemmonii*	CNPS Rare Plant Rank 1B.2	Pinyon and juniper woodland, and valley and foothill grassland.	Possible. Suitable habitat present, known occurrences to the east and south of the Project site (Figure 6).	Likely. Suitable habitat present, known occurrences along the Hwy 41 corridor near the access road (Figure 6).

Name	Status*	Habitat	Potential for Occurrence within the Project Site	Potential for Occurrence along the Access Rd/Hwy 41
Hernandez spineflower *Chorizanthe biloba* var. *immemora*	CNPS Rare Plant Rank 1B.2	Sandy or gravely soils on the east slope of the Diablo Range, in chaparral and cismontane woodland.	Likely. Small areas of suitable habitat present. A record of this species occurs approximately 2 miles west of the Project site in the Cholame Valley (Figure 6, CNDDB 2013).	Unlikely. Suitable habitat is marginal along the access road, closest known occurrence approximately 5 miles from the northernmost extent of the access road. The portion of the access road entering the Cholame Valley supports differing habitat conditions from the location of the known occurrence (Figure 6).
Straight-awned spineflower *Chorizanthe rectispina*	CNPS Rare Plant Rank 1B.3	Sandy or gravelly habitats in chaparral, cismontane woodland, and coastal scrub; often on granite in chaparral.	Possible. Suitable habitat is marginal within the Project site due to lack of sandy or gravelly upland substrates, however small areas in the hills along the periphery of the site could support the species.	Unlikely. Suitable habitat is very marginal along the access road due to lack of sandy or gravelly upland substrates. Nearby records along Highway 41 (Figure 6) in differing edaphic conditions from those found on site.
Potbellied spineflower *Chorizanthe ventricosa*	CNPS Rare Plant Rank 4.3	Serpentinite soils in cismontane woodland and valley and foothill grassland.	Possible. Suitable serpentine grassland habitat present.	Possible. Suitable serpentine grassland habitat present.
Small-flowered morning glory *Convolvulus simulans*	CNPS Rare Plant Rank 4.2	Clay soils and serpentinite seeps in valley and foothill grassland, coastal scrub, and openings in chaparral.	Present. Detected on the Project site in 2013.	Unlikely. Suitable soils and seep habitat not present.
Rattan's cryptantha (*Cryptantha rattanii*)	CNPS Rare Plant Rank 4.3	Cismontane woodland, riparian woodland, and valley and foothill grassland habitats	Possible. Suitable grassland habitat present.	Possible. Suitable grassland habitat present.

Name	Status*	Habitat	Potential for Occurrence within the Project Site	Potential for Occurrence along the Access Rd/Hwy 41
Hall's tarplant *Deinandra halliana*	CNPS Rare Plant Rank 1B.1	Reported from a variety of substrates including clay, sand, and alkaline soils in cismontane woodland, chenopod scrub, and valley and foothill grassland, usually in areas with serpentine influence.	Present. Suitable habitat present, several nearby records including one overlapping the northwestern corner of the Project site (Figure 6). Detected on the Project site in 2013.	Likely. Suitable habitat present, several nearby records along Highway 41 near the access road (Figure 6).
Recurved larkspur *Delphinium recurvatum*	CNPS Rare Plant Rank 1B.2	Chenopod scrub, valley and foothill grasslands, cismontane woodland on alkaline soils; often in valley saltbush or valley chenopod scrub.	Unlikely. Suitable strongly alkaline soil conditions were not observed in the Project site.	Unlikely. Suitable strongly alkaline soil conditions were not observed along the access road.
Hoover's eriastrum *Eriastrum hooveri*	CNPS Rare Plant Rank 4.2	Chenopod scrub, pinyon and juniper woodland, and valley and foothill grassland.	Absent. Soils unsuitable for the species.	Absent. Soils unsuitable for the species.
Yellow-flowered eriastrum *Eriastrum luteum*	CNPS Rare Plant Rank 1B.2	Sandy or gravelly soils in broadleafed upland forest, chaparral, and cismontane woodland.	Unlikely. Suitable woodland habitat is marginal within the Project site.	Absent. Suitable woodland habitat not present along access road.
Eastwood's buckwheat *Eriogonum eastwoodianum*	CNPS Rare Plant Rank 1B.3	Sandy, shale, talus, or barren clay substrates in cismontane woodland and valley and foothill grassland.	Possible. Suitable shale or barren habitat present.	Unlikely. Only marginally suitable edaphic habitat present.
Elegant wild buckwheat *Eriogonum elegans*	CNPS Rare Plant Rank 4.3	Sandy or gravelly substrate, often in washes, occasionally along roadsides in cismontane woodland and valley and foothill grassland.	Unlikely. Suitable sandy or gravelly habitat very limited on the Project site.	Unlikely. Only marginally suitable habitat present, roadside areas more loamy or clayey.
Cottony buckwheat *Eriogonum gossypinum*	CNPS Rare Plant Rank 4.2	Clay substrate in chenopod scrub and valley and foothill grassland.	Possible. Suitable clay grassland habitat present.	Possible. Suitable clay grassland habitat present.

Name	Status*	Habitat	Potential for Occurrence within the Project Site	Potential for Occurrence along the Access Rd/Hwy 41
Protruding buckwheat *Eriogonum nudum* var. indictum	CNPS Rare Plant Rank 1B.3	Clay or serpentinite substrate in chaparral, chenopod scrub, and cismontane woodland, may also occur in open grassy areas near these habitat types.	Likely. Suitable clay and serpentine substrates in and near woodland habitat present. Detected within the BSA, outside the Project site in 2013.	Possible. Suitable clay habitat present.
Temblor buckwheat *Eriogonum temblorense*	CNPS Rare Plant Rank 1B.2	Barren clay or sandstone substrate in valley and foothill grassland.	Likely. Suitable barren clay habitat present, nearby records located approximately 5 miles south of the Project site along Highway 41 (Figure 6). Detected within the BSA, outside the Project site in 2013.	Unlikely. Despite nearby records, only marginally suitable habitat present, no suitable barren soils.
San Benito poppy *Eschscholzia hypecoides*	CNPS Rare Plant Rank 4.3	Serpentinite clay in chaparral, cismontane woodland, and valley and foothill grassland.	Possible. Suitable clay and serpentine habitat present.	Possible. Suitable clay and potentially serpentine-influenced habitat present.
Diamond-petaled California poppy *Eschscholzia rhombipetala*	CNPS Rare Plant Rank 1B.1	Alkaline clay substrate in valley and foothill grassland.	Possible. Suitable alkaline clay habitat present.	Possible. Suitable clay habitat present, edges of some wetland features may provide required alkalinity.
Stinkbells *Fritillaria agrestis*	CNPS Rare Plant Rank 4.3	Clay (sometimes serpentinite) in chaparral, cismontane woodland, pinyon and juniper woodland, and valley and foothill grassland.	Possible. Suitable clay serpentine habitat present.	Possible. Suitable clay and potentially serpentine-influenced habitat present.
Trumpet-throated Gilia *Gilia tenuiflora* ssp. *amplifaucalus*	CNPS Rare Plant Rank 4.3	Sandy substrate in cismontane woodland and valley and foothill grassland.	Unlikely. Marginally suitable habitat present, sandy upland soils rare within Project site.	Unlikely. Marginally suitable habitat present, sandy upland soils rare along access road.
Delicate bluecup *Githopsis tenella*	CNPS Rare Plant Rank 1B.3	Mesic sites in chaparral and cismontane woodland.	Absent. Suitable habitat not detected during habitat mapping and wetland surveys. Nearest record questionable.	Absent. Suitable habitat not detected during habitat mapping and wetland surveys. Nearest record questionable.

Name	Status*	Habitat	Potential for Occurrence within the Project Site	Potential for Occurrence along the Access Rd/Hwy 41
Hogwallow starfish *Hesperevax caulescens*	CNPS Rare Plant Rank 4.2	Mesic, clay sites or shallow vernal pools in valley and foothill grassland.	Present. Detected during wetland surveys and habitat mapping.	Likely. Suitable habitat present, nearby occurrences confirmed.
Forked hare-leaf *Lagophylla dichotoma*	CNPS Rare Plant Rank 1B.1	Sometimes clay substrate in cismontane woodland and valley and foothill grassland.	Possible. Suitable clay woodland and grassland habitat present.	Possible. Suitable clay habitat present.
Pale-yellow layia *Layia heterotricha*	CNPS Rare Plant Rank 1B.1	Alkaline or clay soils in cismontane woodland, coastal scrub, pinyon and juniper woodland, and valley and foothill grassland.	Possible. Suitable alkaline and clay grassland habitat present.	Likely. Suitable clay grassland habitat present, multiple nearby records occur in the vicinity of the access road and Highway 41 (Figure 6).
Munz's tidy-tips *Layia munzii*	CNPS Rare Plant Rank 1B.2	Alkaline clay soils in chenopod scrub and valley and foothill grassland.	Unlikely. Suitable soil conditions occur in Project site, but only in very limited areas.	Unlikely. Although nearby records occur in the vicinity of the access road and Highway 41 (Figure 6), soils are unsuitable along the access road itself.
Panoche pepper-grass *Lepidium jaredii* ssp. *album*	CNPS Rare Plant Rank 1B.2	White or grey clay lenses on steep slopes, clay and gypsum rich soils, in valley and foothill grassland.	Unlikely. Suitable white/grey clay lenses on slopes present but limited, gypsum rich rare on the Project site.	Unlikely. Suitable clay soils very limited, nearby record located approximately 4 miles south of the access road terminus occurs in a very different soil type than found near the access road.
Jared's pepper-grass *Lepidium jaredii* ssp. *jaredii*	CNPS Rare Plant Rank 1B.2	Alkali and adobe soils in valley and foothill grasslands.	Possible. Suitable adobe soils present.	Unlikely. Suitable mesic, heavy clay soils limited.
Spring Lessingia *Lessingia tenuis*	CNPS Rare Plant Rank 4.3	Openings in chaparral, cismontane woodland, and lower montane coniferous forest.	Unlikely. Only marginally suitable habitat present.	Absent. No suitable woodland or chaparral habitat present.

Name	Status*	Habitat	Potential for Occurrence within the Project Site	Potential for Occurrence along the Access Rd/Hwy 41
Showy golden madia *Madia radiata*	CNPS Rare Plant Rank 1B.1	Adobe clay in valley and foothill grassland, cismontane woodland, and chenopod scrub.	Likely. Suitable adobe clay habitat present, multiple nearby records including one record that just overlaps the northwest corner of the Project site (Figure 6, CNDDB 2013).	Possible. Suitable adobe clay habitat limited, but several records in the vicinity of the access road and Highway 41 (Figure 6).
Indian Valley bush-mallow *Malacothamnus aboriginum*	CNPS Rare Plant Rank 1B.2	Granitic outcrops, sandy bare soil, often in burned areas and disturbed soils, in cismontane woodland and chaparral.	Unlikely. Marginally suitable substrate occurs on the Project site. No recently burned chaparral or woodland areas on the Project site (although there are recently burned grasslands with no shrub cover). Closest known record over 5 miles away (Figure 6).	Unlikely. Marginally suitable substrate occurs along the access road. No recently burned areas along the access road.
Sylvan microseris *Microseris sylvatica*	CNPS Rare Plant Rank 4.2	Chaparral, cismontane woodland, Great Basin scrub, pinyon and juniper woodland, and valley and foothill grassland (sometimes on serpentinite).	Possible. Suitable serpentine, grassland, and woodland habitat present.	Possible. Suitable serpentine and grassland habitat present.
San Antonio Hills monardella *Monardella antonina* ssp. *antonina*	CNPS Rare Plant Rank 3	Chaparral and cismontane woodland.	Absent. Suitable habitat not present, outside known species' range.	Absent. Suitable habitat not present, outside known species' range.
Adobe navarretia *Navarretia nigelliformis* ssp. *nigelliformis*	CNPS Rare Plant Rank 4.2	Vernally mesic clay or sometimes serpentine soils in valley and foothill grassland habitats (sometimes in vernal pools).	Possible. Suitable habitat present.	Likely. Suitable habitat present.
Shinning navarretia *Navarretia nigelliformis* ssp. *radians*	CNPS Rare Plant Rank 1B.2	Cismontane woodland, valley and foothill grassland, and often upland areas adjacent to vernal pools.	Possible. Suitable habitat wetland ecotone habitat present, plants detected in 2013 being confirmed to subspecies.	Likely. Suitable wetland ecotone habitat present, record from approximately 1.5 miles west of the access road (Figure 6).

Name	Status*	Habitat	Potential for Occurrence within the Project Site	Potential for Occurrence along the Access Rd/Hwy 41
Large-flowered nemacladus *Nemacladus secundiflorus* var. secundiflorus	CNPS Rare Plant Rank 4.3	Gravelly openings in chaparral and valley and foothill grassland, dry slopes.	Unlikely. Marginally suitable dry slope habitat present, although not gravelly. Nearby occurrences recorded in Project quadrangles (CNPS 2013), in habitats differing from those on the Project site.	Unlikely. Marginally suitable dry slope habitat present, although not gravelly. Nearby occurrences recorded in Project quadrangles (CNPS 2013) in habitats differing from those on the Project site.
Chaparral ragwort *Senecio aphanactis*	CNPS Rare Plant Rank2.2	Chaparral, cismontane woodland, and coastal scrub.	Unlikely. Marginally suitable habitat present.	Unlikely. Marginally suitable habitat present.
Mason's neststraw *Stylocline masonii*	CNPS Rare Plant Rank 1B.1	Sandy washes in chenopod scrub and pinyon and juniper woodland.	Absent. No sandy chenopod scrub or pinyon and juniper woodland in the Project site.	Absent. No suitable habitat present; although a nearby record exists west of the access road in the Cholame Valley (Figure 6), the area of the known occurrence supports chenopod scrub habitats not found near the access road.

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***Listing Status**

FE	=	Federally listed Endangered
FT	=	Federal listed Threatened
FC	=	Federal Candidate for listing
SE	=	State listed Endangered
ST	=	State listed Threatened
SR	=	State Rare
CSSC	=	California Species of Special Concern
SP	=	State Fully Protected Species

Definitions Regarding Potential Occurrence:

Present:	Species or sign of their presence observed on the site
Likely:	Species or sign not observed on the site, but reasonably likely to occur on the site; known records in similar habitats nearby or overlapping BSA
Possible:	Species or sign not observed on the site, but conditions suitable for occurrence
Unlikely:	Species or sign not observed on the site, conditions marginal for occurrence
Absent:	Species or sign not observed on the site, conditions unsuitable for occurrence

Other Focal Corridor Species:

CS	=	Regional State Focal Corridor Species

CNPS Rare Plant Ranks:	CNPS Threat Code Extensions:
1A – Plants presumed extinct in California	.1 – Seriously endangered in California
1B – Plants rare, threatened, or endangered in California and elsewhere	.2 – Fairly endangered in California
2 – Plants rare, threatened, or endangered in California, but more common elsewhere	.3 – Not very endangered in California
3 – Plants about which more information is needed – a review list	
4 – Plants of limited distribution – a watch list	

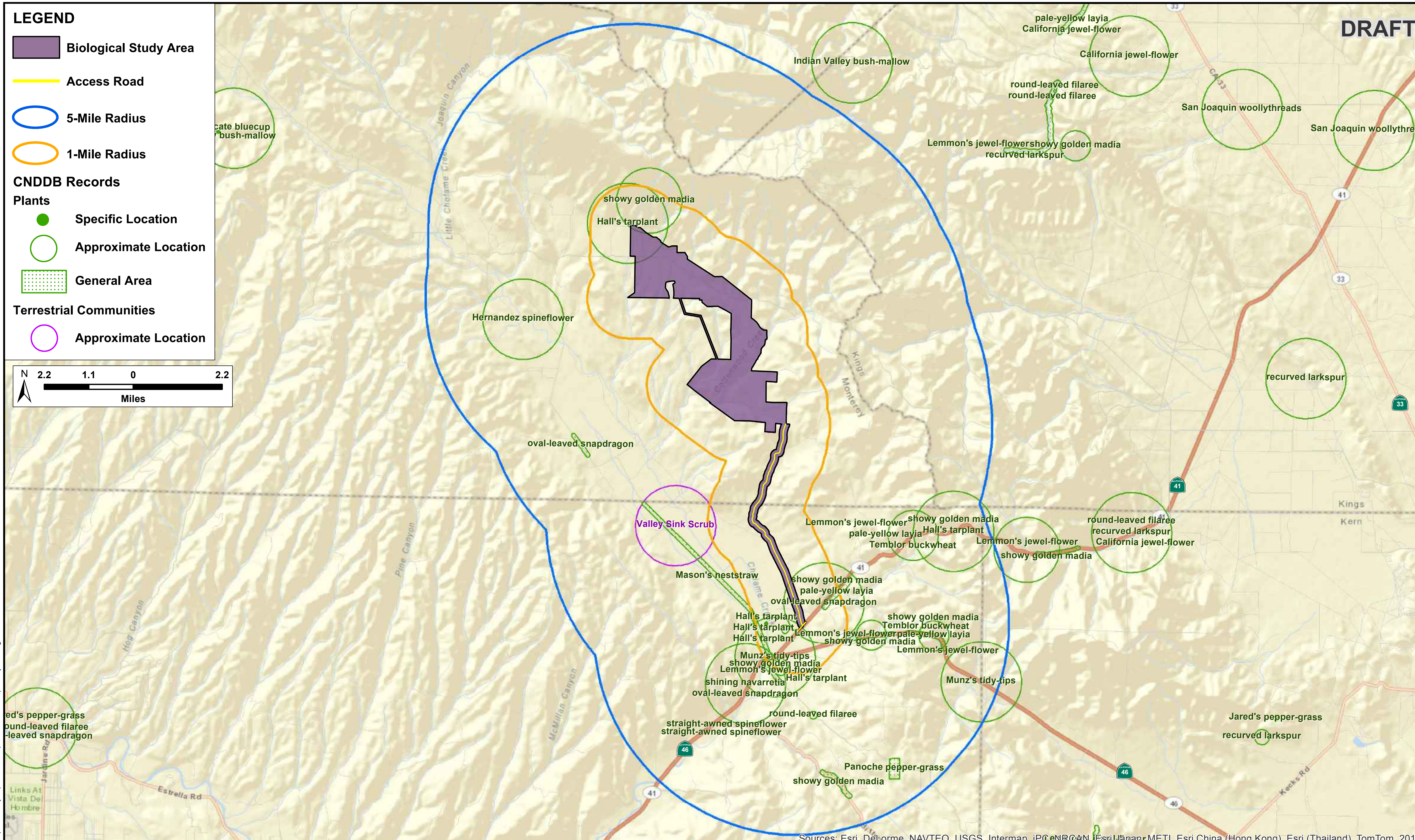

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Figure 6: CNDDB Plants Records

California Flats Solar Project, California - Interim Biotic Resources Report (3308-02)
May 2013

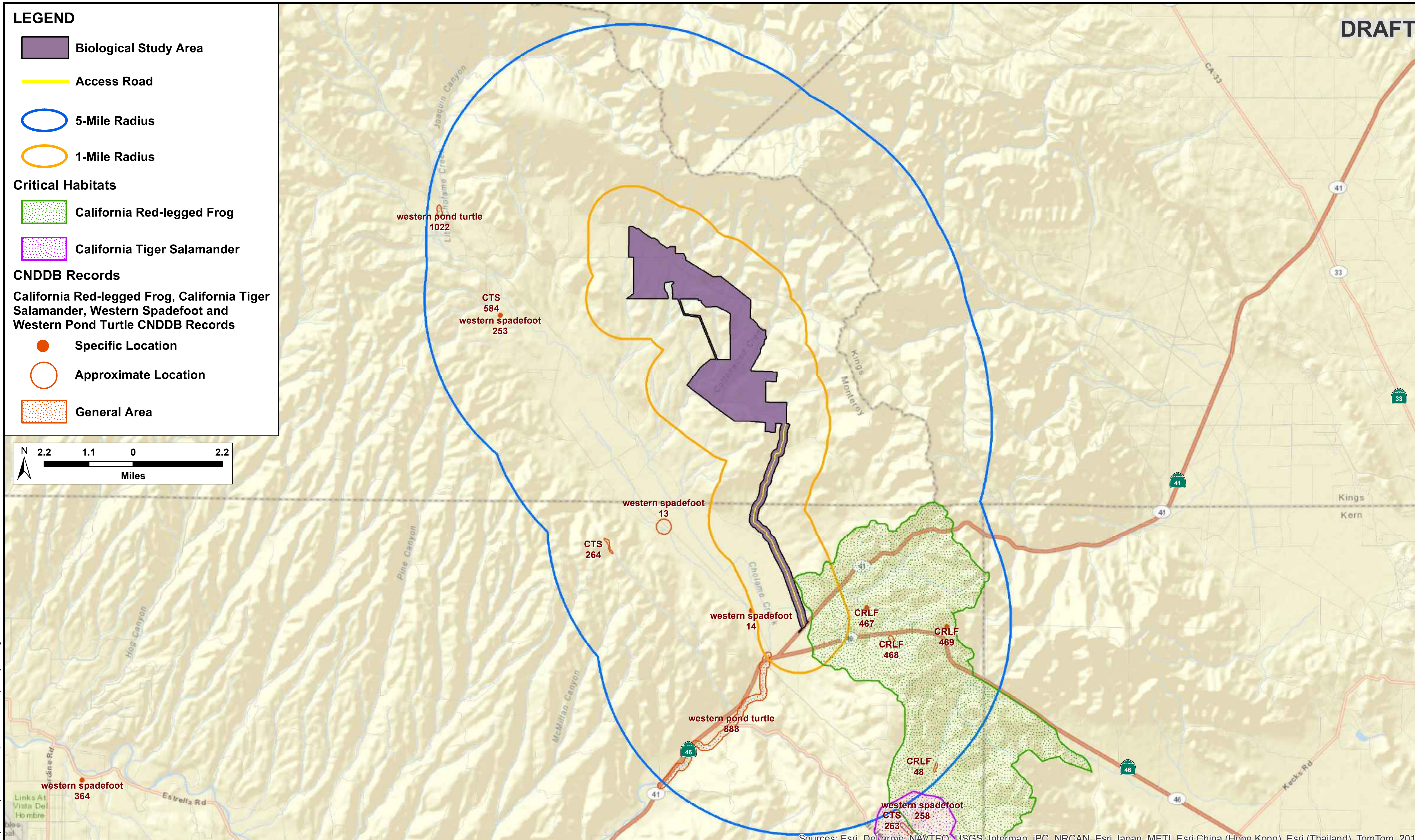

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Figure 7: California Red-legged Frog, California Tiger Salamander, Western Spadefoot and Western Pond Turtle CNDDB Records

California Flats Solar Project, California - Interim Biotic Resources Report (3308-02)
May 2013

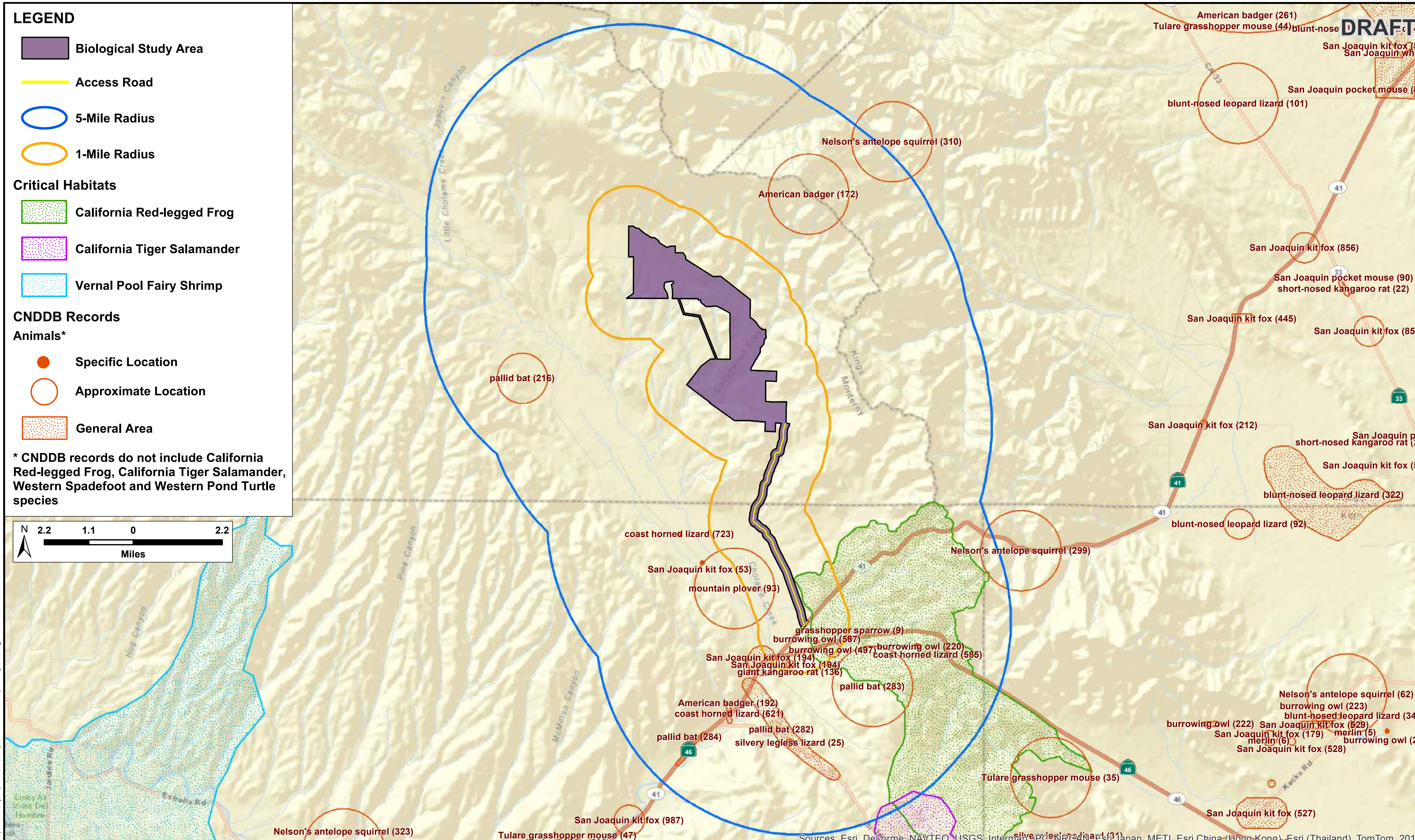

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Figure 8: Wildlife CNDDB Records and Critical Habitats

California Flats Solar Project, California - Interim Biotic Resources Report (3308-02)

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3.5 Special-Status Plant Species

3.5.1 State- and Federally Listed Species

California Jewelflower (*Caulanthus californicus*). Federal Status: Endangered; State Status: Endangered; CNPS Rare Plant Rank: 1B.1. California jewelflower is an annual herb belonging to the mustard family (Brassicaceae) that blooms from February to May. This plant occurs in chenopod scrub, valley and foothill grassland, and pinyon and juniper woodland on sandy soils, at elevations between 200 and 3281 feet. This species is found in Fresno, Kern, Santa Barbara, and San Luis Obispo counties. Over 35 historical occurrences are extirpated, including those in Kings and Tulare counties. Experimental reintroductions have occurred in Kern, Santa Barbara, and Tulare counties, but all have failed (CNPS 2013).

The nearest records for the species are about 9 miles southeast of the BSA (CNDDB 2013). The grasslands within the Project site provide only marginally suitable habitat for this species, because there is a distinct lack of sandy, gravelly, marine-based substrates with a high proportion of bare ground favored by this species. Open areas on the site tend to be clayey or loamy, sometimes serpentine, and with cobbles rather than small gravels mixed with coarse sand. The species was not detected during 2012 wetland surveys and habitat mapping, or 2013 rare plant surveys, and it is unlikely that the species occurs within the Project site or the access road/Hwy 41 improvement areas.

San Joaquin Woollythreads (*Monolopia congdonii*). Federal Status: Endangered; State Status: None; CNPS Rare Plant Rank: 1B.2. San Joaquin woollythreads is an annual herb in the sunflower family (Asteraceae) that blooms from February to May. This plant grows in chenopod scrub, valley and foothill grasslands, and alluvial fans with a sparse cover of saltbush. This species is often found on sandy soils and occurs at elevations between 197 and 2625 feet (CNPS 2013). San Joaquin woollythreads is endemic to the southern San Joaquin Valley and surrounding hills. Its historic range extended from southern Fresno and Tulare counties (excluding the Tulare Lake bed) to Bakersfield and Cuyama Valley. About half of the historic occurrences are extirpated. Today the species occurs primarily near Carrizo Plain, Kettleman Hills, and Kettleman Plain in Fresno, Kings, Kern, Santa Barbara, San Benito, San Luis Obispo, and Tulare counties.

The nearest records for the species are about 13 miles northeast of the BSA (CNDDB 2013). The grasslands within the BSA provide only marginally suitable habitat for this species. The site lacks the type of sandy, often alkaline substrates, broad sandy alluvial fans, and scrubby habitats preferred by San Joaquin woollythreads. The species was not detected during 2012 wetland surveys and habitat mapping, or 2013 rare plant surveys, and it is unlikely the species occurs within the Project site or the access road/Hwy 41 improvement areas.

3.5.2 CNPS Rare Plant Ranked Species

Santa Clara Thorn-mint (*Acanthomintha lanceolata*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 4.2. Santa Clara thorn-mint is an annual herb in the mint family (Lamiaceae) that blooms from March to June. This subspecies occurs in rocky, often serpentinite soils in chaparral, cismontane woodland, and coastal scrub habitats from 262 to 3937 feet in elevation. Santa Clara thorn-mint is a California endemic documented in Alameda, Fresno, Merced, Monterey, San Benito, Santa Clara, San Joaquin, and Stanislaus counties.

The nearest record for the species is about 12 miles northwest of the BSA (CCH 2013). Suitable serpentine habitat is present for the species within the Project site and access road although the species was not observed during 2012 wetland surveys or habitat mapping. The species could occur within the Project site or the access road/Hwy 41 improvement areas.

San Benito Thorn-mint (*Acanthomintha obovata* ssp. *obovata*). Federal Status: None; State Listing Status: None; CNPS Rare Plant Rank: 4.2. San Benito thorn-mint is an annual herb in the mint family (Lamiaceae) that blooms from April to July. This subspecies occurs in heavy clay, alkaline, and serpentinite soils in chaparral, cismontane woodland, and valley and foothill grassland habitats from 1296 to 4921 feet in elevation. San Benito thorn-mint is a California endemic documented in Fresno, Monterey, San Benito, and San Luis Obispo counties.

The nearest record for the species is about 14 miles north of the BSA (CCH 2013). Suitable serpentine-clay substrates and habitat is present for the species within the Project site and along the access road, although the species was not observed during 2012 wetland surveys and habitat mapping. The species could occur within the Project site or the access road/Hwy 41 improvement areas.

Douglas' fiddleneck (*Amsinckia douglasiana*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 4.2. Douglas' fiddleneck is an annual herb in the borage family (Boraginaceae) that blooms from March to May. This species occurs in dry Monterey shale soils in cismontane woodland, and valley and foothill grassland habitats from 0 to 6398 feet in elevation. This California endemic has been documented in the counties of Kern, Monterey, Santa Barbara, San Benito, San Luis Obispo, and Ventura.

The nearest known record for the species is about 15 miles southeast of the BSA (CCH 2013). The shale soils within the Project site and access road provides suitable habitat for this species, and it was detected immediately south of the BSA on a steep north facing hillside within oak woodland during rare plant surveys in 2013. This species could occur within the Project site or the access road/Hwy 41 improvement areas.

Forked Fiddleneck (*Amsinckia furcata*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 4.2. Forked fiddleneck is an annual herb in the borage family (Boraginaceae) that blooms from February to May. This species occurs in cismontane woodland and valley and foothill grassland habitats from

164 to 3281 feet in elevation. This California endemic has been documented in Fresno, Kings, Kern, Merced, San Benito, and San Luis Obispo counties.

The nearest known record for the species is about 7 miles northeast of the BSA (CCH 2013). The woodlands and grasslands within the Project site and along the access road provide suitable habitat for this species, and it was detected north of the Project site during rare plant surveys in 2013. The species could possibly occur within the Project site or the access road/Hwy 41 improvement areas.

California Androsace (*Androsace elongata* ssp. *acuta*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 4.2. California androsace is an annual herb in the primrose family (Primulaceae) that blooms from March through June (CNPS 2013). This species occurs on dry, grassy slopes (Hickman 1993) in chaparral, cismontane woodland, coastal scrub, valley and foothill grassland habitats, and meadows and seeps. The species ranges from Baja California into Oregon at elevations between 492 and 3937 feet. California androsace is widespread in several counties, including: Alameda, Contra Costa, Fresno, Kern, San Bernardino, San Diego, Siskiyou, San Joaquin, San Luis Obispo, and possibly Tehama counties. It is believed to be extirpated from Los Angeles County and is considered endangered in Oregon.

This species has been detected along the periphery of the Project site during the 2012 wetland surveys and habitat mapping and 2013 rare plant surveys. It is also possible to occur in marginally suitable habitats within the access road/Hwy 41 improvement areas.

Oval-leaved Snapdragon (*Antirrhinum ovatum*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 4.2. Oval-leaved snapdragon is an annual herb in the figwort family (Scrophulariaceae) that blooms from May to November. This species occurs in clay or gypsum, often alkaline soils in chaparral, cismontane woodland, pinyon and juniper woodland, and valley and foothill grassland habitats from 656 to 3281 feet in elevation. Oval-leaved snapdragon is a California endemic documented in Fresno, Kern, Monterey, Santa Barbara, San Benito, San Luis Obispo, and Ventura counties.

The nearest record for the species occurs along the access road near Highway 41, and may even overlap the access road alignment (Figure 6, CNDDB 2013). The clay soils found within the woodlands and grasslands within the Project site and along the access road provide suitable habitat for this species, although the species was not observed during 2012 wetland surveys or habitat mapping. The species could occur within the Project site and has a high probability of occurring in the vicinity of the access road/Hwy 41 improvement areas.

Indian Valley Spineflower (*Aristocapsa insignis*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 1B.2. Indian Valley spineflower is an annual herb in the buckwheat family (Polygonaceae) that blooms from May to September. This species occurs in sandy soils in cismontane woodland habitat from 984 to 1969 feet in elevation. Indian Valley spineflower is a California endemic documented in Monterey and San Luis Obispo counties.

The nearest records for the species are about 20 miles to the west (CNPS 2013), and 26 miles south of the BSA (CCH 2013). The habitat within the Project site and along the access road is not suitable for this species, which is generally restricted to cismontane woodlands with sandy and/or well drained soils. The species is also considered to be extirpated from Monterey County (Baldwin et al. 2012). The species has not been detected during any survey effort to date and is considered absent from the Project site and the access road/Hwy 41 improvement areas.

Salinas Milk-vetch (*Astragalus macrodon*) Federal Status: None; State Status: None; CNPS Rare Plant Rank: 4.3. Salinas milk-vetch is a perennial herb in the legume (pea) family (Fabaceae) that blooms from April to July (CNPS 2013). This species can occur in a variety of soil types that include sandstone, shale, and serpentinite, and has been documented to grow in chaparral, cismontane woodland, and valley and foothill grassland. Salinas milk-vetch ranges from Ventura to Monterey and San Benito counties.

While no records for Salinas milk-vetch were found within the vicinity of the BSA, the BSA is within the current known range of the species. The serpentine, shale, and cobbly well-drained soils within the Project site and along the access road provide suitable habitat for the species; therefore, this species could possibly occur within the Project site or the access road/Hwy 41 improvement areas.

Crownscale (*Atriplex coronata* var. *coronata*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 4.2. Crownscale is an annual herb in the goosefoot family (Chenopodiaceae) that blooms from March to October. It is distributed across the Central Valley and the central California coast in strongly alkaline, open soils in chenopod scrub, valley and foothill grassland, and vernal pools at elevations from 3 to 1800 feet. Crownscale is a Californian endemic that is documented from Alameda, Contra Costa, Fresno, Glenn, Kings, Kern, Merced, Monterey, San Luis Obispo, Solano, and Stanislaus counties (CNPS 2013).

The nearest record for the species is within 2 miles of the BSA (CCH 2013). The alkaline soils of the grasslands and seasonal wetlands within the Project site provide suitable habitat for this species, although it was not observed during 2012 wetland surveys or habitat mapping. The species could occur within the Project site but is unlikely to occur within the access road/Hwy 41 improvement areas.

Lost Hills Crownscale (*Atriplex vallicola*). Federal Listing Status: None; State Listing Status: None; CNPS Rare Plant Rank: 1B.2. Lost Hills crownscale is an annual herb in the goosefoot family (Chenopodiaceae) that blooms from April to August. The species occurs on alkaline soils in chenopod scrub, valley and foothill grassland, and vernal pool habitats from 164 to 2083 feet in elevation. Lost Hills crownscale is a California endemic and is considered rare throughout its range in Fresno, Kings, Kern, Merced, and San Luis Obispo counties (CNPS 2013).

This species is not known from Monterey County. The nearest records to the Project site approximately 30 miles to the east, in western Kern County (CCH 2013), and from the Carrizo Plain, about 40 miles southeast of the BSA (CNDDB 2013). The alkaline soils of the grasslands and seasonal wetlands within the Project site provide suitable habitat for this species. It was not observed during 2012 wetland surveys or habitat mapping, but due to a late blooming period has not yet been fully assessed by the current 2013 surveys. The species could possibly occur within suitable alkaline wetland habitat within the Project site but is unlikely to occur within the access road/Hwy 41 improvement areas.

Western Lessingia (*Benitoa occidentalis*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 4.3. Western lessingia is an annual herb in the sunflower family (Asteraceae) that blooms from May to November. This species often occurs in clay or serpentinite, and has been found growing in chaparral, cismontane woodland, valley and foothill grassland, and coastal scrub habitats (CNPS 2013). The range of western lessingia is currently limited to Fresno, San Benito, and Monterey counties.

The nearest record for this species is along the Parkfield-Coalinga Road, approximately 12 miles north of the BSA (CCH 2013). The serpentine clay soils within the Project site and access road provide suitable habitat for this species, although it was not observed during 2012 wetland surveys or habitat mapping. The species could occur within the Project site or the access road/Hwy 41 improvement areas.

Round-leaved Filaree (*California macrophylla*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 1B.1. Round-leaved filaree is an annual herb in the geranium (Geraniaceae) family that blooms from March to May. This species occurs on clay soils in valley and foothill grassland or open cismontane woodland habitats at elevations from 49 to 3937 feet. It occurs in 92 USGS 7.5-minute quadrangles throughout the state in Alameda, Contra Costa, Colusa, Fresno, Glenn, Kings, Kern, Lake, Lassen, Los Angeles, Merced, Monterey, Napa, Riverside, Santa Barbara, San Benito, Santa Clara, San Diego, San Joaquin, San Luis Obispo, San Mateo, Solano, Sonoma, Stanislaus, Tehama, Ventura, and Yolo counties, and within habitats from Oregon to Baja California. It is considered extirpated from Butte County and from Santa Cruz Island. Many collections of the species are historic.

This species has been detected within the Project site during 2012 wetland surveys and habitat mapping and 2013 rare plant surveys, and it is possible that it occurs in heavy clay soils within the access road/Hwy 41 improvement areas.

La Panza Mariposa Lily (*Calochortus simulans*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 1B.3. La Panza mariposa lily is an annual herb in the lily family (Liliaceae) that blooms from April to June. This species occurs on sandy, often decomposed granite, sometimes spertentinite substrates in chaparral, cismontane woodland, lower montane coniferous forest, and valley and foothill grassland habitats from 1296 to 3609 feet in elevation. It is a California endemic known from Santa Barbara and San Luis Obispo counties.

The nearest record for the species is about 10 miles southwest of the BSA in the Shed Canyon quadrangle (CCH 2013). The rocky serpentine areas within the Project site provide at least marginally suitable habitat for this species, although the species prefers sandy substrates. The species was not observed during 2012 wetland surveys or habitat mapping. The species has a low probability of occurring within the Project site or the access road/Hwy 41 improvement areas.

South Coast Range Morning-glory (*Calystegia collina* ssp. *venusta*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 4.3. South Coast Range morning-glory a perennial rhizomatous herb in the bindweed family (Convolvulaceae) that blooms from April to June. This species occurs on serpentinite or sedimentary substrate in chaparral, cismontane woodland, and valley and foothill grassland habitats from 1394 to 4888 feet in elevation. It is a California endemic known from Fresno, Monterey, Santa Barbara, San Benito, and Santa Clara counties (CNPS 2013).

The nearest record for the species is about 3 miles west of the BSA (CCH 2013). The serpentine soils within the Project site and potentially serpentine-influenced soils along the access road provide suitable habitat for this species. This species was detected on the Project site during the 2013 rare plant surveys, and could also occur within the access road/Hwy 41 improvement areas.

Hardham's Suncup (*Camissonia hardhamiae*). Federal Listing Status: None; State Listing Status: None; CNPS Rare Plant Rank: 1B.2. Hardham's suncup is an annual herb in the evening-primrose family (Onagraceae) that blooms from March to May. This species occurs on sandy or decomposed carbonate soils and in disturbed or burned areas of chaparral and cismontane woodland from 459 to 3100 feet in elevation. Hardham's suncup is a California endemic known from fewer than 20 occurrences in San Luis Obispo and Monterey counties (CNPS 2013).

The nearest record for this species is about 25 miles west of the BSA at Camp Roberts (CNDDB 2013). Because portions of the grassland on the Project site burned in the summer of 2012, the species was considered for occurrence. However, habitat found within the Project site and access road/Hwy 41 improvement areas is very marginal or even entirely absent for this species, which prefers sandy substrates and decomposed carbonate soils. Additionally, this species was not observed during 2012 wetland surveys or habitat mapping, or 2013 rare plant surveys. Therefore, the species is considered absent within the Project site and along the access road.

Lemmon's Jewelflower (*Caulanthus lemmonii*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 1B.2. Lemmon's jewelflower is an annual herb in the mustard family (Brassicaceae) that blooms from March to May. This species occurs in pinyon and juniper woodland and valley and foothill grassland habitats from 262 to 4003 feet in elevation. It is a California endemic known from Fresno, Kings, Kern, Merced, Monterey, Santa Barbara, San Benito, San Joaquin, San Luis Obispo, Stanislaus, and Ventura counties. It is extirpated from Alameda County. Lemmon's jewelflower is threatened by development and grazing (CNPS 2013).

The nearest record for the species is about 2.5 miles southeast of the BSA (Figure 6, CNDDB 2013). The grasslands within the Project site and along the access road provide suitable habitat for this species, although the species was not observed during 2012 wetland surveys or habitat mapping. The species could occur within the Project site and has a moderately high likelihood of occurring along the access road/Hwy 41 improvement areas.

Hernandez Spineflower (*Chorizanthe biloba* var. *immemora*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 1B.2. Hernandez spineflower is an annual herb in the buckwheat family (Polygonaceae) that blooms from May to August, and sometimes as late as September. This variety occurs on sandy and gravelly substrates in chaparral and cismontane woodland habitats from 1969 to 2625 feet in elevation. It is a California endemic known from approximately 5 occurrences occurring in 7 USGS quadrangles in Fresno, Monterey, and San Benito counties (CNPS 2013).

The nearest record for the species is about 2 miles west of the BSA (Figure 6, CNDDB 2013). The rocky areas within the Project site and along the access road may support this species; however, the occurrence of this species along the access road may be unlikely do to the restricted geographic distribution. The common variety of this species, twolobe spineflower (*Chorizanthe biloba* var. *biloba*), is present within the suitable habitats within the Project site and along the access road. This species was not observed during 2012 wetland surveys or habitat mapping; however, due to the nearby known occurrence and presence of suitable habitat for the species, Hernandez spineflower is likely to occur within the Project site but is considered unlikely to occur within the access road/Hwy 41 improvement areas.

Straight-awned Spineflower (*Chorizanthe rectispina*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 1B.3. Straight-awned spineflower is an annual herb in the buckwheat family (Polygonaceae) that blooms from April to July. This species often occurs on granite in sandy or gravelly soils in chaparral, cismontane woodland, and coastal scrub habitats from 279 to 3396 feet in elevation. It is a California endemic known from approximately 20 occurrences in Monterey, Santa Barbara, and San Luis Obispo counties.

Several records for this species occur in the vicinity of the access road near Highway 41 (Figure 6, CNDDB 2013). This species was not detected during 2012 wetland surveys or habitat mapping. The grassland habitats on the site do not provide suitable habitat for this species, which prefers chaparral habitats; additionally, sandy and gravelly upland substrates are very rare within the BSA. However, suitable habitat for the species does exist in isolated areas in the hills along the periphery of the Project site. As such, this species may occur in small numbers within the Project site and is unlikely to occur within the access road/Hwy 41 improvement areas.

Potbellied Spineflower (*Chorizanthe ventricosa*). Federal Listing Status: None; State Listing Status: None; CNPS Rare Plant Rank: 4.3. Potbellied spineflower is an annual herb in the knotweed family (Polygonaceae) that blooms from May to September. This species often occurs on soils derived from serpentinite and is found in cismontane woodland and valley and foothill grassland habitats from 1640 to 3280 feet in elevation. Potbellied spineflower is a California endemic documented in Fresno, Monterey, San Benito, and San Luis Obispo counties (CNPS 2013).

The nearest record for this species is about 3 miles east of the BSA, off Hwy 41 near Cottonwood Pass (CCH 2013). Suitable grassland habitat with serpentinite inclusions is present for the species within the Project site but rare along the access road, and the species was not observed during 2012 wetland surveys and habitat mapping. The species could occur within the Project site and is unlikely to occur within the access road/Hwy 41 improvement areas.

Small-flowered Morning-glory (*Convolvulus simulans*). Federal Listing Status: None; State Listing Status: None; CNPS Rare Plant Rank: 4.2. Small-flowered morning glory is an annual herb in the morning-glory family (Convolvulaceae) that blooms from March to July. This species occurs on clay soils or serpentinite seeps in chaparral (openings), coastal scrub, and valley and foothill grassland habitats from 98 to 2297 feet in elevation. Small-flowered morning-glory is a California endemic with published accounts from 12 counties including Contra Costa, Fresno, Kern, Los Angeles, Orange, Riverside, Santa Barbara, San Benito, San Diego, San Joaquin, San Luis Obispo, and Stanislaus counties. It has also been documented on three of the Channel Islands including San Clemente, Santa Catalina, and Santa Cruz islands (CNPS 2013).

Although not recognized in the CNPS (2013) database, the nearest known record for this species is only about 3 miles from the BSA, off of Cholame Valley Road. However, this record is a historical (1887) collection by J.G. Lemmon (CCH 2013). Only one other record exists in the vicinity, a collection from about 30 miles south of the BSA near Yeguas Mountain in 1950 (CCH 2013). Suitable serpentine-clay substrates and habitat is present for the species within the Project site but rare within the access road/Hwy 41 improvement areas, and the species was detected on the Project site during the 2013 rare plant surveys. The species is unlikely to occur within the access road/Hwy 41 improvement areas.

Rattan's cryptantha (*Cryptantha rattanii*). Federal Listing Status: None; State Listing Status: None; CNPS Rare Plant Rank: 4.3. Rattan's cryptantha is an annual herb in the borage family (Boraginaceae) that blooms from April to July. This species occurs in cismontane woodland, riparian woodland, and valley and foothill grassland habitats from 804 to 3002 feet in elevation. It is a California endemic known from Fresno, Merced, Monterey, and San Benito counties (CNPS 2013).

The species is known from along the Parkfield grade. The grasslands on the Project site and along the access road provide suitable habitat for this species, although the species was not observed during 2012 wetland surveys or habitat mapping. The species could occur within the Project site or the access road/Hwy 41 improvement areas.

Hall's Tarplant (*Deinandra halliana*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 1B.1. Hall's tarplant is an annual herb in the sunflower family (Asteraceae) that blooms from April to

May. This species appears only in unusually wet years. Hall's tarplant occurs in clay soils in chenopod scrub, cismontane woodland, and valley and foothill grassland habitats from 984 to 3117 feet in elevation. It is a California endemic documented in 12 USGS quadrangles in Fresno, Monterey, San Benito, and San Luis Obispo counties.

The nearest record for the species is within 1 mile north of the BSA and may overlap the northwest corner of the Project site (Figure 6, CNDDB 2013). The clay and serpentine soils found within the grasslands on the Project site and the access road/Hwy 41 improvement areas provide suitable habitat for this species, which was found on the Project site during the 2013 rare plant surveys. The species has a high probability of occurrence within the access road/Hwy 41 improvement areas.

Recurved Larkspur (*Delphinium recurvatum*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 1B.2. Recurved larkspur is a perennial herb in the buttercup family (Ranunculaceae) that blooms from March to June. This species occurs in alkaline soils in chenopod scrub, cismontane woodland, and valley and foothill grassland habitats from 10 to 2461 feet in elevation. It is a widely distributed California endemic found in 67 USGS quadrangles in Alameda, Contra Costa, Fresno, Glenn, Kings, Kern, Madera, Merced, Monterey, San Joaquin, San Luis Obispo, Solano, and Tulare counties. It is extirpated from its historical range in Butte and Colusa counties.

This species tends to prefer strongly alkaline soils along wetland ecotones, which are rare within the Project site and largely absent from the access road/Hwy 41 improvement areas. This perennial species was not observed within the small areas of suitable habitats on the site. The species is unlikely to occur along the access road or within the Project site.

Hoover's Eriastrum (*Eriastrum hooveri*). Federal Status: Delisted on 7 October 2003; State Status: None; CNPS Rare Plant Rank: 4.2. Tracy's eriastrum occurs in Fresno, Kings, Kern, Los Angeles, Santa Barbara, San Benito, and San Luis Obispo counties within drying, grassy areas of chenopod scrub, pinyon-juniper woodland, and valley and foothill grassland habitats at elevations of 164 to 3002 feet. The species is typically found in broad alkaline flats above dry streambeds (Baldwin et al. 2012). It is an annual herb in the phlox (Polemoniaceae) family that blooms from March to July (CNPS 2013).

The nearest record for the species is about 15 miles north of the BSA (CNDDB 2013). Grasslands within the Project site and access road/Hwy 41 improvement areas do not provide suitable alkaline flat habitat for this species, and it has not been observed within the BSA during any survey effort to date. The species is considered absent from the Project site and the access road/Hwy 41 improvement areas.

Yellow-flowered Eriastrum (*Eriastrum luteum*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 1B.2. Yellow-flowered eriastrum is an annual herb in the phlox family (Polemoniaceae) that blooms from May to June. This species occurs in sandy or gravelly soils in broadleaf upland forest, chaparral, and cismontane woodland habitats. This uncommon California endemic occurs in Monterey and San Luis Obispo counties and is currently known from approximately 24 occurrences (CNPS 2013).

CNPS currently lists yellow-flowered eriastrum as occurring to the west of the BSA in the Parkfield quadrangle; however, information for this occurrence is vague and its exact location is currently unavailable. The grassland habitats within the Project site and along the access road do not provide suitable habitat for this species, which prefers habitats with dense shrub and/or tree growth. It has not been detected in any survey effort on the BSA to date. Therefore, the species is unlikely to occur within the Project site and is considered absent from the access road/Hwy 41 improvement areas.

Eastwood's Buckwheat (*Eriogonum eastwoodianum*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 1B.3. Eastwood's buckwheat is an annual herb in the buckwheat family (Polygonaceae) that blooms from May to September. This species occurs on sandy, shale, talus, or barren clay substrate in cismontane woodland, and valley and foothill grassland habitat from 656 to 3281 feet in elevation. This California endemic is known from three USGS quadrangles in Fresno and Monterey counties. Eastwood's buckwheat is potentially threatened by road maintenance and grazing (CNPS 2013).

The nearest record for the species is about 7 miles northwest of the BSA (CNDDB 2013). The shale areas within the Project site provide suitable habitat for this species, although the edaphic habitat along the access road is marginal. The species could occur on the Project site but has a low probability of occurring within the access road/Hwy 41 improvement areas.

Elegant Wild Buckwheat (*Eriogonum elegans*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 4.3. Elegant wild buckwheat is an annual herb in the buckwheat family (Polygonaceae) that blooms from May to November. This species occurs in sandy or gravelly substrate, often in washes, occasionally along roadsides in cismontane woodland, and valley and foothill grassland habitat from 656 to 5003 feet in elevation. The range of this California endemic includes Monterey, Santa Barbara, San Benito, San Luis Obispo, and Ventura counties (CNPS 2013).

The nearest record for the species is about 19 miles west of the BSA (CCH 2013). The washes and cobbly/rocky areas within the Project site provide only marginally suitable habitat for this species, additionally only very marginal habitat is present within the access road/Hwy 41 improvement areas. It has not been detected in the BSA during any survey effort to date. The species is unlikely to occur within the Project site or the access road/Hwy 41 improvement areas.

Cottony Buckwheat (*Eriogonum gossypinum*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 4.2. Cottony buckwheat is a perennial herb in the buckwheat family (Polygonaceae) that blooms from March to September. This species occurs on clay substrate in chenopod scrub, and valley and foothill grassland habitat from 328 to 1804 feet in elevation. The range of this California endemic includes Fresno, Kings, Kern, and San Luis Obispo counties (CNPS 2013).

The nearest record for the species is about 16 miles east of the BSA (CCH 2013). Suitable soils for this species are found throughout much of the Project site and along the access road; therefore, the species could occur within the Project site or the access road/Hwy 41 improvement areas.

Protruding Buckwheat (*Eriogonum nudum* var. *indictum*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 4.2. Protruding buckwheat is a perennial herb in the buckwheat family (Polygonaceae) that blooms from May to October, and sometimes as late as December. This variety occurs in clay and serpentinite substrate in chaparral, chenopod scrub, and cismontane woodland habitat from 492 to 4800 feet in elevation. The range of this California endemic includes Fresno, Kern, Merced, Monterey, San Benito, and San Luis Obispo counties (CNPS 2013).

The nearest record for the species is about 6 miles southeast of the BSA (CCH 2013). The clay-based or serpentine grassland and oak woodland habitats within the Project site are especially suitable for the species, and isolated areas along the access road provide some suitable habitat for this species. Therefore, the species is considered likely to occur within the Project site and possibly occurs within the access road/Hwy 41 improvement areas.

Temblor Buckwheat (*Eriogonum temblorense*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 4.2. Temblor buckwheat is a perennial herb in the buckwheat family (Polygonaceae) that blooms from April to September. This species occurs in barren clay or sandstone substrate in valley and foothill grassland habitat from 492 to 4800 feet in elevation. The range of this California endemic includes Fresno, Kern, Monterey, and San Luis Obispo counties (CNPS 2013).

The nearest record for the species is about 3 miles east of the access road near Highway 41 (Figure 6, CNDDB 2013). The barren shale areas found within the Project site provide suitable habitat for this species, which was detected within similar habitats outside the Project site within the BSA during the 2013 rare plant surveys. However, similar barren shale habitat is lacking from along the access road/Hwy 41 improvement areas. The species is likely to occur within the Project site but has a low probability of occurring within the access road/Hwy 41 improvement areas.

San Benito Poppy (*Eschscholzia hypecoides*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 4.3. San Benito poppy is an annual herb in the poppy family (Papaveraceae) that blooms from March to June. This species occurs in serpentinite clay and rocky areas in chaparral, cismontane woodland, and valley and foothill grassland habitat from 656 to 4921 feet in elevation. The range of this California endemic includes Fresno, Imperial, Mendocino, Monterey, San Benito, and San Luis Obispo counties (CNPS 2013).

The nearest record for the species is about 8 miles northwest of the BSA (CCH 2013). The serpentine clay and/or rocky soils found within the Project site and along access road provide suitable habitat for this species, although the species was not observed during 2012 wetland surveys or habitat mapping. The species could occur within the Project site or the access road/Hwy 41 improvement areas.

Diamond-petaled California Poppy (*Eschscholzia rhombipetala*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 1B.1. Diamond-petaled California poppy is an annual herb in the poppy family (Papaveraceae) that blooms from March to April. This species occurs in alkaline clay substrate in valley and foothill grassland habitat from 0 to 3199 feet in elevation. The range of this California endemic includes Alameda, San Joaquin, and San Luis Obispo counties. It is considered extirpated from Contra Costa and Stanislaus counties (CNPS 2013).

The nearest records for the species occur about 43 miles west of the BSA and also about 40 miles south, in the Carrizo Plain (CNDDB 2013, CCH 2013). This small annual can easily be overlooked and may be present wherever suitable habitat is present, despite large geographic distances from known occurrences. The clay and/or alkaline areas within the Project site and along the access road provide suitable habitat for this species, although the species was not observed during 2012 wetland surveys or habitat mapping. The species could occur within the Project site or the access road/Hwy 41 improvement areas.

Stinkbells (*Fritillaria agrestis*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 4.3. Temblor buckwheat is a perennial bulbiferous herb in the lily family (Liliaceae) that blooms from March to June. This species occurs on clay (sometimes serpentinite) in chaparral, cismontane woodland, pinyon and juniper woodland, and valley and foothill grassland habitat from 33 to 5102 feet in elevation. The range of this California endemic includes alameda, Contra Costa, Fresno, Kern, Mendocino, Merced, Monterey, Mariposa, Placer, Sacramento, Santa Barbara, San Benito, Santa Clara, San Luis Obispo, Stanislaus, Tuolumne, Ventura, and Yuba counties. It is considered extirpated from Santa Cruz and San Mateo counties.

The nearest record for the species is about 8 miles northwest of the BSA (CCH 2013). The clay soils found within the Project site and along the access road provide suitable habitat for this species, although the species was not observed during 2012 wetland surveys or habitat mapping. The species could occur within the Project site or the access road/Hwy 41 improvement areas.

Trumpet-throated Gilia (*Gilia tenuiflora* ssp. *amplaifaucalus*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 4.3. Trumpet-throated gilia is an annual herb in the phlox family (Polemoniaceae) that blooms from March to April. This species occurs on sandy substrate in cismontane woodland and valley and foothill grassland habitat from 1280 to 2953 feet in elevation. The range of this California endemic includes Monterey and San Luis Obispo counties (CNPS 2013).

The nearest record for the species is about 23 miles west of the BSA (CCH 2013). Habitat found within the Project site and access road/Hwy 41 improvement areas is marginal for this species, which prefers sandy substrates absent from these areas. Additionally, this species was not observed during 2012 wetland surveys or habitat mapping. Therefore, the species is unlikely to occur within the Project site or the access road/Hwy 41 improvement areas.

Delicate Bluecup (*Githopsis tenella*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 1B.3. Delicate bluecup is an annual herb in the bellflower family (Campanulaceae) that blooms from May to June. This species occurs on mesic sites in chaparral and cismontane woodland habitat from 3609 to 6234 feet in elevation. The range of this California endemic includes Kern, Tulare, and Tuolumne counties, and possibly the Cholame Hills in Monterey County (CNPS 2013).

The nearest record for this species is a questionable one in the Stockdale Mountain quadrangle approximately 8 miles west of the BSA (CNPS 2013). The grassland and oak woodlands present on the Project site and access road/Hwy 41 improvement areas do not provide suitable habitat for this species, which prefers chaparral and mesic, dense cismontane woodlands. It has not been detected in the BSA during any survey effort to date. The species is considered absent from the Project site and the access road/Hwy 41 improvement areas.

Hogwallow Starfish (*Hesperevax caulescens*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 4.2. Hogwallow starfish is an annual herb in the sunflower family (Asteraceae) that blooms from March to June. This species occurs in mesic, clay sites or shallow vernal pools in valley and foothill grassland habitat from 0 to 1657 feet in elevation. The range of this California endemic includes Alameda, Amador, Butte, Contra Costa, Colusa, Fresno, Glenn, Kern, Merced, Monterey, Sacramento, San Joaquin, San Luis Obispo, Solano, Stanislaus, Sutter, Tehama, and Yolo counties, and is considered extirpated from Napa and San Diego counties.

This species has been detected within the Project site during 2012 wetland surveys and habitat mapping and the 2013 rare plant surveys, and is likely to occur within the access road/Hwy 41 improvement areas.

Forked Hair-leaf (*Lagophylla dichotoma*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 1B.1. Forked hair-leaf is an annual herb in the sunflower family (Asteraceae) that blooms from April to September. This species occurs in cismontane woodland, and valley and foothill grassland habitat, sometimes in clay soil, from 164 to 2493 feet in elevation. The range of this California endemic includes Calaveras, Fresno, Monterey, San Benito, and Stanislaus counties; the species is considered extirpated from Butte and Merced counties (CNPS 2013).

The nearest record for the species is about 23 miles west of the BSA (CCH 2013). The clay soils found within the Project site and along the access road provide suitable habitat for this species, although the species was not observed during 2012 wetland surveys or habitat mapping. The species could occur within the Project site or the access road/Hwy 41 improvement areas.

Pale-yellow Layia (*Layia heterotricha*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 1B.1. Pale-yellow layia is an annual herb in the sunflower family (Asteraceae) that blooms from March to June. It occurs within cismontane woodland, coastal scrub, pinyon and juniper woodland, and valley and foothill grassland habitats on alkaline and clayey soils at elevations of 984 to 5594 feet. The range of this California endemic includes documentation in 57 USGS quadrangles in Fresno, Los Angeles, Monterey, Santa Barbara, and Ventura counties, and is believed extirpated from Kings, Kern, San Benito, and San Luis Obispo counties. Historically, pale-yellow layia was found from Panoche south along the South Coast Range and edge of adjacent interior valleys to the Transverse Ranges, and in the southern Sierra foothills from Lake Isabella to Plieto Ridge.

The nearest record for the species is less than 1 mile east of the access road near Highway 41 (Figure 6, CNDDB 2013). The clay and small areas of alkaline soils found within the Project site and along the access road provide suitable habitat for this species, although the species was not observed during 2012 wetland surveys and habitat mapping. Therefore, the species could occur on the Project site and has a high likelihood of occurrence within the access road/Hwy 41 improvement areas.

Munz's Tidy-tips (*Layia munzii*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 1B.2. Munz's tidy-tips is a Californian endemic, annual herb in the sunflower family (Asteraceae) that blooms from March to April. Preferred habitat for the species is in valley and foothill grassland, and chenopod scrub on alkaline or clay soils at elevations less than 3000 feet. It is distributed across 23 USGS quadrangles in San Luis Obispo, Fresno, and Kern counties. CNDDB (2013) records indicate six occurrences in San Luis Obispo County from 1935 to 1998. Historically, Munz's tidy-tips were found from southeastern Cuyama Valley north to Merced County along the western edge of the San Joaquin Valley and into the Interior South Coast Range (CNDDB 2013, CCH 2013).

The nearest record for the species is about 5 miles southeast of the access road (CNDDB 2013). This species typically prefers strongly alkaline clay soils, which are very rare on the Project site and absent along the access road alignment. The species was not observed during 2012 wetland surveys or habitat mapping. This species is considered unlikely to occur within the Project site and the access road/Hwy 41 improvement areas.

Panoche Peppergrass (*Lepidium jaredii* ssp. *album*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 1B.2. Panoche peppergrass is an annual herb in the mustard family (Brassicaceae) that blooms from February to June. This plant grows alkali bottoms, slopes, washes, and alluvial fans with clay and gypsum-rich soils in valley and foothill grasslands at elevations of 607 to 902 feet (CNDDB 2013, CNPS 2013). Panoche peppergrass is known from Fresno, San Benito, and San Luis Obispo counties.

The nearest record for the species is about 6 miles south of the Project site and 1.5 miles south of the access road (CNDDB 2013). There are very few heavy bare clay and alkaline areas found within the Project site and along the access road that could provide suitable habitat for this species, and it was not observed during 2012 wetland surveys or habitat mapping. The species is considered unlikely to occur within the Project site or the access road/Hwy 41 improvement areas.

Jared's Peppergrass (*Lepidium jaredii* ssp. *jaredii*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 1B.2. Jared's peppergrass is an annual herb in the mustard family (Brassicaceae) that blooms from May to March. This plant grows on alkali and adobe soils in valley and foothill grasslands at elevations of 1099 to 3297 feet. This California endemic is known from near Soda Lake and Devil's Den in Kern and San Luis Obispo counties, respectively (CNPS 2013).

The nearest record for the species is about 11 miles southeast of the BSA (CCH 2013). The clay and alkaline areas found within the Project site provide suitable habitat for this species, although such heavy clays are relatively rare along the access road. The species was not observed during 2012 wetland surveys or habitat mapping. The species could occur within the Project site, but has a low probability of occurrence within the access road/Hwy 41 improvement areas.

Spring Lessingia (*Lessingia tenuis*). Federal Status: None; State Status: Rare; CNPS Rare Plant Rank: 4.3. Spring Lessingia is an annual herb in the sunflower family (Asteraceae) that blooms from May to July. This species occurs in openings in chaparral, cismontane woodland, and lower montane coniferous forest habitats from 984 to 7054 feet in elevation. The range of this California endemic includes Alameda, Kern, Monterey, Santa Barbara, San Benito, Santa Clara, San Luis Obispo, Stanislaus, and Ventura counties (CNPS 2013).

The nearest record for the species is about 37 miles west of the BSA (CCH 2013). The grassland and oak woodland habitats provide marginal habitat for this species, which prefers chaparral, dense cismontane woodlands, and coniferous forests. Additionally, this species and was not observed during 2012 wetland surveys or habitat mapping. Therefore, the species is unlikely to occur within the Project site and is considered absent from the access road/Hwy 41 improvement areas.

Showy Golden Madia (*Madia radiata*). Federal Status: None; State Status: Rare; CNPS Rare Plant Rank: 1B.1. Showy golden madia is an annual herb in the sunflower family (Asteraceae) that blooms from March to May. This species typically occurs in clay or shale soils in cismontane woodland, and valley and foothill grassland habitats from 82 to 2953 feet in elevation. The historical range of this California endemic includes 34 USGS quadrangles in Contra Costa, Fresno, Kings, Kern, Monterey, Santa Barbara, San Benito, San Joaquin, San Luis Obispo, and Stanislaus counties. It now only occurs in 20 USGS quadrangles in Fresno, Kern, San Benito, San Luis Obispo, and Stanislaus counties. Grazing and non-native plants threaten the species (CNPS 2013).

The nearest record for the species is within 1 mile of the access road, where several occurrences are located along Hwy 41, and overlapping the northwest corner of the Project site (Figure 6, CNDDB 2013). The grassland and oak woodlands provide suitable habitat for this species, although the species was not observed during 2012 wetland surveys or habitat mapping. The species is likely to occur within the Project site and could occur within the access road/Hwy 41 improvement areas.

Indian Valley Bush-mallow (*Malacothamnus aboriginum*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 1B.2. Indian Valley bush-mallow is a deciduous shrub in the mallow family (Malvaceae) that blooms from April to October. This plant grows on rocky granitic soils, often in burned areas, within chaparral and cismontane woodland communities at elevations between 492 and 5577 feet (CNPS 2013). Indian Valley bush-mallow is known to occur in Fresno, Monterey, San Benito, and San Mateo counties. The species appears in abundance after fires (CNPS 2013).

The nearest record for the species is about 6.5 miles northeast of the BSA (CNDDB 2013). The washes and cobbly areas found within the Project site and along the access road provide marginal habitat for this species, which typically prefers rocky granitic soils and recent burns. The species, which is often a conspicuous shrub, was not observed during 2012 wetland surveys or habitat mapping. Therefore, the species is unlikely to occur within the Project site or the access road/Hwy 41 improvement areas.

Sylvan Microseris (*Microseris sylvatica*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 4.2. Sylvan microseris is a perennial herb in the sunflower family (Asteraceae) that blooms from March to June. This plant typically grows in chaparral, cismontane woodland, Great Basin scrub, pinyon and juniper woodland, and valley and foothill grassland (sometimes on serpentinite) at elevations between 148 and 4921 feet (CNPS 2013). This California endemic is known to occur in Alameda, Amador, Butte, Contra Costa, Colusa, Fresno, Glenn, Kern, Lassen, Merced, Napa, Nevada, Placer, San Benito, Solano, Stanislaus, Sutter, Tehama, Tulare, Tuolumne, and Yolo counties, and is considered extirpated from Los Angeles and Santa Clara counties.

The nearest record for the species is in the Joaquin Rocks quadrangle, about 26 miles northeast of the BSA; however, information for this occurrence is vague and its exact location is currently unavailable (CNPS 2013). The grasslands and oak woodlands found within the Project site and along the access road provide suitable habitat for this species, although the species was not observed during 2012 wetland surveys or habitat mapping. The species could occur within the Project site and/or the access road/Hwy 41 improvement areas.

San Antonio Hills Monardella (*Monardella antonina* ssp. *antonina*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 3. San Antonio Hills monardella is a perennial rhizomatous herb in the mint family (Lamiaceae) that blooms from June to August. This plant grows in chaparral and cismontane woodland communities at elevations between 1640 and 3281 feet. San Antonio Hills monardella is known to occur in Fresno and Monterey counties. The species may also occur in Alameda, Contra Costa, San Benito, and Santa Clara counties.

The nearest record for the species is in the Smith Mountain quadrangle about 16 miles northeast of the BSA; however, information for this occurrence is vague and its exact location is currently unavailable (CNPS 2013). The grasslands and oak woodlands of the Project site and along the access road do not provide suitable habitat for this species, which prefers chaparral and dense cismontane woodlands. The species is absent from the Project site and access road/Hwy 41 improvement areas.

Adobe Navarretia (*Navarretia nigelliformis* ssp. *nigelliformis*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 4.2. Adobe navarretia is an annual herb in the evening phlox family (Polemoniaceae) that blooms from April to June. This species occurs on vernally mesic clay or sometimes serpentine soils in valley and foothill grassland habitats (sometimes in vernal pools) at elevations from 328 to 3281 feet (CNDDB 2013). This California endemic species is found in Alameda, Butte, Contra Costa, Colusa, Fresno, Kern, Merced, Monterey, Placer, Sutter, and Tulare counties (CNPS 2013).

Navarretia nigelliformis has been detected within the Project site during 2012 wetland surveys and habitat mapping, and the subspecies *Navarretia nigelliformis* ssp. *nigelliformis* may occur within the access road/Hwy 41 improvement areas. Results of the 2013 rare plant surveys will provide definitive determination of which subspecies of *Navarretia nigelliformis* are present within the BSA.

Shining Navarretia (*Navarretia nigelliformis* ssp. *radians*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 1B.2. Shining navarretia is an annual herb in the phlox family (Polemoniaceae) that blooms from May to July. This subspecies occurs in cismontane woodland, valley and foothill grassland, and vernal pool habitats from 249 to 3281 feet in elevation. It is a California endemic documented in 28 USGS quadrangles in Fresno, Merced, Monterey, San Benito, and San Luis Obispo counties. Development, grazing, and competition from non-native plants pose threats to the species (CNPS 2013).

The nearest record for the species is about 1.5 miles southwest of the access road (Figure 6, CNDDB 2013). The grasslands found within the Project site and along the access road provide suitable habitat for this species, particularly in areas that retain water for longer periods of time, such as the clay soils.

Navarretia nigelliformis has been detected within the Project site during 2012 wetland surveys and habitat mapping, and the subspecies *Navarretia nigelliformis* ssp. *radians* may occur within the access road/Hwy 41 improvement areas. Results of the 2013 rare plant surveys will provide definitive determination of which subspecies of *Navarretia nigelliformis* are present within the BSA.

Large-flowered Nemacladus (*Nemacladus secundiflorus* var. *secundiflorus*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 4.3. Large-flowered nemacladus is an annual herb in the bellflower family (Campanulaceae) that blooms from April to June. This variety occurs on gravelly openings in chaparral, and valley and foothill grassland habitats from 656 to 6562 feet in elevation. This California endemic is known from Kern, Monterey, San Luis Obispo, and Tulare counties (CNPS 2013).

The nearest records for the species are within the Cholame quadrangle south of the BSA and within the Parkfield quadrangle northwest of the BSA (CNPS 2013). The dry slopes found within the grasslands of the Project site and along the access road provide only marginally suitable habitat for this species, as there are no favorable gravelly substrates. Additionally, it was not observed during 2012 wetland surveys or habitat mapping. Therefore, the species is unlikely to occur on the Project site or within the access road/Hwy 41 improvement areas.

Chaparral Ragwort (*Senecio aphanactis*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 2.2. Chaparral ragwort is an annual herb in the sunflower family (Asteraceae) that blooms from January to April. This species occurs in chaparral, cismontane woodland, and coastal scrub habitats from 49 to 2625 feet in elevation. This California endemic is known from Alameda, Contra Costa, Fresno, Los Angeles, Merced, Monterey, Orange, Riverside, Santa Barbara, Santa Clara, San Diego, San Luis Obispo, Solano and Ventura counties, and Santa Rosa, Santa Catalina, and Santa Cruz Islands (CNPS 2013).

The nearest record for the species is about 36 miles southwest of the BSA (CCH 2013). The grasslands and oak woodlands provide only marginal habitat for this species, and therefore it is unlikely to occur on the Project site or within the access road/Hwy 41 improvement areas.

Mason's Neststraw (*Stylocline masonii*). Federal Status: None; State Status: None; CNPS Rare Plant Rank: 1B.1. Mason's neststraw is an annual herb in the sunflower family (Asteraceae) that blooms from March to May. This species occurs in sandy washes in chenopod scrub and pinyon and juniper woodland habitats from 328 to 3937 feet in elevation. This California endemic is known from Kern, Los Angeles, Monterey and, San Luis Obispo counties (CNPS 2013).

The nearest record for the species is about 4 miles south of the Project site and 2 miles west of the access road (CNDDB 2013). The washes/drainages that occur within the Project site and access road are not sufficiently sandy to provide suitable habitat for this species, and these are situated in a matrix of grasslands and oak woodlands, not chenopod scrub or pinyon-juniper woodlands. Additionally, this species was not observed during any survey effort within the BSA to date. Therefore, the species is considered absent from the Project site and from within the access road/Hwy 41 improvement areas.

3.6 Special-Status Animal Species

3.6.1 Invertebrates

Longhorn Fairy Shrimp (*Branchinecta longiantenna*). Federal Status: Endangered; State Status: None. The longhorn fairy shrimp is a member of the aquatic crustacean order Anostraca and is endemic to ephemeral fresh water habitats referred to as vernal pools (Eng et al. 1990). Vernal pools form in Mediterranean climates where shallow depressions fill with rainwater during fall and winter, and then dry via the evaporative process in spring. Percolation of the water is prevented by an impervious layer, which may be clay pan, hardpan, or a volcanic stratum.

Pools usually occur as complexes because of the influences of the topography and geology of the area. A dense, interconnected mosaic of small pools or a less dense dispersion of larger pools often represents these complexes. The life history of the shrimp and the variability of their aquatic environment suggest that a metapopulation framework is the best way to understand and depict local populations of this species. Using this approach, populations would be defined from pool complexes and not individual pools.

The present distribution of the longhorn fairy shrimp is currently known to be restricted to vernal pools in a small number of disjunct locales in Contra Costa, Alameda, Merced, Fresno, and San Luis Obispo counties (Sugnet & Associates 1993, USFWS 2007a, H.T. Harvey & Associates 2009 and 2011). The longhorn fairy shrimp occurs in the same general area as the Conservancy fairy shrimp, vernal pool fairy shrimp, and versatile fairy shrimp (*Branchinecta lindahli*), but have only been observed in the same vernal pools as versatile fairy shrimp and vernal pool fairy shrimp (USFWS 2007a, H. T. Harvey & Associates and ESR 2009 and 2011b).

The shrimp play an important role in the community ecology of these pools and are themselves ecologically dependent on seasonal fluctuations in this habitat. Depending upon prevailing weather, longhorn fairy shrimp occur in grassland pools from late December until late April (Eng et al. 1990). Important factors influencing their prevalence and persistence within pools include; the absence or presence of water during specific times of the year, the duration the water persists, and water chemistry that includes salinity levels, conductivity, amount of dissolved solids, and pH (USFWS 1994). The vernal pools that longhorn fairy shrimp inhabit have very low conductivity, total dissolved solids, and alkalinity (Eng et al. 1990).

There are no records for this species within 5 miles of the BSA (CNDDB 2013). Seasonal wetland habitats potentially suitable for this species, however, are present on the site. These habitats are marginal in nature, and are mostly subject to very short hydroperiods and/or are located in drainages where cysts can be scoured from the habitat during flows. Protocol-level wet season surveys conducted in 2011–2012 and 2012–2013 did not detect longhorn fairy shrimp. The results of the dry-season surveys are still pending. It is unlikely the species would occur within the Project site or along the access road/Hwy 41 improvement areas based upon the species current distribution and absence in surveys within the BSA to date.

Vernal Pool Fairy Shrimp (*Branchinecta lynchi*). Federal Status: Threatened; State Status: None. The vernal pool fairy shrimp is a member of the aquatic crustacean order Anostraca and is endemic to ephemeral fresh water habitats referred to as vernal pools in the Central Valley, eastern coastal foothills from Tehama to Riverside counties, and a limited number of sites in the Transverse Range and Santa Rosa Plateau of California (Eng et al. 1990, Sugnet & Associates 1993, USWFS 1994). Vernal pools form in Mediterranean climates where shallow depressions fill with rainwater during fall and winter, and then dry via the evaporative process in spring. Percolation of the water is prevented by an impervious layer, which may be clay pan, hardpan, or a volcanic stratum.

The present distribution of the vernal pool fairy shrimp in California is restricted to vernal pools within a geographic range extending from Shasta County south through the Central Valley into Tulare County, and along the central coast range from northern Solano County south into Ventura County (USFWS 2003b). Although the range of this species is widespread, it only occurs sporadically within local vernal pool complexes (Eng et al. 1990). Vernal pool fairy shrimp may occur with other vernal pool species, but they do not represent the dominant species in such cases (USFWS 1994).

The shrimp play an important role in the community ecology of these pools and are themselves ecologically dependent on seasonal fluctuations in this habitat. Important factors influencing their prevalence and persistence within pools include; the absence or presence of water during specific times of the year, the duration the water persists, and water chemistry that includes salinity levels, conductivity, amount of dissolved solids, and pH (USFWS 1994). The pools that vernal pool fairy shrimp inhabit have low conductivity, total dissolved solids, alkalinity, and chloride levels. These pools are typically clear to tea-colored and occur most commonly in grass or mud bottomed swales or basalt lava flow depressions in unplowed grasslands. Single populations, however, are known to occur in a sandstone rock outcrop and an alkaline vernal pool (USFWS 1994).

The USFWS designated 35 critical habitat units for the vernal pool fairy shrimp from southern Oregon through central California. There is no designated critical habitat in the BSA; the closest critical habitat for vernal pool fairy shrimp is approximately 12 miles west of the access road.

There are no records for this species within 5 miles of the BSA (CNDDB 2013). Seasonal wetland habitat potentially suitable for this species, however, is present on the site. These habitats are marginal in nature, and are mostly subject to very short hydroperiods and/or are located in drainages where cysts can be scoured from the habitat during flows. Protocol-level wet season surveys conducted in 2011–2012 and 2012–2013 did not detect vernal pool fairy shrimp. The results of the dry-season surveys are still pending. It is unlikely the species occurs within the Project site or along the access road/Hwy 41 improvement areas based upon the marginal nature of the habitat and absence in the surveys to date.

3.6.2 Reptile and Amphibian Species

California Tiger Salamander (*Ambystoma californiense*). Federal Status: Threatened; State Status: Threatened. The California tiger salamander has disappeared from a significant portion of its range due to habitat loss attributed to agricultural practices and urbanization, and the introduction of non-native aquatic predators (*e.g.*, bluegill [*Lepomis macrochirus*], largemouth bass [*Micropterus salmoides*], mosquitofish [*Gambusia affinis*], and bullfrogs). The California tiger salamander's current range includes the Great Central Valley of

California and adjacent foothill districts as well as the coastal grasslands from the vicinity of San Francisco Bay south at least to Santa Barbara County (Storer 1925, Morey 1988).

The California tiger salamander is a principally terrestrial species, spending most of its adult life in underground refugia consisting mainly of burrows excavated by small mammals such as California ground squirrels (*Otospermophilus beecheyi*) and Botta's pocket gophers (*Thomomys bottae*). During the winter and spring, adults return to aquatic habitat to breed. Preferred breeding habitat consists of pond environments that persist a minimum of three to four months on an annual basis. Examples of such environments include vernal and ephemeral pools, and human-made ponds. The species will use permanent ponds provided that aquatic vertebrate predators, such as fish or bullfrogs, are not present (Stebbins 1954). While these ponds provide breeding and larval rearing habitat, the surrounding uplands with burrows excavated by small mammals are required for juvenile and adult salamanders. Therefore, a population of California tiger salamanders is typically considered present within an area that contains a breeding pond surrounded by upland habitat with small mammal burrows out to a distance of 1.3 miles (dispersal distance of the species; Searcy and Shaffer 2011) when barriers are absent.

The nearest CNDDB records for the species are approximately 3.1 miles west of the Project site and approximately 3.6 miles west of the nearest sections of the access road (CNDDB 2013). Designated critical habitat for the species is present approximately 5 miles south of the access road (Figures 7 and 8). In April 2012, reconnaissance-level surveys of the Project site were conducted by visiting all potential wetland features focusing on assessing the potential for the habitat conditions to support the California tiger salamander. Biotic habitats adjacent to the Project site and access road were also assessed by viewing these habitats from the Project and reviewing background material prior to and following the fieldwork. Four potential breeding ponds were identified within 1.3 miles northwest of the Project site on adjacent private land (ponds 4–7; Figure 9), one potential breeding pond was identified north of Cottonwood Creek adjacent to the SDA and transmission line right-of-way (pond 9; Figure 9), and four potential breeding ponds were identified immediately adjacent to the access road/Hwy 41 improvement area (ponds 1, 2, 3, and 8; Figure 9).

A proposal to establish a conservation and mitigation bank on property northwest of the Project site (Boxtel 2010) documented the occurrence of salamanders adjacent to the Project site. To date, two larval surveys have been completed at two of the ponds adjacent to the access road/Hwy 41 improvement area (ponds 1 and 2; Figure 9), and no California tiger salamanders, egg masses, or larva have been detected. While the breeding habitat is marginal in these ponds, an additional spring 2013 larval survey is scheduled to provide further information regarding the species occurrence. One of these ponds (pond 3) is a vernal pool adjacent to the proposed access route, and was dry during site surveys. The other pond (pond 8) is an artificially-feed artesian well immediately west of the proposed access road.

All upland habitat on the Project site within 1.3 miles of suitable aquatic habitat is suitable for California tiger salamander. Assuming a maximum dispersal distance of 1.3 miles from suitable aquatic habitat, California tiger salamander could occur on approximately 1242.15 acres in the upland areas of the Project site.

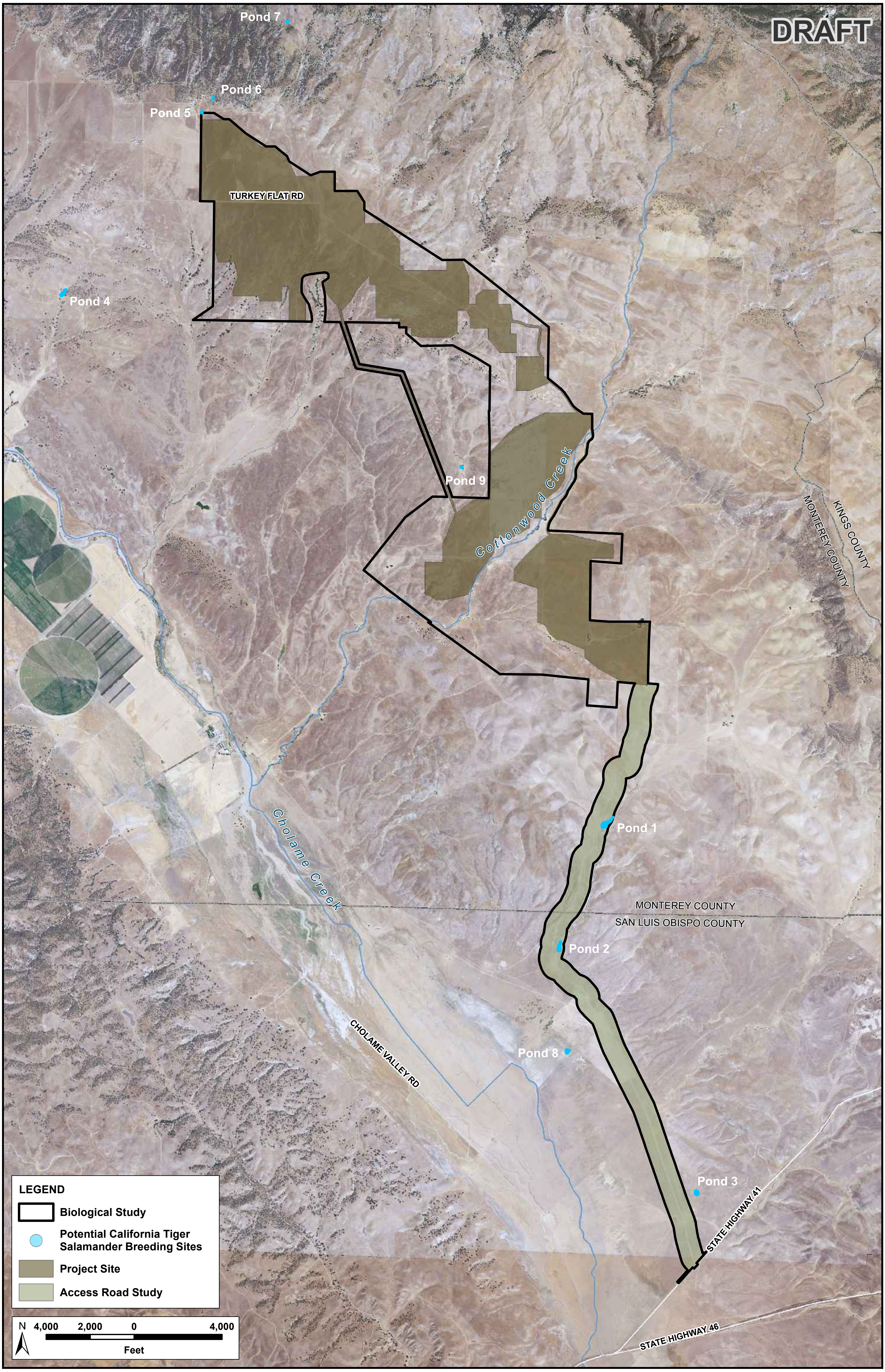

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Figure 9: Potential California Tiger Salamander Breeding Habitat

California Flats Solar Project, California - Interim Biotic Resources Report (3308-02)

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California Red-legged Frog (*Rana draytonii*). Federal Status: Threatened; State Status: Species of Concern. The California red-legged frog is a member of the family Ranidae within the order Anura. Declines in populations of California red-legged frogs across its range are attributed to habitat loss and degradation (USFWS 2000). In the Central Valley of California alone, more than 90% of the historic wetlands have been lost or altered because of agricultural and urban development (Dahl 1990).

California red-legged frogs have been observed in a number of aquatic and terrestrial habitats throughout their historic range. Larvae, juveniles, and adult frogs occur in natural lagoons, dune ponds, pools in or next to streams, streams, marshlands, sag ponds, and springs, as well as human-created stock ponds, secondary and tertiary sewage treatment ponds, wells, canals, golf course ponds, irrigation ponds, sand and gravel pits containing water, and large reservoirs (Storer 1925, Jennings 1988). The key to the presence of California red-legged frogs in these habitats is the presence of perennial, or near perennial, water with adjacent undeveloped upland that is free of barriers to dispersal (such as urban and suburban housing and/or industrial development with large expanses of concrete or asphalt, heavily traveled roads, and large lakes and reservoirs) and the general lack of introduced aquatic predators such as crayfish (*Pacifastacus leniusculus* and *Procambarus clarkii*), bullfrogs, green sunfish, bluegill and centrarchid fishes such as largemouth bass.

In April 2012, reconnaissance-level surveys of the Project site and access road were conducted by visiting all potential wetland features, focusing on assessing the potential to support the California red-legged frog through an evaluation of on-site habitat conditions (H. T. Harvey & Associates 2012b). In August 2012, a California red-legged frog survey according to the Revised Guidance on Site Assessments and Field Surveys for the California Red-legged Frog (USFWS 2005) was conducted.

During the August 2012 survey, California red-legged frogs were observed on the Project site at the southern section of Cottonwood Creek and within an in-stream pool at the southern edge of the northwestern section of the Project site (Figure 10) (H. T. Harvey & Associates 2012b). Suitable aquatic foraging and possible breeding habitat were also identified to be present for the species in several pools of persisting water in the creeks within the Project site and the stock ponds adjacent to the access road, even though California red-legged frogs were not observed at these spots during the survey (H. T. Harvey & Associates 2012b). Larval surveys will be conducted in the spring of 2013 to determine if red-legged frog breeding habitat is present on the Project site or adjacent to the access road, and if present, where this habitat is located. The presence of red-legged frogs is consistent with the reconnaissance-level surveys, which found the aquatic habitats on the Project site consistent with the general type of habitat that supports California red-legged frogs. Specifically, the perennial reaches of the streams on the Project site possess several deep plunge pools that may be used for foraging, cover, and possibly breeding by California red-legged frogs (aquatic breeding habitat). The shallower and intermittent reaches of creeks, seeps, springs, and marshes and adjacent riparian woodland may be used for foraging, cover, and dispersal but not necessarily breeding by California red-legged frogs (aquatic non-breeding habitat).

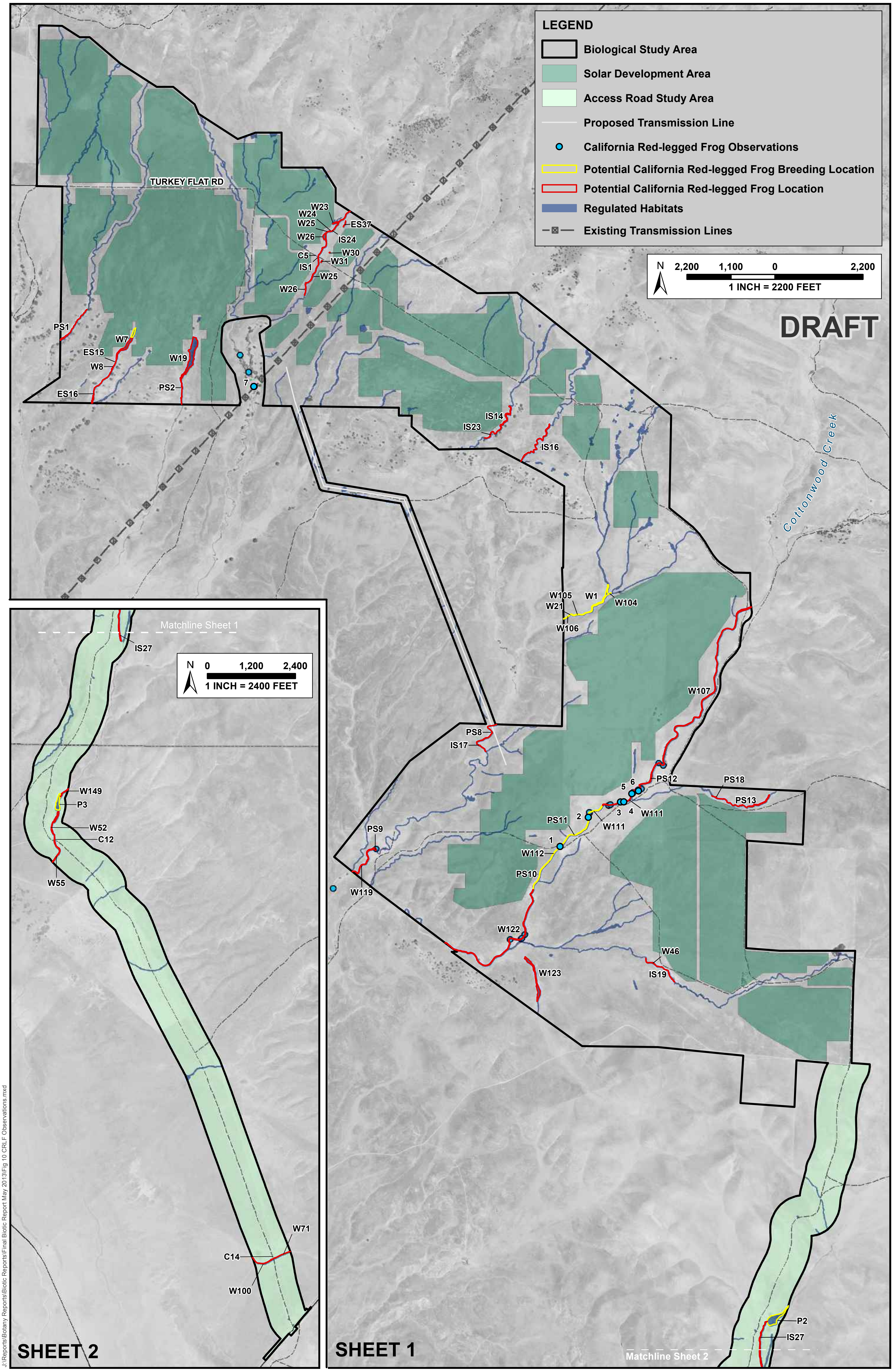

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Figure 10: California Red-legged Frog Observations

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The upland containing woodlands, scrub, and extensive grassland adjacent to the aquatic breeding and non-breeding habitats may be used for foraging, cover, and dispersal between aquatic habitats by California red-legged frogs (upland habitat). The closest CNDDB occurrence of California red-legged frog is approximately 4.9 miles south-southeast of the Project site (1.6 miles east of the intersection of the access road with Hwy 41; CNDDB 2013), and a neighbor reported California red-legged frogs approximately 2 miles northeast of the northwest corner of the Project site (Boxtel 2010). Designated critical habitat for the species is present east of the access road at the junction with Hwy 41.

Blunt-nosed Leopard Lizard (*Gambelia sila*). Federal Status: Endangered; State Status: Endangered. The blunt-nosed leopard lizard (BNLL) is a relatively large (3.5 to 5 inches snout to vent length), carnivorous lizard typically found in sparsely vegetated plains, alkali flats, washes, arroyos, canyon floors, and low foothills in areas of gentle topography and generally does not utilize areas of greater than 30 to 40% slope (Williams and Germano 1992). High-quality habitat is open with scattered shrubs, and contains little grass cover and abundant rodent burrows, which the lizard uses as escape cover, thermal cover, and resting areas (Snow 1972). The BNLL will also use shrubs as hiding and thermal cover. The historic range of the BNLL extended from the San Joaquin Valley and adjacent foothills from Stanislaus County southward to Kern County and the extreme north-east tip of Santa Barbara County (Williams and Germano 1992). The BNLL is now excluded from 94% of its former habitat (Jennings 1995). The current range is primarily the foothills of the western San Joaquin Valley from Merced County, southward to Kern County, the Carrizo Plain of San Luis Obispo County, and a small portion of the foothills of the eastern San Joaquin Valley within Kern County (Jennings 1995).

The BNLL is a diurnal, opportunistic carnivore, capturing and consuming grasshoppers and other insects, small mice, and other lizards (notably the side-blotched lizard). Adults will also cannibalize juvenile BNLL (Williams and Germano 1994). The adult peak activity period ends around July, when adults go underground to enter a period of torpor. Hatchlings emerge around the end of July and are active until early November (Williams and Germano 1994). Thus, there is a temporal separation between the adult and the juvenile peak activity periods. During the active period, BNLL are most active on the surface when temperatures are between 77° F to 95° F (Tollestrup 1976), though they have been observed above ground at temperatures as high as 106° F (CDFG and CIWTG 2008). Known predators of the BNLL include birds of prey, roadrunners, skunks, and snakes (CDFG and CIWTG 2008).

The nearest records for the species are about 12 miles southeast from the Project site and access road (Figure 7) (CNDDB 2013), no BNLL have been detected during the plant and animal surveys. The species is unlikely to occur within the Project site or along the access road/Hwy 41 improvement areas.

Western Spadefoot (*Spea hammondii*). Federal Status: None; State Status: Species of Special Concern. The western spadefoot's range extends from the vicinity of Redding in Shasta County southward into northwestern Baja California, Mexico, and generally includes elevations below 4000 feet. This species is almost completely terrestrial but uses aquatic habitats to breed. Breeding occurs in seasonal pools, and typically occurs between January and May, although the species is capable of reproducing at any time of year if conditions are favorable (Ervin and Cass 2007). Seasonal pools must persist for a minimum of three weeks to allow metamorphosis of tadpoles, and spawning does not occur in dry years when precipitation is not sufficient to create suitable breeding pools. Presence of tadpole predators such as fishes, bullfrogs, and crayfish can render pools unsuitable for this species; many indications exist that the western spadefoot cannot recruit successfully in the presence of these predators (Jennings and Hayes 1994). This species excavates underground burrows for shelter and thermal regulation, and friable soils are an essential component of suitable upland habitat for this species; however, soils in areas occupied by western spadefoots may become significantly less friable when dry. Western spadefoots become active above ground following relatively warm rains in late fall, but surface activity may occur in any month between October and April given sufficient precipitation. The species is predatory, and known prey species taken include crickets, butterflies, beetles, flies, ants, and earthworms (Morey and Gullin 1992).

There are ephemeral wetlands and drainages on the Project site and near the access road (i.e., vernal pool near to the southern part of access road and pools within seasonal stream courses on the Project site) which may support western spadefoot breeding, and the nearest record is approximately 1.1 miles from the access road and 3 miles west of the Project site within the Cholame Valley (Figure 7) (CNDDB 2013). A proposal to establish a conservation and mitigation bank on an adjacent property (Boxtel 2010) notes occurrences of spadefoot toads on the property. It is therefore possible that the species could occur within the Project site and/or the access road/Hwy 41 improvement areas.

Western Pond Turtle (*Actinemys marmorata*). Federal Status: None; State Status: Species of Special Concern. The western pond turtle is a medium-sized brown or olive-colored aquatic turtle, and is found west of the Sacramento-San Joaquin Delta, and south to northern Baja, except in desert areas. The pond turtle is normally found in and along riparian areas, although females have been reported up to 1 mile away from water in search of appropriate nest sites. The preferred habitat for these turtles includes ponds or slow-moving relatively deep water with numerous basking sites (logs, rocks, etc.), food sources (plants, aquatic invertebrates, and carrion), and few predators (raccoons, introduced fishes, and bullfrogs). Juvenile and adult turtles are commonly seen basking in the sun at appropriate sites, although they are extremely wary animals and often dive into the water at any perception of danger.

Suitable aquatic habitat is present for the western pond turtle in pools of persisting water in the creeks within the Project site and in the stock ponds adjacent to the access road. Suitable nesting habitat is present throughout the uplands of the site outside of these aquatic habitats but nests are typically from 600 feet to over ¼ mile away (Rathbun et al. 1992, Holland 1994, Jennings and Hayes 1994, Bury and Germano 2008). HTH biologists detected this species within the stock ponds adjacent to the access road during surveys for California red-legged frog (H. T. Harvey & Associates 2012b) and Sage Associates (O. Sage, pers. comm.) has detected this species in drainages within the Project site.

Coast Horned Lizard (*Phrynsosoma blainvillii*). Federal Status: None; State Status: Species of Special Concern. In California, this species occurs from the Transverse Ranges to the Mexican border west of the deserts, at elevations between sea level and approximately 7000 feet (Jennings and Hayes 1994). Coast horned lizards generally emerge from hibernation in late March and are active above ground until July, after which time most adults aestivate. The species reappears briefly during August, disappearing into overwintering sites by early October. Coast horned lizards do not voluntarily expose themselves to temperatures exceeding 104° F for extended periods, and this limitation may be among the factors limiting the species' distribution to areas west of the deserts in southern California.

The coast horned lizard occupies a wide variety of habitats, including coastal sage scrub, annual grassland, chaparral, oak woodland, riparian woodland, and coniferous forest. Key elements of such habitats include loose, fine soils with a high sand fraction; an abundance of native ants or other insects for forage; open areas with limited overstory for basking; and low, but relatively dense shrubs for refuge. In foothill and mountain habitats covered with dense vegetation, coast horned lizards are largely restricted to areas with inclusions of open microhabitat (Jennings and Hayes 1994).

There is a record for the species less than 3 miles south of the Project site and 2 miles west of the access road (Figure 7) (CNDDB 2013). The Project site is moderately suitable habitat for this species and there are records from the Project vicinity. The species may occur within the Project site and/or along the access road/Hwy 41 improvement areas.

Silvery Legless Lizard (*Anniella pulchra pulchra*). Federal Status: None; State Status: Species of Special Concern. The silvery legless lizard occurs in areas of sparse vegetative cover within coastal sage scrub, chaparral, pine-oak woodlands, riparian areas, and occasionally desert scrub habitats (Stebbins 2003). Loose, moist soil is an important habitat component for this fossorial species (Stebbins 2003; CDFG and CIWTG 2008), which tunnels through the soil and under leaf litter consuming small insects, beetles, termites, and spiders around the bases of shrubs (Californiaherps.com 2012). The range in which silvery legless lizards are commonly found includes the coastal ranges from Contra Costa County south to the Mexican border. Throughout the rest of their range, including the floor of the San Joaquin Valley from San Joaquin County south, the west slope of the southern Sierra, the Tehachapi Mountains west of the Mojave Desert, and the mountains of southern California, occurrences of the lizard are scattered and isolated (CDFG and CIWTG 2008).

The nearest records for the species are about 8 miles south of the Project site and 3 miles south of the access road (Figure 7) (CNDDB 2013). The Project site is only moderately suitable habitat for this species. The species is unlikely to occur within the Project site or along the access road/Hwy 41 improvement areas.

San Joaquin Coachwhip (*Masticophis flagellum ruddocki*). Federal Status: None; State Status: Species of Special Concern. The San Joaquin coachwhip (synonymous with San Joaquin whipsnake) subspecies is endemic to California, and the known range extends from the Sacramento Valley southward to the Grapevine in the Kern County portion of the San Joaquin Valley and westward into the inner South Coast Ranges (Jennings and Hayes 1994). The known elevational range of the San Joaquin coachwhip extends from approximately 66 feet to around 2950 feet in the Temblor Range.

In the western San Joaquin Valley, this species occurs in valley grassland and saltbush scrub associations with little or no tree cover. It is known to climb shrubs such as saltbush (*Atriplex* spp.) for viewing prey and potential predators (Cunningham 1955). The San Joaquin coachwhip requires one or more mammal associates, because it uses burrows for refuge and probably for oviposition sites, and small mammals are included within its diet.

The CNDDB (2013) lists one occurrence of San Joaquin coachwhip approximately 11 miles and 7.5 miles southwest of the Project site and southern end of the access road, respectively, and one occurrence approximately 13 miles to the northeast of the Project site (Figure 7). Moderately suitable habitat exists for this species within the Project site and along the access road/Hwy 41 improvement areas, and it is possible that the species occurs within these areas.

3.6.3 Avian Species

California Condor (*Gymnogyps californianus*). Federal Status: Endangered; State Status: Endangered, Fully Protected. The California condor is one of three vulture species that occur in the United States. It is a very large soaring bird with a wingspan of approximately 10 feet. They are distinguished from other vultures and raptors by their large size and bold white wing patches. Condors are highly dependent on terrain when moving long distances, preferring to follow mountains, ridgelines, gorges, and hillsides, which create updrafts that provide favorable soaring conditions. Although they may be found in a variety of habitats, including cliff/outcrop nesting sites within dense chaparral or forest, they forage mostly in open, foothill grassland and oak savannah habitats (Kiff et al. 1996, Snyder and Schmitt 2002). Individuals may wander widely throughout the species' range in the state. Like most vultures, condors are gregarious and often travel in groups, especially outside of the breeding season.

Condors nest in caves, in rock crevices, behind rock slabs, or on large ledges on high sandstone cliffs. Initial courtship and nest-selection activities typically occur in January and February, with egg-laying occurring from late January through early April (Snyder and Schmitt 2002). Time to hatch averages about 57 days and chicks typically fledge five and a half to six months later, but then remain dependent on their parents for at least another six months. Because of this lengthy nesting cycle, condors typically nest only every other year.

Historically, condors fed on the carcasses of mule deer (*Odocoileus hemionus*), Tule elk (*Cervus canadensis nannodes*), pronghorn (*Antilocapra americana*), and whales (Order Cetacea) and California sea lions (*Zalophus californianus*) along the Pacific Coast (Kiff et al. 1996). Currently, the California condor's diet in central California consists of mammal carcasses of various sizes, ranging from California ground squirrels to elk, mule deer, and domestic livestock (Snyder and Schmitt 2002).

In the early nineteenth century, the California condor occurred along the Pacific Coast from northern Baja California to southern British Columbia, with inland reports from Arizona, Nevada, Utah, Wyoming, Colorado, Idaho, Montana, and southern Alberta (Kiff et al. 1996, Snyder and Schmitt 2002). In California, California condors historically occurred along a wishbone-shaped area encompassing 10 counties in the southern and central parts of the state—San Benito, Monterey, San Luis Obispo, Santa Barbara, Kern, Ventura, Tulare, Fresno, Kings, and Los Angeles counties—and along the northern Coast Ranges and coastal northern California to the Oregon border (Kiff et al. 1996). By the mid-twentieth century, the species range was confined to southern California.

After continuous population declines, the last of the wild California condors were removed from the wild in the late 1980s and brought into captivity, with the hope of eventually re-releasing condors back into the wild. Since 1992, condors have been reintroduced in California at Big Sur in the Ventana Wilderness Sanctuary, in the Sespe Condor Sanctuary, and in Los Padres National Forest in Santa Barbara, Ventura, and Kern Counties, as well as at sites in Arizona and Baja California, Mexico (Kiff et al. 1996, Snyder and Schmitt 2002). As of October 2012, the current wild population included 127 condors in California, 77 in Arizona, and 28 in Baja California (USFWS 2012).

The Project site and access road lie within the historic and current range of the California condor, and most of the 2562-acre Project site currently provides potentially suitable foraging habitat for the species. The mountain ranges bordering the Project site provide conditions favorable to condor movement, and mortality of California ground squirrels, mule deer, feral pig, pronghorn antelope, and other wildlife provides suitable foraging opportunities within the Project site and along the access road/Hwy 41 improvement areas.

The condor release locations closest to the Project are the Bitter Creek National Wildlife Refuge, approximately 80 miles southeast, and Pinnacles National Monument, approximately 62 miles north of the Project site. The Project site and access road do not occur within any designated critical habitat for California condors, the nearest being the East Unit of the Hi Mountain-Beartrap Condor Area approximately 35 miles south of the Project (USFWS 1977).

The CNDDB (2013) is not an effective source of information for California condors (containing only 11 records for the entire state); however, eBird (National Audubon Society [NAS] and Cornell Lab of Ornithology [CLO] 2012) records recent sightings in several locations within 20–50 miles of the Project site. More importantly, recent global positioning system (GPS) daytime tracking data indicate that captive-released California condors periodically occur in the mountain ranges that border the Project site to the west, north, and east, and condors were recorded in the vicinity of the Project site in 2005 and 2006 (California Condor Wind Energy Work Group 2011, USFWS 2011a). Given the current distribution of condors, condors are unlikely to forage within the Project site and along the access road/Hwy 41 improvement areas. The solar generation facilities are not planned in an area that is expected to bisect a high-use flight path for the species. Although there is suitable roosting and nesting habitat for California condors in the surrounding mountain ranges, the Project site contains no such habitat and other habitat features favorable to resident birds (i.e., large cavity filled nest trees, caves, or rocky outcrops) are limited on the site.

Swainson's Hawk (*Buteo swainsoni*). Federal Status: Species of Concern; State Status: Threatened. The Swainson's hawk is a medium-sized soaring raptor of open habitats, with a wingspan of approximately 4 feet. Throughout their range in North America, Swainson's hawks favor foraging in open grassland, rangeland, prairie, and shrubsteppe habitats; however, over the past several decades they have grown increasingly dependent on agricultural environments in many areas (Estep 1989, Bechard et al. 2010). Irrigated and dryland hayfields, especially alfalfa fields, fallow fields, and irrigated pastures are particularly important. Swainson's hawk home ranges in the Central Valley of California typically encompass a diverse array of favored agricultural, pasture, and fallow field habitats, which the birds use variably during the breeding season as prey availability and accessibility vary with crop growth and harvest schedules (Estep 1989, 2007, 2008, 2009). Preferred prey items include voles (*Microtus* spp.), gophers, and small to medium-sized birds, but Swainson's hawks are also highly insectivorous (favoring grasshoppers), especially outside of the breeding season (Johnson et al. 1987, Bechard et al. 2010).

Swainson's hawks build stick nests in a wide variety of trees ranging from moderate-stature junipers (*Juniperus* spp.), willows (*Salix* spp.) and oaks (*Quercus* spp.) to tall cottonwoods (*Populus* spp.) and sycamores (*Platanus racemosa*), and including many types of non-native trees planted in residential and agricultural environments (Bloom 1980, Estep 1989, Bechard et al. 2010). They also nest on utility poles, but only very rarely on rocky substrates (Bechard et al. 2010). In the Central Valley, riparian and oak woodlands represent a key nesting habitat for Swainson's hawks, because they frequently provide suitable nesting substrates adjacent to the open grassland and agricultural habitats favored for foraging (Bloom 1980, Schlorff and Bloom 1984, Estep 1989). A variety of other isolated trees and small woodlots also may provide suitable nesting substrates, with proximity to high-quality grassland and agricultural foraging habitats the key siting factor.

Most Swainson's hawks are highly migratory and vacate North America to winter in the pampas region of central Argentina (Bildstein 2006); however, central California supports a small but regular wintering population and some breeders from this region only migrate to western Mexico for the winter (Herzog 1996, Bradbury 2009). Because of their long-distance migration behavior, the Swainson's hawk nesting season is compressed compared to less-migratory raptors. In the western United States, migrants typically return to their breeding grounds from early March through mid-April (Bechard et al. 2010). In California, most clutches are completed by mid-April, fledging typically occurs from July through mid-August, and then fledglings typically remain dependent on their parents and stay within 0.6–1.2 miles of the nesting area for an additional three to four weeks (Estep 1989). After that, they begin dispersing farther afield and typically aggregate with other juveniles and subadults in groups of up to several hundred individuals in suitable foraging habitats and pre-migration staging areas (Johnson et al. 1987). Swainson's hawks typically depart their breeding grounds to head south for the winter from mid-August through mid-October (Woodbridge et al. 1995, Fuller et al. 1998, Hoffman and Smith 2003, Kochert et al. 2011). Thus, for monitoring and nest-protection purposes, the Swainson's hawk breeding season in California extends from 1 March through 15 September, but nesting often is completed by mid-August (CDFG 1994, 2010).

The Swainson's hawk has been listed as a threatened species in California since 1983, because their breeding population in the state declined by as much as 90% over the course of the previous century due to agricultural and urban expansion and possibly other factors such as contaminants (Bloom 1980, Risebrough et al. 1989, CDFG 1988). The CDFW established the Swainson's Hawk Technical Advisory Committee (SWHTAC) in 1989 to address management, research, and land-use issues affecting the species. The Swainson's hawk is a focal species in the California Partner's in Flight Riparian Bird Conservation Plan (Woodbridge 1998).

Historically, Swainson's hawks nested throughout much of California in foothill and lowland areas where riparian woodlands and oak savannahs provided key nesting substrates and adjacent or intermixed native bunchgrass prairies were used as foraging habitat (Bloom 1980). Currently, however, only a fraction of once-prevalent native prairie and suitable riparian habitats remain in the state and nesting Swainson's hawks currently are restricted to a much smaller overall range (Bradbury 2009). Repeated inventories conducted since the late 1980s have suggested that conservation efforts may have helped the species rebound in some areas. Alternatively, recent increases may reflect a combination of continuing, successful adjustment over time by the hawks to use of agricultural fields as primary foraging habitats, and a positive response to reduced mortality on the wintering grounds (Goldstein et al. 1999, Briggs 2007).

Because of their status as a threatened species and preference for nesting and foraging in open, lowland habitats that often are the focus of urban, industrial, incompatible agricultural (i.e., many row crops such as corn, but especially orchards and vineyards; Estep 1989, Babcock 1993), and increasing renewable-energy development, Swainson's hawks garner considerable conservation attention and frequently are a prominent regulatory concern under CEQA. For this reason, the CDFW has promulgated standards for quantifying and mitigating risks to Swainson's hawks from various development activities (CDFG 1994, California Energy Commission [CEC] and CDFG 2010).

Most Swainson's hawks nesting in California now rely primarily on agricultural habitats, especially irrigated hayfields, pastures, and grazed annual grasslands for sustenance, and they nest in a broad range of isolated, native and non-native trees interspersed within such landscapes (Estep 1989, 2007; Woodbridge 1991; England et al. 1995; LSA Associates 2007). In the middle Central Valley, they also often nest in urban and residential settings where planted trees provide nesting substrates close to suitable foraging habitats (England et al. 1995). Importantly, this translates to most nest sites and home ranges being located on or encompassing primarily private lands, which renders the species particularly susceptible to changes in agricultural activity and other development patterns (Estep 1989, LSA Associates 2007).

The nearest nesting records for the species reported in the CNDDB (2013) are located more than 20 miles northeast and southeast of the Project site in the western San Joaquin Valley, and the nearest sighting records in eBird (NAS and CLO 2012) are all more than 10 miles away to the southwest, southeast, and east. To date, HTH biologists have not observed any Swainson's hawks on the Project site or along the access road; however, surveys have not yet been conducted during the breeding season. Roberson (2002) reported that a few pairs nested around Cholame Valley until the mid-1970s, but since then there has been no confirmed nesting of Swainson's hawks in Monterey County, with most nesting in the general region shifted to the agricultural habitats of the Central Valley. There has, however, been one Swainson's hawk nesting territory active just west of Shandon in San Luis Obispo County for the past several years, roughly 13 miles southwest of the Project site and 7 miles from the beginning of the access road (Edell, pers. comm.). This activity and another nest in southern San Luis Obispo County represent a recent return of Swainson's hawk nesting activity to San Luis Obispo County (Edell, pers. comm.). Moderately suitable nesting habitat remains in the riparian and oak woodland portions of the Project site and access road, and the grasslands and nearby agricultural habitats (alfalfa) could again provide potential foraging habitat. Therefore, although the Project site lies peripheral to the current, primary breeding range in California, Swainson's hawks are unlikely to nest or forage within the Project site and the access road/Hwy 41 improvement areas.

White-tailed Kite (*Elanus leucurus*). Federal Status: None; State Status: Fully Protected. The white-tailed kite is a distinctive, medium-sized raptor of open habitats, with a wingspan of about 39 inches and white and gray plumage. In western North America, the white-tailed kite occurs sparsely from southwestern Washington through western Oregon, commonly throughout western California, and south into northern Baja California (Dunk 1995). In California, white-tailed kites can be found in the Central Valley and along the coast, in grasslands, agricultural fields, cismontane woodlands, riparian habitats, pastures, and other open habitats (Erichsen et al. 1996, Hunting 2004, Polite et al. 2005). White-tailed kites are year-round residents of the state, establishing breeding territories that encompass open expanses of relatively undisturbed grassland and marshland habitat that supports healthy prey populations (Dixon et al. 1957, Dunk 1995). White-tailed kites nest in a wide variety of snags, shrubs, and trees, in both dense stands of vegetation and isolated features (Dunk 1995). The presence of white-tailed kites depends on the availability of favored prey, particularly voles; prey base may be the most important factor in determining habitat quality for the species (Dunk and Cooper 1994, Skonieczny and Dunk 1997). In agricultural areas, alfalfa and sugarbeets support the highest vole populations, and ungrazed habitats support higher vole populations than grazed lands (Moore 2000). White-tailed kites hunt primarily from the air, almost exclusively by hovering 15–75 feet above the ground and then dropping on targeted prey (Dunk 1995). Breeding birds typically spend the winter in the same area as where they nest; however, limited movements may occur and white-tailed kites may become nomadic during periods of low vole (*Microtus* spp.) abundance (Stendell 1972, Dunk and Cooper 1994, Dunk 1995).

Established breeding pairs typically remain together year-round. In California, nest building may begin in January, egg-laying typically begins from early February through mid-to-late March, and peak nesting activity occurs from May through August (Dixon et al. 1957, Dunk 1995, Polite et al. 2005). Chicks fledge in about a month and then remain dependent on their parents for another one to two months before dispersing (Dunk 1995). In California, white-tailed kites may raise two broods per breeding season, often initiating construction of second nest before the first brood has fledged (Peters and Peters 2005). For monitoring and nest-protection purposes, the primary white-tailed kite breeding season in California extends from 15 January through 31 August, but some nests may remain active into September.

White-tailed kite populations declined substantially during the early twentieth century due to factors such as habitat loss, shooting, and possibly egg collecting, and the species was extirpated from many portions of its former range throughout the lowlands of California (Pickwell 1930, Waian and Stendell 1970). The species has rebounded considerably since then (Dixon et al. 1957, Fry 1966, Eisenmann 1971) and is once again common throughout most lowland areas of the state, especially in the Central Valley and along the coast, including an estimated 50 nesting pairs in Monterey County as of the early 2000s (Roberson 2002).

The CNDDB (2013) lists only three nesting records for white-tailed kites in Monterey County and no records within 30 miles of the Project site. To date, HTH biologists have not observed any kites within the BSA; however, nesting-season surveys have yet to be conducted. The BSA contains suitable nesting and foraging habitat and white-tailed kites could nest and/ or forage within the Project site or along the access road/Hwy 41 improvement areas. Several occurrence records from Cholame Valley and other nearby areas are reported in eBird (NAS and CLO 2012), with one 2007 record from within 2 miles of the Project site. Roberson (2002) also reported that the species "occurs with some regularity in Cholame Valley and may nest there, as well."

Golden Eagle (*Aquila chrysaetos*). Federal Status: Species of Concern; State Status: Fully Protected. Golden eagles are large, long-lived birds of prey that nest throughout much of California in suitable habitats, and as breeders are largely sedentary in this region (Thelander 1974, Zeiner et al. 1990, Kochert et al. 2002, Peters and Peters 2005). The species ranges from sea level up to 11,500 feet (Kochert et al. 2002). Occasional migrants and winter visitors, and wandering non-breeders, occur throughout the state wherever relatively undisturbed and suitable foraging habitat occurs. Throughout most of their range, golden eagles nest on cliffs and other elevated rocky substrates, building stick nests that often grow very large from continuous use and augmentation over many years. In other areas, they nest in large, mature conifers, and in central California they frequently nest in large, mature oak and eucalyptus trees. Nesting occurs in association with open-country grassland, prairie, savanna, shrubsteppe, desert, and montane habitats. Breeding occurs from January through August, but individual pairs often do not breed every year. Egg-laying to fledging typically takes three and a half to four months, but fledglings may continue to rely on parental care for up to another six months (longer for resident birds than for migrants; Kochert et al. 2002). For monitoring and nest-protection purposes, the golden eagle breeding season in California extends from 15 January through 31 August.

Golden eagles forage by soaring, surprising prey while in low contouring flight, and sighting prey from perches and striking rapidly from perch to ground. Although low, contouring flight is the most common hunting method in open habitats, hunting from perches may be energetically favored where suitable perches are available (Kochert et al. 2002). Prey selection varies by region, but primary constituents include black-tailed jackrabbits (*Lepus californicus*), other hares and rabbits (*Sylvilagus* spp.), ground squirrels (e.g., *Spermophilus* *beecheyi* in California), marmots (*Marmota* spp.), and a variety of other medium to large birds and mammals. Similar to many birds of prey, golden eagles also often rely on scavenging to supplement their diet, especially during winter.

A 1974 study of nesting golden eagles estimated that 500 pairs were present in California (Thelander 1974). No more recent statewide population estimates currently are available; however, the USFWS (2009) recently estimated population sizes by Bird Conservation Regions (BCRs). Those estimates included 26 breeding pairs and 108 individuals in the California portion of BCR 5 (northwestern "rain forests"), 21 breeding pairs and 84 individuals in the Sierra Nevada, 235 breeding pairs and 960 individuals in BCR 32 (most of the Coast Ranges, Central Valley, and south coast), and unknown numbers in the northeastern Great Basin and southeastern Mojave desert portions of the state. Nesting populations have declined markedly in San Diego County since the 1950s due to human disturbance and encroaching urban development (Scott 1985;), whereas the nesting population in the Diablo Range of central California currently appears relatively stable despite substantial mortality at the Altamont Pass Wind Resource Area (Hunt 2002, Hunt and Hunt 2006). The status of populations in the rest of the state is largely unknown. Breeding Bird Survey data for California suggest a slight decline statewide since 1966, but are not considered a reliable indicator for this species (Sauer et al. 2011). Christmas Bird Count data for California indicate a marked increase in winter abundance from 1966 through the mid-1990s, followed by a sharp decline through 2007 but then an increasing pattern since then (NAS 2011). At a broader geographic scale, there is concern over possible long-term declines across much of the species' western range (Kochert and Steenhof 2002, Farmer et al. 2008, USFWS 2009).

Most of the 2562-acre Project site, the access road, and much of the rest of Cholame Valley currently provide suitable foraging habitat for golden eagles. The montane and foothill topography bordering the Project site provides favorable flight conditions for eagles, which rely on wind-driven updrafts for energy-saving lift. California ground squirrels, black-tailed jackrabbits (*Lepus californicus*), feral pigs, and other mammals and birds occur in the Project site and access road study areas and provide suitable prey for foraging eagles. The Valley oaks (*Quercus lobata*), gray pines (*Pinus sabiniana*), and black cottonwoods (*Populus trichocarpa*) on the Project site, throughout Cholame Valley, and in neighboring foothills provide nesting substrates, and other nesting areas occur on cliff substrates in the nearby mountains.

HTH biologists are conducting intensive aerial and ground-based surveys on and around the Project site during the 2013 nesting season to better quantify golden eagle use of the Project site, the access road area, and within 10 miles of the Project site, per USFWS (2009, 2013) recommendations for characterizing the local-area nesting population. Prior to this work, eBird (NAS and CLO 2012) confirmed regular sightings of golden eagles in Cholame Valley and HTH biologists had observed foraging golden eagles on the Project site and west and north of the access road in the Project vicinity on several occasions during initial reconnaissance, wetland, and burrowing animal surveys. There were no previous CNDDB (2013) nesting records for golden eagles within a 20-mile radius of the Project site, with the closest located approximately 22 miles to the southwest. Breeding bird atlas results for Monterey County (Roberson and Tenney 1993) indicated several confirmed and probable breeding locations around the periphery of Cholame Valley and the

Project site, however, and golden eagles are a known breeder in the mountains of this region and farther south (Thelander 1974, Latta 2010, H. T. Harvey and Associates 2012c).

Aerial survey work conducted within a 10-mile radius of the Project site during March and May 2013, and additional ground surveys conducted within the Project area, confirmed 12 active (eggs laid in nest) golden eagle nests. None of the active nests was located within the BSA; however, one was located within 0.4 miles of the Project site; four were located within ≤2 miles of the Project site or access road; and four others were located within 5 miles of the Project site or access road.

In central California, where most adult eagles are non-migratory permanent residents, territory distributions tend to remain fairly stable, and established breeding pairs tend to remain in the vicinity of their nesting territories year-round to maintain a hold on their domain (Hunt 2002). In general, golden eagles show high breeding-site fidelity as established breeders and even in non-breeding years, established breeding pairs often make discernible improvements to their nests (e.g., adding bits of greenery or refurbishing nest margins), especially early in the year as part of their pair-bonding rituals (Watson 2010). Accordingly, repeated surveys to locate pairs of adult eagles that appear associated with obvious but currently inactive eagle nests can reveal much about the probable distribution of territories, even if some pairs are not actively nesting. To the trained eye, eagle nests often can be easily distinguished from those of other raptors by their location on the substrate, their overall size, and the types and sizes of sticks used in their construction. This is less true, however, where trees of modest size and durability (e.g., oaks, cottonwoods, and gray pines) are commonly used as nest substrates (the case throughout much of central California), because the nature of the substrate often limits the size and durability of the nest. During the 2013 surveys, the documented active nests ranged from easily discernible to highly cryptic. Similarly, many of the documented inactive nests with eagles nearby were easily discerned and identified as eagle nests, while for others the association was strictly circumstantial.

In addition to the 12 pairs tending active nests detected in 2013, six other pairs of adult eagles (meaning a smaller male and larger female occurring together in close proximity on multiple occasions), for which a probable nest site was identified, were detected. These included one pair and nest site located within the BSA, and at least two or possibly three other pairs and nest sites located within 0.7 mile of the Project site. One single adult eagle that was building a new nest (confirmed incomplete later in the season), with a possible inactive alternate nest located nearby, and at least another subadult eagle in the area, was detected. In addition, two other pairs and four other single adult eagles were recorded in other disparate areas for which no nest sites were detected.

In summary, a minimum of 20 pairs resided within a 10-mi radius of the Project site during the 2013 breeding season, with several more probable territory areas occupied by at least one breeding-age adult, and two or three more possible, former nesting areas not occupied in 2013. Moreover, during the 2013 nesting season at least seven and possibly eight pairs of breeding-age eagles occurred in the general area in apparent association with a known or probable nest site, with most of these pairs confirmed on, or in close proximity to, the Project area on multiple occasions. Available data suggests that adult eagles most often forage within 1–2 miles of their nest site while provisioning chicks (Marzluff et al. 1997, Hunt 2002), they may easily range several miles from their nest sites in search of prey, and their breeding season home ranges often extend across several to 20 square miles or more depending on the habitat (Kochert et al. 2002). Therefore, it is highly likely that the foraging home ranges of several breeding pairs overlap the Project site and access road/Hwy 41 improvement areas.

Bald Eagle (*Haliaeetus leucocephalus*). Federal Status: Species of Concern; State Status: Endangered, Fully Protected. Bald eagles are large, long lived birds of prey that nest across much of northern California and portions of central and southern California where large lakes, reservoirs, and rivers support favored fish and waterfowl prey and large trees provide suitable nest substrates (Polite et al. 1999; Peters and Peters 2005; CDFW 2013). Most breeding sites in California are located in mountain and foothill forests and woodlands near aquatic habitats, but nesting also occurs in other locations such as on the Channel Islands (CDFW 2013). On rare occasions, bald eagles may nest in habitats devoid of aquatic resources and rely on other prey such as ground squirrels and rabbits (e.g., Boal et al. 2006). Throughout their range, bald eagles nest primarily in large conifers capable of supporting their substantial stick nests, which may grow very large from continuous use and augmentation over many years, but they also frequently build their nests atop rocky outcrops (Buehler 2000). In California, breeding occurs from January through August. Egg-laying to fledging typically takes three and a half to four months, but fledglings may continue to rely on parental care for several more weeks (Buehler 2000).

Bald eagles may take a variety of prey animals, but favor fish, waterfowl, other waterbirds, and aquatic mammals located in shallow water, which they take primarily by swooping down from nearby, elevated hunting perches in trees or snags (Buehler 2000). Especially during winter, bald eagles also routinely scavenge for carrion, including especially dead and dying salmon but also livestock remains and birthing remnants, and in some areas frequently can be found hunting ground squirrels and rabbits along with other raptor species.

Bald eagles that breed in California are largely non-migratory. During winter, the state attracts additional bald eagles that migrate south from northern latitudes. Most such eagles concentrate for the winter in the Klamath Basin along the Oregon border; however, other wintering birds may be found at a variety of other lakes, reservoirs, and river areas across much of the state (CDFW 2013). For example, 40–50 eagles typically winter around Lake Nacimiento and Lake San Antonio 25–30 miles west of the Project site (Roberson 2002).

Bald eagles declined markedly due to the adverse consequences of widespread DDT use and, as a result, were listed as federally endangered in 1967 and state endangered in California in 1971. Following a substantial post-DDT recovery throughout most of the species' former range, including in California, the USFWS removed the bald eagle from the federal list of threatened and endangered species in 2007; however, bald eagles are still listed as endangered under CESA. Between 1977 and 1997, the distribution of nesting bald eagles in California increased from 8 to 28 counties (CDFW 2013), and between 1993 and 2012 the number of nesting territories known in the central coast region increased from one to 29 (Ventana Wildlife Society

2012). As of the 2012 nesting season, Monterey County contained six, known occupied nesting territories and San Luis Obispo County contained nine occupied territories (Ventana Wildlife Society 2012).

During February 2013, HTH biologists observed a pair of adult bald eagles on one occasion and a single adult on a second occasion perched in trees along a riparian corridor immediately adjacent to the northern part of the Project site, to the west of the existing high voltage lines and to the south of Turkey Flat Road. In addition, Roberson (2002) reported that foraging bald eagles occur annually during winter in Cholame Valley and eBird (NAS and CLO 2012) reports several, recent winter and early spring sightings in the valley. Prior to 2013, the closest known nesting territories were located 25–30 miles west of the Project site around Lake Nacimiento (Ventana Wildlife Society 2012). Along with confirming golden eagles in the Project area, the initial aerial survey conducted by HTH biologists during March 2013 confirmed an active bald eagle nest approximately 4.1 miles southwest of the Project site. At least two subadult bald eagles also have been seen near this area on several occasions. At the same time, the initial aerial survey revealed a second pair of adults approximately 4 miles northwest of the Project site, with no active nest apparent at this time but a possible inactive nest located nearby. Thus, although it is rare for bald eagles to nest and forage in areas that are largely devoid of aquatic resources (although there are limited waterfowl resources in some of the nearby livestock ponds and occasionally on some of the perennial stretches of Cottonwood Creek), it appears that the ground squirrel, jackrabbit, and possibly feral pig populations on the Project site support foraging by bald eagles.

Northern Harrier (*Circus cyaneus*). Federal Status: None; State Status: Species of Special Concern (breeding). The northern harrier is a distinctive, medium-sized raptor commonly found in open grasslands, agricultural areas, marshlands, shrub-steppe, and tundra habitats across much of North America (Smith et al. 2011). Harriers as a group are widely distributed across the World, but the northern harrier is the sole representative of its genus in North America. It breeds throughout much of the interior western and central United States, and north throughout suitable open habitats of Canada and Alaska. On the Pacific Coast, its breeding range is more restricted to relatively extensive, open grassland and marshland habitats characteristic of the Central Valley and coastal areas of California (Davis and Niemela 2008), and similar areas of western Oregon and Washington (Smith et al. 2011). Northern harriers are year-round residents as breeders in California and the interior western and central United States, but northern breeding populations are migratory and the abundance of harriers increases markedly during winter in places such as the Central Valley of California (Davis and Niemela 2008).

Harriers may nest semi-colonially and build their nests on the ground in relatively large expanses of undisturbed grassland or marshland habitat, where tall, dense grasses or marsh plants provide essential cover and suitable foraging habitat is located nearby. In most cases, nesting areas are preferentially located near wet areas (Smith et al. 2011). Harriers hunt in a broad range of open habitats for a variety of prey, including rodents, birds, frogs, reptiles, and insects (Davis and Niemela 2008, Smith et al. 2011). They hunt almost exclusively on the wing, coursing low over suitable habitat and dropping quickly on prey once detected. They use both sight and sound to detect prey items; using sound alone, they are capable of detecting and capturing small rodents obscured by fairly dense vegetative cover or a blanket of snow.

In California, nesting occurs from March through August (Loughman and McLandress 1994). Egg-laying to fledging takes about 65–70 days and fledglings typically remain dependent on their parents for another six to ten weeks (Smith et al. 2011). Breeding activity often varies substantially from year to year depending on rainfall and prey abundance (Davis and Niemela 2008, Smith et al. 2011).

By the early 1940s, the northern harrier breeding population in California had declined substantially due to loss of suitable nesting and foraging habitat (Grinnell and Miller 1944), especially wetlands but also native grasslands (Davis and Niemela 2008). The overall breeding range of harriers in California has changed little since the 1940s; however, overall numbers have been reduced and some local extirpations have occurred, especially in the Central Valley and on the south coast (Davis and Niemela 2008). Nevertheless, although many areas therein have been highly degraded, portions of the Central Valley still contain among the highest known nesting densities of harriers in North America (Davis and Niemela 2008, Smith et al. 2011). In addition, Breeding Bird Survey data for harriers in California show no significant trend on a statewide basis since 1966 (Sauer et al. 2011). In contrast, Christmas Bird Count data for harriers in California indicate a marked increase in winter abundance from 1966 through the late 1980s, but then a declining pattern since then (NAS 2011).

Because they nest on the ground in open habitats, human-related disturbance in the form of people walking or recreating near nests, off-leash dogs, and off-highway vehicles are a primary source of nest failure for harriers (Davis and Niemela 2008).

The CNDDB (2013) lists no records of northern harriers nesting within 20 miles of the Project site and access road/Hwy 41 improvement areas; however, harriers are known to nest in Cholame Valley (Roberson 2002) and have been detected by HTH biologists foraging on the Project site study area. To date northern harriers have not been confirmed nesting on the Project site. An evaluation of the grassland habitat on the Project site and access road/Hwy 41 improvement areas suggests that harrier nesting is unlikely because there are few if any areas where the grassland vegetation is of sufficient stature to attract nesting harriers. Harriers nest only in relatively extensive and undisturbed patches of tall grass and marsh vegetation, which they require to conceal their ground nests, and they are very sensitive to disturbance when nesting, whether in the form of mammalian predators, domestic dogs, or human intruders.

Burrowing Owl (*Athene cunicularia*). Federal Status: Species of Concern; State Status: Species of Special Concern. Burrowing owls inhabit much of California. They usually nest and roost in the old burrow of a ground squirrel, prairie dog (*Cynomys* spp.), American badger (*Taxidea taxus*), or other mammal, but also frequently use other types of natural and artificial cavities/burrows, such as drainage pipes and chambers in rock piles (Poulin et al. 2011). In Florida, they are also known to dig their own burrows in soft soil and use foundation cracks to access secluded chambers under buildings (Millsap and Bear 2000). In

California, however, without ground-squirrel populations, habitats typically are not suitable for occupancy by burrowing owls. Burrowing owls prefer open, dry, annual or perennial grasslands, deserts, and scrublands characterized by low-growing vegetation and a general absence of trees and other elevated structures. They depend on their burrow mounds, nearby isolated shrubs, and/or artificial perches such as fence posts to provide positions from which they can achieve broad surveillance of the surrounding landscape and thereby guard against surprise attacks by predators such as coyotes (*Canus latrans*), foxes (*Vulpes* spp.), and larger raptors (e.g., red-tailed hawks *Buteo jamaicensis*, prairie falcons *Falco mexicanus*, golden eagles, and great horned owls *Bubo virginianus*).

Burrowing owls are year-round residents in central and southern California (Gervais et al. 2008, Barclay et al. 2011), but are migratory at northern latitudes and in interior regions where the winter climate is harsher (Poulin et al. 2011). In the Project site study area, owls are present year-round and, depending on the time of year, may include mixes of year-round residents, migrating transients, and/or winter residents that breed farther north. Burrowing owls are semi-colonial nesters and prefer to occupy areas with a high density of alternative burrows, some used as nest burrows and some used as satellite, shelter burrows (Poulin et al. 2011). Burrowing owls generally show high fidelity to specific breeding areas, but may disperse to other areas following nest failure (Rosenberg and Haley 2004, Rosier et al. 2006). The nesting season in California, as recognized by the CDFW (2013), runs from 1 February through 31 August. Egg-laying to fledging typically takes about 72–80 days, with chicks typically beginning to emerge from burrows at about 14 days old (Poulin et al. 2011).

Burrowing owls are primarily nocturnal and crepuscular, but often can be seen above ground during the day and occasionally hunt during the day, especially during brood rearing (Poulin et al. 2011). Their prey consists mostly of insects and small mammals, but they are opportunistic and will also take a variety of reptiles, amphibians, birds, other invertebrates, and carrion (Poulin et al. 2011). Their foraging tactics vary depending on the prey type, and may include walking, hopping, or running along the ground to catch insects or lizards; hunting from a perch; hovering, especially over tall vegetation; and aerial flycatching. During the breeding season, burrowing owls in California typically forage within 2000 feet of their nest, but some have been recorded foraging up to 2 miles away (Gervais et al. 2003, Rosenberg and Haley 2004).

Burrowing owls have been listed as a CSSC since the 1970s and concern over apparent population declines in California in areas of human development was expressed as early as the 1940s (Grinnell and Miller 1944). The overall range of the species in the state has changed relatively little since the 1940s (Gervais et al. 2008); however, local population declines and extirpations have occurred in several areas, especially along the central and southern coast in areas of rapid urbanization (DeSante et al. 1997a, b, 2007; Wilkerson and Siegel 2010), as well in Santa Clara Valley (Barclay et al. 2011). Conversely, large breeding populations remain in agricultural areas in the Central and especially Imperial Valleys, where the highly modified environments support robust ground squirrel populations, which provide abundant burrows for the owls, and the irrigated agricultural fields support abundant insect and small rodent prey species (DeSante et al. 2004, Rosenberg and Haley 2004). Breeding Bird Survey data for California indicate a 1.5% per year decline since 1966 statewide, but essentially a stable overall trend since 2000 (-0.2% per year; Sauer et al. 2011). Christmas Bird Count data indicate a substantial decline in winter abundance from 1966 through about 1990, but a mostly stable trend since then (NAS 2011). Other evaluations suggested declines in the Central Valley, San Francisco Bay region, and southern coast (DeSante et al. 1997a, 2007; Trulio 1997; Comrack and Mayer 2003), whereas the population in the Imperial Valley appears to have increased markedly since agriculture expanded throughout the region (DeSante et al. 2007, Gervais et al. 2008).

The CNDDB (2013) contains two records for burrowing owls approximately 5 miles south of the Project site (Figure 8) and many other records within a 20-mile radius to the northeast, east, and south (Figure B). eBird (NAS and CLO 2012) also contains occurrence records in Cholame Valley. Nearly the entire 2562-acre Project site currently provides suitable foraging and breeding habitat for burrowing owls. The grassland, rolling foothill habitats and abundant California ground squirrel burrow systems in the area provide suitable foraging, nesting, and sheltering opportunities for resident, wintering, and transient owls. Suitable habitat for the species is also present along the access road/Hwy 41 improvement areas.

Daytime grid surveys and nighttime spotlight surveys conducted in 2012 by HTH biologists confirmed burrowing owls or their sign throughout most areas of the Project site and in several areas along the access road/Hwy 41 improvement areas (Figure 11).

Mountain Plover (*Charadrius montanus*). Federal Status: Species of Concern; State Status: Species of Special Concern (wintering). The mountain plover recently was proposed for listing under FESA; however, after a review of all available scientific and commercial information, the USFWS determined that the mountain plover was not threatened or endangered throughout all or a significant portion of its range (USFWS 2011b). The mountain plover breeds in the short-grass prairies east of the Rockies, and winters in large flocks in California's Central and Imperial valleys and interior Coast Ranges, and in the deserts of northern Mexico (Knopf and Wunder 2006). The California range supports 50–88% of the global population of the species during winter months. The current California winter distribution of this small shorebird generally encompasses the western Central Valley, including Colusa, Yolo, and Solano counties in the Sacramento Valley; the San Joaquin Valley from Stanislaus to Kern counties; and Imperial and Riverside counties in the Imperial Valley (Hunting and Edson 2008).

Mountain plovers begin arriving on their California wintering grounds between mid-September and mid-October, where they form loosely affiliated flocks ranging in size from two to >1000 birds (Knopf and Wunder 2006). They forage in flat grasslands with low vegetation, such as grazed pastures and fallow or burned fields (Knopf and Rupert 1995), where they hunt for a variety of invertebrates (e.g., beetles, wasps, moths, butterflies, and grasshoppers) hidden in cracks and crevices in the ground (Knopf 1998). Mountain plovers leave for their breeding grounds in the high plains on the eastern slope of the Rocky Mountains between early and mid-March, often after coalescing into increasingly large flocks in staging habitats along the lower Colorado River Valley (Knopf and Wunder 2006).

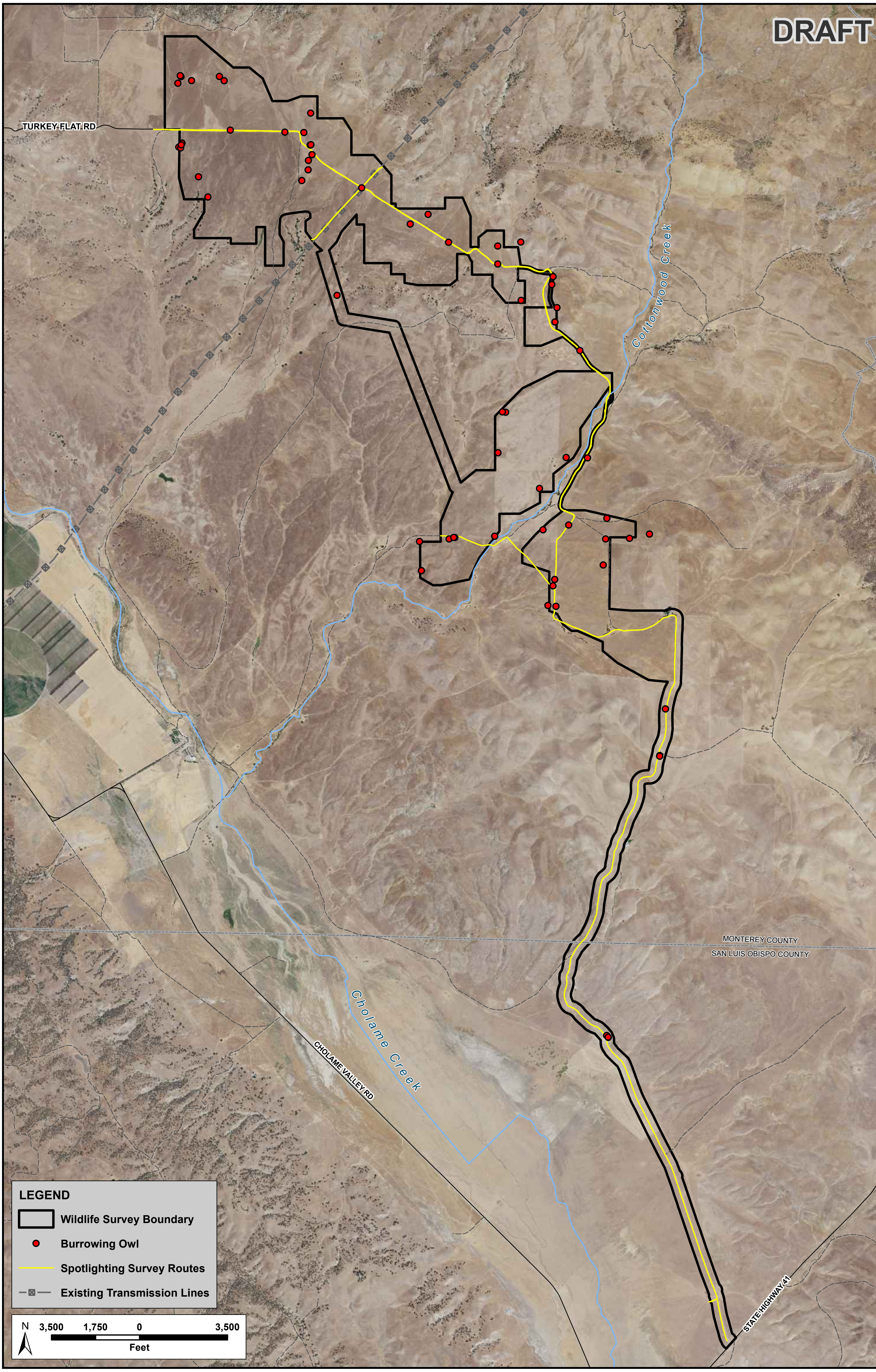

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Figure 11: Occurrences of Burrowing Owl during 2012 Spotlight and Grid Surveys

California Flats Solar Project, California - Interim Biotic Resources Report (3308-02)

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Mountain plover populations are believed to be in decline on both their breeding and wintering grounds, primarily due to conversion of habitat to urban areas (Hunting and Edson 2008); however, Christmas Bird Count data for California since 1966 suggest a highly variable, roughly cyclical pattern with high peaks every 10–15 years, but no overall long-term trend (NAS 2011).

The CNDDB (2013) contains no records for mountain plover within 20 miles of the Project site; however, Roberson (2002) reported that small flocks occurred with some regularity during winter in Cholame Valley at least through the late 1990s, with one 1988 occurrence record (120 birds) shown in eBird (NAS and CLO 2012) roughly 4 miles south of the Project site. eBird (NAS and CLO 2012) includes several other recent (2010–2011) winter records in agricultural habitats located 10–15 miles east and southeast of the Project site and access road/Hwy 41 improvement area, and Mountain plovers commonly occur in greater numbers during winter farther east in the extensive agricultural and fallow-field habitats of the San Joaquin Valley and in the extensive grazed grassland habitats of the Carrizo Plain roughly 30 miles south of the Project site study area (Hunting and Edson 2008, NAS and CLO 2012). The Project site and access road/Hwy 41 improvement areas include grazed grassland and nearby agricultural habitats that are potentially suitable for winter flocks of this species; therefore, mountain plovers could occur on the Project site and likely occur along the access road/Hwy 41 improvement areas. To date, however, HTH biologists have not observed mountain plovers on or near the Project site (Appendix C).

Loggerhead Shrike (*Lanius ludovicianus*). Federal Status: Species of Concern; State Status: Species of Special Concern (mainland populations, breeding). The loggerhead shrike is a unique, raptor-like songbird that occurs as a year-round resident across the southern United States and much of Mexico, and as a migratory population in portions of the northern United States and plains of south-central Canada (Yosef 1996). The species occurs throughout much of California, except in the higher elevation and heavily forested areas of the state (Humple 2008). It is a year-round resident in the southern deserts, parts of the south and central coasts, and the Central Valley, where numbers are augmented by migrants and winter visitors. Loggerhead shrikes establish breeding territories in open habitats with generally short vegetation that provides good prey visibility. They are found in grasslands, scrub habitats, riparian areas, other open woodlands, ruderal habitats, and developed areas including golf courses and agricultural fields (Yosef 1996). They typically build their nests in shrubs or low trees, but may also use brush piles when shrubs are not available. Ideal breeding habitat consists of short-grass habitat with many perches, shrubs, or trees for nesting, and sharp branches or barbed wire fences for impaling prey. They require the presence of structures for impaling their prey; these most often take the form of thorny or sharp-stemmed shrubs, or barbed wire (Yosef 1996, Humple 2008). They are primarily perch hunters and feed on arthropods and a variety of small reptiles, amphibians, birds, and mammals (Yosef 1996).

Shrikes nest earlier than most other passerines, especially in the West where populations are sedentary; in California their breeding season may begin as early as late February and lasts through July (Yosef 1996). Egg-laying to fledgling typically takes 35–37 days and fledglings may remain dependent on their parents for several weeks thereafter. In some southern latitude areas, loggerhead shrikes may raise two broods in some years (Yosef 1996).

Noteworthy declines in loggerhead shrike populations have been recorded across much of the species' range in North America (Pruitt 2000, Humple 2008). In California, the species' overall breeding range has not changed appreciably since the 1940s; however, populations have declined steadily in many areas (Cade and Woods 1997) and local extirpations have occurred (Humple 2008). That said, the population appears to have increased in the northeastern Great Basin portion of the state and remained relatively stable in the southeastern Mojave Desert region of the state (Humple 2008). Nevertheless, at the statewide level, both Breeding Bird Survey and Christmas Bird Count data show substantial, on-going declines since 1966 (NAS 2011, Sauer et al. 2011). Although the specific causes are poorly understood, loss and degradation of breeding and wintering habitat from conversion to incompatible agriculture (e.g., row crops, vineyards, orchards), loss of riparian and oak woodland habitats, urbanization, invasive species (e.g., exotic grasses that alter fire regimes in shrubland habitat), and overgrazing and mismanagement of fire to the detriment of essential shrub communities, as well as possible negative effects of pesticides, are believed to be the major contributors to the population declines exhibited by this species (Cade and Woods 1997, Pruitt 2000, Humple 2008).

The CNDDB (2013) lists no nesting records for loggerhead shrikes within 20 miles of the Project site; however, the Monterey County Breeding Bird Atlas project confirmed nesting throughout the southeastern portion of the county, including Cholame Valley (Roberson and Tenney 1993; also see Roberson 2002) and eBird (NAS and CLO 2012) contains numerous records from Cholame Valley. In addition, HTH biologists observed shrikes on the Project site on several occasions during the burrowing animal surveys. In addition, the access road/Hwy 41 improvement areas include suitable nesting and foraging habitat for the species and it is likely that loggerhead shrikes nest therein.

Oregon Vesper Sparrow (*Pooecetes gramineus affinis*). Federal Status: Species of Concern; State Status: Species of Special Concern. The vesper sparrow, a widespread grassland obligate (Vickery et al. 1999) that breeds in Canada and the United States and winters in the southern states and Mexico, is represented by two subspecies in California (Grinnell and Miller 1944, Jones and Cornely 2002). One of these subspecies, the Great Basin vesper sparrow (*P. g. confinis*) is relatively widespread in western North America, breeding from northern British Columbia south to the high desert-grasslands from eastern California to New Mexico, and wintering primarily from the southwest United States to southern Mexico. In contrast, the Oregon vesper sparrow (*P. g. affinis*) has a highly restricted distribution, breeding only from western Washington and Oregon south into extreme northwestern California and wintering only in California west of the Sierra Nevada and along the southwest coastal slope into northwest Baja California (Erickson 2008).

Habitats occupied during winter in California typically are characterized as mainly open ground with sparse vegetation or short grass/forb cover, such as can be found in fallow/harvested agricultural fields, other weedy fields, meadows, grazed pastures, dry washes and mesas, semi-desert scrub habitats, and roadside edges (Grinnell and Miller 1944, Jones and Cornely 2002, Erickson 2008). Wintering vesper sparrows feed on invertebrates and seeds, which they glean from the ground and vegetation (Jones and Cornely 2002, Erickson 2008). Oregon vesper sparrows typically occur on winter ranges in central and southern California between October and March (Roberson 2002).

The overall winter range of the Oregon vesper sparrow in California most likely has not changed appreciably since the mid-1900s, except perhaps for retractions in parts of the southern coast (Erickson 2008). That said, determining the status of the Oregon vesper sparrow is greatly confounded by overlap with the Great Basin vesper sparrow (Grinnell and Miller 1944, Roberson 2002, Erickson 2008). Declines are inferred based on the substantial loss of native grasslands that has occurred across the state in the past century (Vickery et al. 1999, Erickson 2008).

The CNDDB (2013) lists no records of this species within 20 miles of the Project site; however, eBird (NAS and CLO 2012) reports sightings of vesper sparrows in Cholame Valley as recently as December 2012 within roughly 2 miles of the Project site and Roberson (2002) reported that the species is a "local but regular visitor in winter (mostly November through March) in Peachtree and Cholame Valleys," with sightings typically comprising small numbers but occasionally flocks of 20–40 birds. The mapped distribution of the Oregon subspecies includes southeastern Monterey County (Erickson 2008) and the Project site and access road/Hwy 41 improvement areas provide suitable habitat for wintering individuals. The relative numbers of the Oregon and Great Basin subspecies occurring in the region, however, are entirely unknown. To date, HTH biologists have not observed any vesper sparrows on the Project site or within the /Hwy 41 improvement areas.

Grasshopper Sparrow (*Ammodramus savannarum*). Federal Status: None; State Status: Species of Special Concern. The grasshopper sparrow breeds primarily in the eastern United States, but also occurs in portions of the Great Basin and California (Vickery 1996). In California, it breeds locally in grasslands from the foothills of the Sierra Nevada and Cascade Range west and south to San Diego County (Unitt 2008). These sparrows generally prefer to nest in short to moderate height, moderately open grasslands with patchy bare ground and some shrub cover, although they typically avoid areas of dense shrub cover (Vickery 1996, Unitt 2008). They are more likely to occupy larger tracts of suitable habitat (75–250 acre minimum, depending on the region; Vickery 1996). The grasshopper sparrow is at least a partial migrant, but its movement ecology is poorly known and breeding populations often fluctuate among years, likely in response to changing habitat conditions related to annual variation in rainfall and/or changes in disturbance factors such as grazing (Unitt 2008).

The grasshopper sparrow occurs in California primarily from March to September (Garrett and Dunn 1981) and breeds from mid-March to August (Collier 1994); however, the timing of occurrence of nesting colonies/groups varies from location to location (Roberson 2002). Grasshopper sparrows place their nests in small depressions on the ground under overhanging grasses or forbs, and they search for food (mostly insects) in dense grassland and low-growing vegetation. Egg-laying to fledging typically takes 19–22 days and, although not well documented, fledglings may remain dependent on their parents for another one to three weeks after fledging (Vickery 1996). Double-brooding within nesting seasons commonly occurs and fledglings from first broods usually disperse from the area before second broods hatch (Vickery 1996).

Grasshopper sparrows have declined across many areas of their range in the United States due to habitat loss, fragmentation, and degradation (Vickery 1996). In California, the species' overall breeding range appears largely unchanged since the 1940s; however, numbers have declined and local extirpations have occurred, especially in the Central Valley and parts of the southern coast (Unitt 2008). Breeding Bird Survey data for the species in California suggest an increasing pattern between the mid-1960s and late 1980s, but a declining pattern since then (Sauer et al. 2011). Primary threats include expansion of incompatible agriculture, such as row crops and vineyards, livestock overgrazing, and especially urbanization, with habitat fragmentation a critical problem for this species (Roberson and Tenney 1993, Saab et al. 1995, Unitt 2008).

The CNDDB (2013) contains nesting records for grasshopper sparrows about 5 miles south of the Project site (Figure 8) and the Monterey County Breeding Bird Atlas detected breeders in the southeastern corner of the county within 2–3 miles of the Project site (Roberson and Tenney 1993). In addition, eBird (NAS and CLO 2012) includes April and May sighting records from the west-central portion of Cholame Valley that may represent breeding birds. To date, HTH biologists have not observed grasshopper sparrows on the Project site. Given recent occurrence records in the area and the prevalence of grassland habitat, grasshopper sparrows likely occur within the Project site and the access road/Hwy 41 improvement areas, and may nest on the Project site.

Tricolored Blackbird (*Agelaius tricolor*). Federal Status: Species of Concern; State Status: Species of Special Concern. Tricolored blackbirds occur primarily in California, with only a few scattered breeding locations elsewhere in Oregon, Washington, Nevada, and Baja California (Beedy and Hamilton 1999, Beedy 2008). In California, they are found primarily in the Central Valley and in central and southern coastal areas. Tricolored blackbirds nest colonially, forming dense breeding colonies that may consist of up to tens of thousands of pairs. They typically nest in tall, dense, stands of cattails (*Typha* spp.) or other similar marsh vegetation, but also sometimes in willows (*Salix* spp.), blackberry (*Rubus* spp.), wild rose bushes (*Rosa* spp.), and a variety of other herbaceous vegetation, usually located near fresh water. Tricolored blackbirds form large, often multi-species flocks during the non-breeding period and range more widely than during the breeding season. They forage primarily in agricultural fields, fallow fields, pastures, and grasslands on locally abundant insects, especially grasshoppers, maturing and ripe seeds, concentrated agricultural food resources, and other invertebrates such as snails (Beedy and Hamilton 1999). Tricolored blackbirds are permanent residents in California, but often move extensively both within the breeding season and during winter (DeHaven et al. 1975, Hamilton 1998).

Nesting typically occurs from mid-March through early August, but autumnal breeding (September through November) also has been documented in the Central Valley and at Point Reyes in Marin County (Beedy and Hamilton 1999). This species also sometimes exhibits itinerant breeding, nesting in southerly locations early in the breeding season and then moving north to nest again at more northerly locations (Hamilton 1998). Multiple broods per season are commonplace in this species. Egg-laying to fledging typically takes 21–25 days, and adults often begin preparing new nests before previous broods fledge (Beedy and Hamilton 1999). The abundance of tricolored blackbirds nesting in the Central Valley has declined dramatically in recent decades (Beedy and Hamilton 1999, Hamilton et al. 1999, Hamilton 2000, Green and Edson 2004, Cook and Toft 2005, Beedy 2008). A statewide survey conducted in 2004 revealed that only 33 of 182 former large nesting colonies still supported nesting birds (Green and Edson 2004). Breeding Bird Survey data for California show no trend since 1966 (Sauer et al. 2011), whereas Christmas Bird Count data show an increasing pattern through the late 1970s, but a declining pattern since then (NAS 2011).

The CNDDB (2013) contains only one record of nesting tricolored blackbirds within a 20-mile radius of the Project site (just under 20 miles to the north; Figure 8); however, tricolored blackbirds have nested on Cholame Creek roughly 3–4 miles south of the Project site and may nest in other areas within Cholame Valley (Roberson and Tenney 1993, Roberson 2002). eBird (NAS and CLO 2012) also contains many sightings records of the species during both summer and winter in Cholame Valley, including within 2–3 miles of the Project site and access road/Hwy 41 improvement areas, and in other nearby areas. The Project site contains a small amount of marginally suitable habitat in peripheral riparian areas, including one marshy area and a few willow-thicket and bramble areas that could support small nesting colonies. Thus, tricolored blackbirds could nest on the Project site, but the likelihood of that occurring is low. HTH biologists observed small numbers of this species in two different areas on the Project site in March 2013.

Long-eared Owl (*Asio otus*). Federal Status: None; State Status: Species of Special Concern (breeding). The long-eared owl is a medium-sized owl that breeds across much of western North America and throughout the boreal forest zone of the northern United States and Canada (Marks et al. 1994). It occurs throughout the wooded habitats of California, typically nesting in relatively dense vegetation near open grasslands, shrubsteppe, and meadows, or in open woodlands or patchy forests where they can hunt in open areas (Hunting 2008). Riparian and oak woodlands and mixed oak-conifer woodlands adjacent to open foraging habitats are the most common nesting situations. In California, long-eared owls generally are thought to be permanent residents; however, relatively little is known about this species' dispersal and migration habits (Marks et al. 1994). They may also be semi-nomadic at times in response to prey fluctuations (Hunting 2008).

Long-eared owls are primarily nocturnal but may be a bit crepuscular during brood rearing (Marks et al. 1994). They hunt primarily on the wing, coursing low over open habitats in search of prey. Small mammals such as mice, voles, pocket gophers, and young rats are primary prey, but various birds, bats, and reptiles may be important in some cases (Marks et al. 1994, Hunting 2008).

Nesting in California occurs from February through July. Egg-laying to fledging usually takes about 65–70 days and fledglings remain dependent on their parents for another five to six weeks. Long-eared owls sometimes nest semi-colonially and, depending on nesting densities, young from multiple nests may congregate and roost together.

In California, long-eared owls are extirpated from most of the Central Valley and breeding populations are declining in many south-coastal areas (Hunting 2008). The primary threat is loss and degradation of breeding and foraging habitat due to human activities; however, depredation by growing populations of common ravens (*Corvus corax*) is believed to be a problem in some areas and rodent control in agricultural areas may contribute to declines due to reduction of prey populations. The Breeding Bird Survey does not provide population trend information for long-eared owls in California due to a lack of data (Sauer et al. 2011); however, Christmas Bird Count data suggest an increasing trend since 1966 (NAS and CLO 2011).

The CNDDB (2013) lists no records of long-eared owls nesting within 20 miles of the Project site and the Monterey County Breeding Bird Atlas also contains no records in the Project site and access road study areas (Roberson 1992). The species was once thought to nest in Cholame Valley and may nest there today, but survey data for this species are generally sparse (Roberson 2002). eBird (NAS and CLO 2012) contains a few recent (2010–2011) sighting records from Cholame Valley and Vineyard Canyon within several miles of the Project site. To date, HTH biologists have not observed any long-eared owls on the Project site. The Project site and access road/Hwy 41 improvement areas contain mixes of woodland and open habitat that are potentially suited to nesting and foraging by this species. Long-eared owls regularly nest in similar grassland and sparsely treed habitat areas to the south of the Project site on the Carrizo Plain (H. T. Harvey & Associates 2011b).

Short-eared Owl (*Asio flammeus*). Federal Status: None; State Status: Species of Special Concern (breeding). The short-eared owl is a medium-sized owl that nests in open grassland and marshland habitats, where sufficiently tall grasses or marsh vegetation (usually taller than 1.5 feet) is available to conceal their ground nests (Wiggins et al. 2006). These are open-country owls that occupy a similar niche as northern harriers; i.e., open grassland, marsh, and tundra habitats across the continent (Wiggins et al. 2006). Suitable nesting habitats may also include irrigated alfalfa or grain fields and ungrazed (at least not recently) grasslands and old pastures. Short-eared owls are at least semi-nomadic, with breeding densities often shifting and fluctuating markedly among years in response to changes in primary prey populations (primarily voles of the genus *Microtus*). The known, current breeding distribution of short-eared owls in California encompasses several scattered areas across the state, including the southwestern San Joaquin Valley and the Carrizo Plain to the south of the Project site (Roberson 2008, H. T. Harvey & Associates 2011b).

Short-eared owls can be found hunting both day and night, but often are primarily crepuscular hunters (Wiggins et al. 2006). They hunt primarily on the wing either coursing low over open habitats or hover hunting. They take primarily small microtine rodents, but will also take small birds.

In California, short-eared owls nest from March through July. Egg-laying through fledging typically requires 50–55 days and fledglings remain dependent on their parents for at least several more weeks after that. In

California, as is true elsewhere in the species' range, episodic breeding and marked fluctuations in the distribution of breeding activity make it very difficult to accurately quantify the status of this species. Loss and degradation of natural grassland and marshland habitats is the primary threat faced by these owls, with remaining productive habitat largely confined to wildlife refuges and management areas (Roberson 2008). Breeding Bird Survey data for short-eared owls in California suggest marked declines since 1966, but these data are not considered a reliable indicator for this species (Sauer et al. 2011). Christmas Bird Count data for the state suggest a marked decline from the mid-1960s through mid-1980s, but a mostly stable pattern since then (NAS 2011). Roberson (2002) reports that short-eared owls once nested in northwestern Monterey County, but were extirpated from the county as breeders in the 1980s due to the invasion of non-native red foxes (*Vulpes vulpes*); however, they do still occur in small numbers as seasonal/transient visitors during fall and winter.

Short-eared owls have been observed on the Project site during burrowing animal surveys, and the Project site and access road/Hwy 41 improvement areas include suitable nesting habitat for the species. eBird (NAS and CLO 2012) contains only one record for the species near the Project site roughly 10 miles to the northwest near Vineyard Canyon, but the species is a well-known episodic breeder and transient/winter visitor on the grasslands of the Carrizo Plain roughly 30 miles south of the Project site (Roberson 2008, NAS 2011, NAS and CLO 2012).

3.6.4 Mammal Species

San Joaquin (Nelson's) Antelope Squirrel (*Ammospermophilus nelsoni*). Federal Status: None; State Status: Threatened. The San Joaquin antelope squirrel is synonymous with the species that CNDDB refers to as the Nelson's antelope squirrel. The historical distribution of San Joaquin antelope squirrel included the western and southern portions of the Tulare Basin, San Joaquin Valley, and the contiguous areas in the upper Cuyama Valley and on the Carrizo and Elkhorn Plains (USFWS 1998). This species was distributed over the floor of the San Joaquin Valley in Kern County and along the eastern edge of the Valley northward to near Tipton, Tulare County (Williams 1980). Current distribution indicates that San Joaquin antelope squirrel have been nearly eliminated from the floor of the Tulare Basin; they currently exist mainly in marginal habitat in the mountainous areas bordering its western edge with substantial populations found only in and around Lokern and Elk Hills in western Kern County, and on the Carrizo and Elkhorn Plains in eastern San Luis Obispo County (USFWS 1998).

San Joaquin antelope squirrel are primarily diurnal, usually active early or late in the day. They inhabit the arid annual grassland and shrubland areas with sparsely vegetated loam soils in western and southern San Joaquin Valley (Elliot 1904, USFWS 1998). This species is typically found on open, gently sloping land at elevations ranging from 200 to 1200 feet. San Joaquin antelope squirrel live in burrows, either of their own construction or ones dug by kangaroo rats, and they make use of both shrubs and burrows of giant kangaroo rats as sites of refuge from predators as they move throughout their home ranges (USFWS 1998). They are most numerous in areas with a sparse-to-moderate cover of shrubs such as saltbushes, California ephedra, bladderpod, goldenbushes, matchweed, and others, whereas shrubless areas are only sparsely inhabited, especially where giant kangaroo rats are not present or not common (USFWS 1998). The San Joaquin antelope squirrel is omnivorous and will eat green vegetation, fungi, insects, and occasionally harvester ants. Loss of habitat due to agricultural development, urbanization, and petroleum extraction, as well as the use of rodenticides and insecticides, are factors threatening the San Joaquin antelope squirrel (USFWS 1998). San Joaquin antelope squirrel may also be affected by land management activities that remove shrub cover and increase erosion (USFWS 1998).

No evidence of San Joaquin antelope squirrel was found during the reconnaissance or full coverage ground surveys of the Project site and access road/Hwy 41 improvement areas, and this species is generally readily detected when present. Suitable shrub habitat on the site is limited and the apparent absence of giant kangaroo rats indicates limited suitability of the open grasslands habitat. The nearest record for the species is approximately 5.5 miles northeast of the BSA (Figure 8; CNDDB 2013). The species is unlikely to occur within the Project site or the access road/Hwy 41 improvement areas.

Giant Kangaroo Rat (*Dipodomys ingens*). Federal Status: Endangered; State Status: Endangered. The giant kangaroo rat is endemic to the San Joaquin and Tulare Basins in the southern end of the Great Central Valley in California. Conversion of native valley grassland habitats to agriculture has reduced extant giant kangaroo rats distribution to approximately 2–3% of its historic range (Williams 1980). Giant kangaroo rat distribution is discontinuous, and comprises six major populations, including the northern Fresno/San Benito counties, Kettleman Hills, San Juan Creek, western Kern County, Carrizo Plain, and Cuyama Valley populations. Each of the six major populations is further fragmented by steep topography and unsuitable vegetation, as well as human induced barriers such as cropland, roads, and urban development (USFWS 1998). This species' habitat consists of annual grasslands, although individuals may also utilize alkali or saltbush scrub habitats at elevations ranging from sea level to 2850 feet (USFWS 1998). Giant kangaroo rats are primarily seed eaters, but they also eat green plants and insects (USFWS 1998). Individuals in many populations make large stacks of seed heads or "haystacks" on the surface of their burrow to cure the material before storing underground (USFWS 1998).

Giant kangaroo rats are nocturnal and live in colonies that range from a few to several thousand members, but individuals typically occupy solitary territories called precincts. Precincts have a radius of about 10 to 13 feet, and each contains a burrow that is deep enough for the kangaroo rat to escape the afternoon heat and avoid predators (USFWS 1998). The surfaces of typical burrow systems (precincts) of giant kangaroo rats are elliptical, show little or no mounding above surrounding terrain, and have one to five separate burrow openings with three being typical (Williams et. al 1993). Individual precincts are usually connected to other precincts by well-worn paths and are relatively easy to detect, even from a distance (Williams 1980). The above-ground portion of the precinct is used both for foraging as well as sand bathing (Randall et. al 2001). Cultivation and irrigation of habitat, the use of rodenticides, and the development of infrastructure for petroleum exploration have all contributed to the decline of the giant kangaroo rats (USFWS 1998).

No evidence of giant kangaroo rat occurrence was detected during the reconnaissance or full coverage ground surveys of the Project site and access road/Hwy 41 improvement areas or during review of aerial imagery (giant kangaroo rats modify the vegetation around their burrow precincts which may produce a signature identifiable from even high elevation imagery). The nearest record for the species is approximately 6 miles south of the Project site and 1.7 miles southwest of the access road/Hwy 41 improvement areas (Figure 8; CNDDB 2013). The Project site and access road are sub-optimal habitat for this species. Based on the negative results of the survey effort and highly identifiable precincts, and sub-optimal habitat, the species is considered absent from the Project site and access road/Hwy 41 improvement areas.

San Joaquin Kit Fox (*Vulpes macrotis mutica*). Federal Status: Endangered; State Status: Threatened. The kit fox is the smallest canid species in North America, and the San Joaquin kit fox is the largest subspecies. Extensive loss of habitat to urban, cultivated agricultural and industrial development are the principal factors in the decline of the San Joaquin kit fox throughout most of its former range.

Grinnell et al. (1937) described the range of the kit fox prior to 1930 as including most of the San Joaquin Valley from southern Kern County north to Tracy in San Joaquin County on the west side of the Valley and up to La Grange in Stanislaus County on the east side. However, by 1930, they believed that the range of the kit fox had been reduced by half. Subpopulations of the San Joaquin kit fox appear to be increasingly isolated from one another due to developments within its range including cities, aqueducts, irrigation canals, surface mining, road networks, petroleum fields, and other industrial projects (USFWS 1998).

The kit fox is primarily nocturnal and typically occurs in annual grassland or mixed shrub/grassland habitats throughout low, rolling hills and in the valleys. Kit foxes will use grazed grasslands and grasslands with scattered structures such as power lines and wind turbines, and they live adjacent to and forage in tilled and fallow fields and irrigated row crops. The diet of the kit fox varies geographically, seasonally, and annually, but throughout most of its range, the San Joaquin kit fox's diet consists primarily of rodents, rabbits, ground-nesting birds, and insects. Giant kangaroo rats are a favored prey item. The kit fox requires underground dens for temperature regulation, shelter, reproduction, and predator avoidance. Kit foxes commonly modify and use dens constructed by other animals, such as ground squirrels, badgers, and coyotes, and they will use human-made structures as well (USFWS 1998). Dens are usually located on loose-textured soils on slopes less than 40 degrees, but the characteristics of kit fox dens vary across the fox's geographic range in regard to the number of openings, shape, and the slope of the ground on which they occur (USFWS 1998). Kit foxes change dens often, typically using numerous dens each year. Koopman et al. (1998) estimated that on average a kit fox will use approximately 12 dens over the course of a year and will often not use the same den(s) the following year.

Kit foxes are subject to predation or competitive exclusion by other species, such as the coyote (*Canis latrans*), domestic dog (*Canis familiaris*), bobcat (*Felis rufus*), non-native red fox (*Vulpes vulpes*), and large raptors. Kit foxes are primarily nocturnal, and are active throughout the year.

The Recovery Plan for Upland Species of the San Joaquin Valley, California identifies three core regions in California that are considered critical to the long-term recovery and survival of the species: Carrizo Plain Natural Area in San Luis Obispo County, the natural lands of western Kern County, and the Ciervo-Panoche Natural Area of western Fresno and eastern San Benito counties (USFWS 1998) (Figure 12). Each of these areas are inhabited by an appreciable population of kit foxes, residing on a large block of natural and/or semi-natural habitat within the historic range, each of which is currently, potentially robust enough to respond to varying environmental conditions and to maintain genetic diversity. These core populations are connected to each other and to satellite populations by means of habitat linkages and "stepping stones," creating a range-wide metapopulation (USFWS 1998). Based on an analysis of wildlife corridors conducted by Penrod et al. (2010) the Project site and access road/Hwy 41 improvement areas do not occur within a kit fox satellite population or within an identified wildlife movement corridor. However, the Project site is located within occupied San Joaquin kit fox habitat that is adjacent to a habitat linkage between the Western Kern core population and the Salinas Valley satellite population, a linkage identified as essential to the recovery of the San Joaquin kit fox according to the Recovery Plan for Upland Species of the San Joaquin Valley, California (USFWS 1998).

The majority of the Project site is moderately suitable habitat for the San Joaquin kit fox (Figure 13, and the California Natural Diversity Data Base (CNDDB) lists 38 records of kit fox occurrences within a 20-mile radius of the Project site with several sightings as recent as 2005. The nearest record for the species in the CNDDB is approximately 3.5 miles south of the Project site and about 1.5 miles southwest of the access road/Hwy 41 improvement areas (CNDDB 2013). The species is known to occur in grassland near the intersection of State Route (Hwy) 41 and Hwy 46, and an adjacent landowner along Turkey Flat has photo documentation of San Joaquin kit fox just west of the Project site dating back to 2008.

Many of the potential dens detected on the Project site during the December 2012 survey would be suitable for kit foxes; although, definitive evidence of their presence at any of the potential dens was not found. At one potential den located south of Turkey Flat Road at the west end of the Project site, a small scat was found which could have been kit fox and would be consistent with observations of the adjacent landowner; however, the abundant presence of coyote scat at the den indicated this was more likely a coyote natal den, and the scat was likely that of a coyote pup. The scat was completely bleached, indicating it had been on the surface for an extended period of time, and it was considered to be too degraded to conduct genetic analysis of the sample.

No San Joaquin kit foxes were detected at 39 camera stations distributed throughout the Project site at densities of more than eight cameras per square mile. In addition, no definitive sign of kit fox (e.g., tracks, scat, dens) was observed during full-coverage ground surveys and spotlighting surveys conducted throughout the Project site. The full-coverage ground survey confirmed that many of the potential dens identified on the Project site would be suitable for use by kit fox as escape dens, yet no definitive sign (e.g., tracks or scat) indicating their presence at any of these potential dens was observed.

HTH biologists observed a single adult kit fox along the southern portion of the access road alignment while conducting spotlight surveys in December 2012 (Figure 14). This individual was approximately 1.8 miles north of Hwy 41. Furthermore, HTH biologists recently observed a road-killed kit fox along Hwy 41 within 1 mile of the access road. On 23 May 2013, an HTH biologist experienced with kit fox observed a canid on the Project site that may have been a kit fox. The fox was moving approximately 1000 feet away from the observer, which precluded definitive confirmation. Additional spotlight surveys and scat-detecting scent-dog surveys for San Joaquin kit fox will be conducted throughout the Project site and access road/Hwy 41 improvement areas during the summer of 2013 to further assess kit fox occurrence and their use of habitats within the Project area.

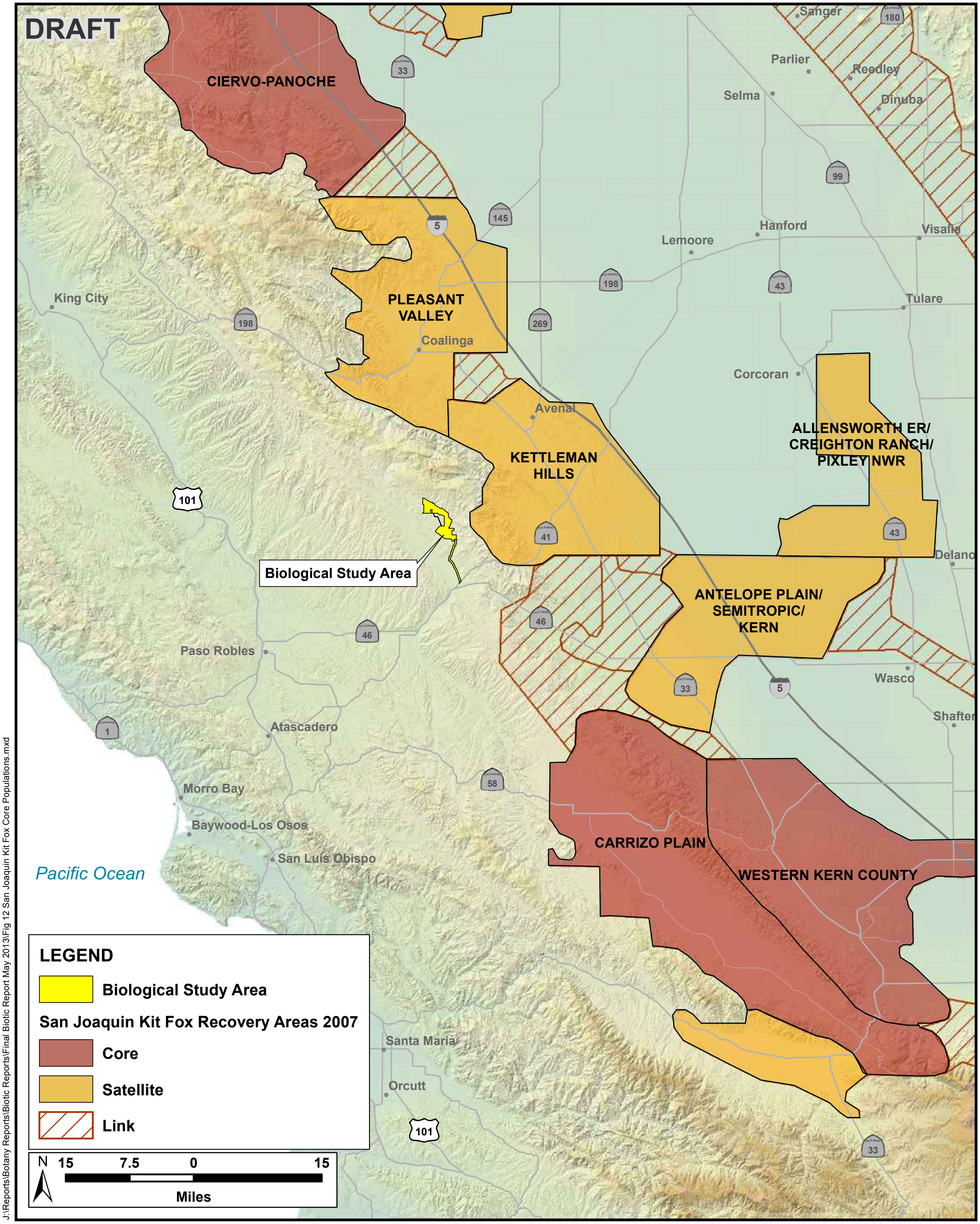

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Figure 12: San Joaquin Kit Fox Core Areas
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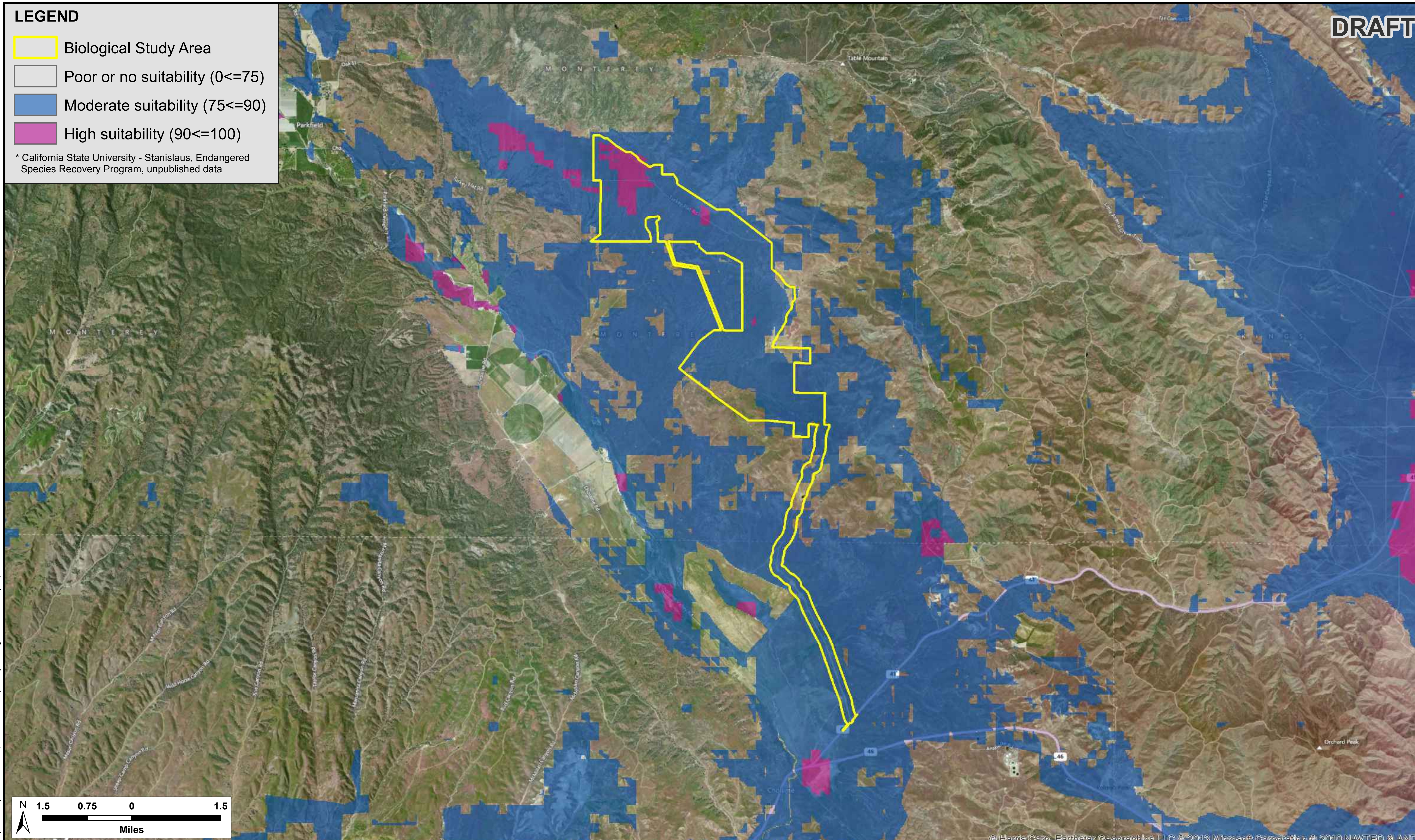

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Figure 13: San Joaquin Kit Fox Suitability Map

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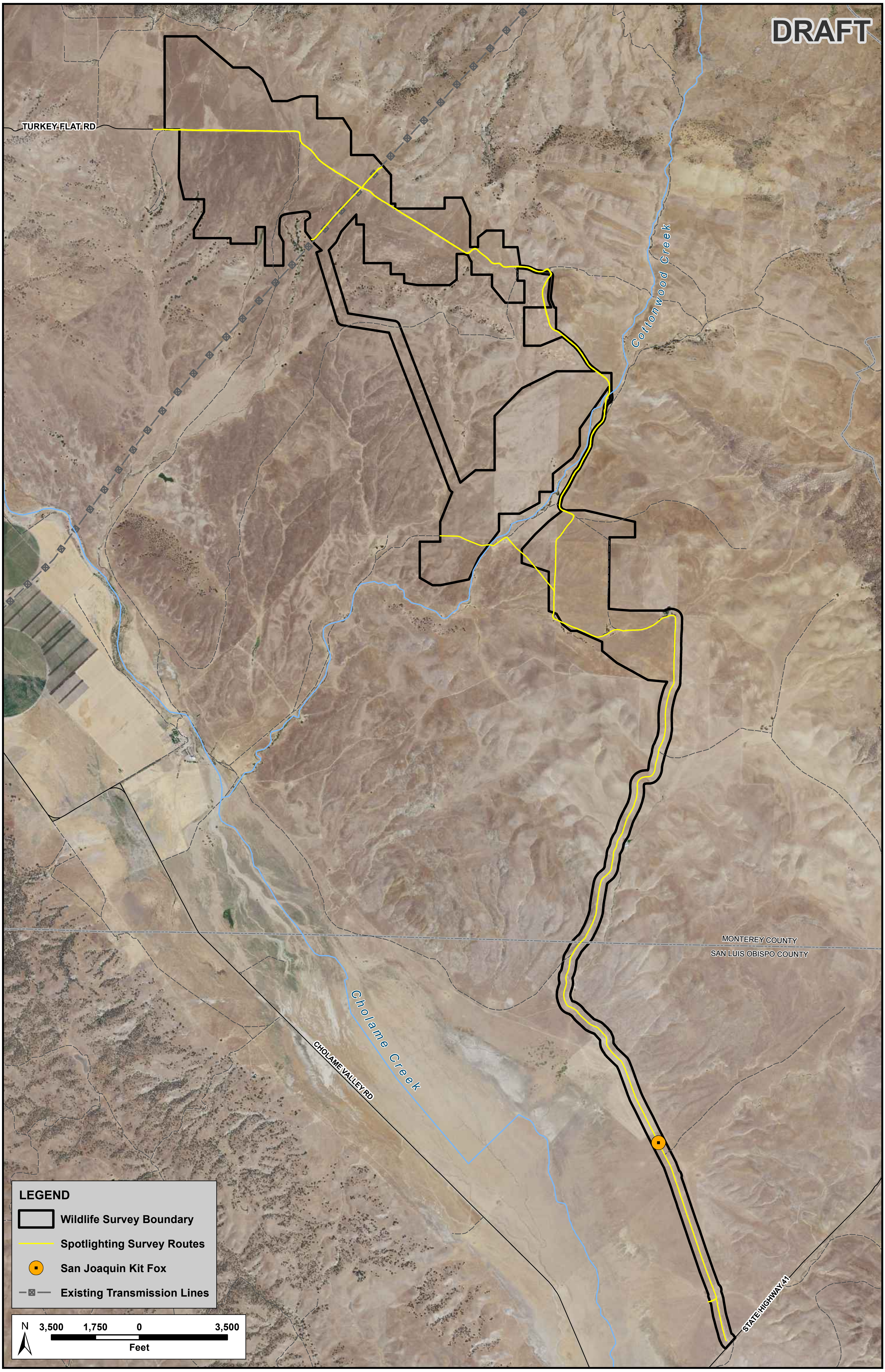

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Figure 14: Occurrences of San Joaquin Kit Fox during 2012 Spotlight Survey Data

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Pallid Bat (*Antrozous pallidus*). Federal Status: None; State Status: Species of Special Concern. The pallid bat occurs throughout most of California, except in the high Sierra Nevada from Shasta to Kern counties and the northwestern corner of the state from Del Norte and western Siskiyou counties to northern Mendocino County. The pallid bat inhabits a variety of habitats, including coniferous forests, deciduous woodlands, brushy terrain, rocky canyons, open farm land, and desert (Pierson and Rainey 1998). The species is most common in open, dry habitats with rocky areas for roosting. Pallid bats are primarily a crevice-roosting species and select daytime roosting sites where they can retreat from view (Pierson and Rainey 1998). The prey of the pallid bat consists of a wide variety of insects and arachnids, including beetles, orthopterans, homopterans, moths, spiders, scorpions, solpugids, and Jerusalem crickets. It is unusual among North American bats in that most of its prey is taken off the ground, although a few are taken aerially (Pierson and Rainey 1998). The pallid bat is highly social and usually occurs in colonies of 12 to 100 individuals (Barbour and Davis 1969) that cluster to share body heat (Vaughn and O'Shea 1976). The pallid bat roosts both during the day and at night, spending 60 to 80% of a 24-hour cycle in the roost environment (Vaughn and O'Shea 1976). During the day this species shelters inside crevices or cavities found in natural features such as trees, cliffs, caves and rocky outcrops, and in man-made features such as barns, bridges, mines, and attics (Barbour and Davis 1969, Hermanson and O'Shea 1983, Pierson and Rainey 1998). Roost temperature may be a limiting factor in roost selection. Pallid bats are intolerant of roost temperatures above 104° F (Licht and Leitner 1967), and often occupy roosts that offer a varied temperature regime. Pallid bats are very sensitive to disturbance at the roost. When disturbed, they generally retreat into crevices, and with repeated disturbance, may abandon the roost (Pierson and Rainey 1998). Recent radio-tracking efforts in the west, including California, suggest that the pallid bat is far more dependent on tree roosts than was previously realized (Pierson and Rainey 1998). Pallid bats are also one of the species most predictably associated with bridges.

The nearest records for the species are about 4 miles west of the Project site and 2.2 miles southeast of the access road/Hwy 41 improvement areas (Figure 8; CNDDB 2013). Suitable roosting and foraging habitat is present for the species within the Project site, and foraging habitat is present along the access road. This species could occur on the Project site and within the access road/Hwy 41 improvement areas.

Western Mastiff Bat (*Eumops perotis californicus*). Federal Status: None; State Status: Species of Special Concern. Western mastiff bats are the largest of all of North America species of bats with a forearm length of 2.87 to 3.27 inches and weighing up to 3.53 ounces. Individuals can forage at elevations of 1968 to 2296 feet above ground level and may forage for seven hours and 15 miles from their roost (Vaughn 1959). This species roosts primarily in cliffs or high buildings where there is a minimum of 9.84 feet of vertical drop at the entrance to roosts (Wilson and Ruff 1999). This species is found in the central and south coastal California, the San Joaquin Valley, the southern half of the Sierra foothills, and throughout desert regions. This species may utilize bridges or buildings as night roosts, day roosts, or maternity roosts.

The Project site and access road/Hwy 41 improvement areas are within the range of the western mastiff bat, and suitable foraging habitat exists within the Project site and along the access road. The CNDDB (2013) lists one occurrence of western mastiff bat within the 9-quadrangle area surrounding the BSA. The species likely forages over the Project site and the access road/Hwy 41 improvement areas on occasion, but suitable roosting habitat is absent.

Tulare Grasshopper Mouse (*Onychomys torridus tularensis*). Federal Status: None; State Status: Species of Special Concern. Historically, the Tulare grasshopper mouse ranged from western Merced and eastern San Benito counties east to Madera County and south to the Tehachapi Mountains (Brown and Williams 2006). Currently, the species is known to occur only in the following areas: along the western margin of the Tulare Basin, including western Kern County; the Carrizo Plain Natural Area; along the Cuyama Valley side of the Caliente Mountains, San Luis Obispo County; and the Ciervo-Panoche Region, in Fresno and San Benito counties (Brown and Williams 2006). Typically, Tulare grasshopper mice inhabit arid shrubland communities in hot, arid grassland and shrubland associations. These include blue oak woodlands at 1476 feet; Upper Sonoran subshrub scrub communities; alkali sink and mesquite associations on the San Joaquin Valley floor; and grassland associations on the sloping margins of the San Joaquin Valley and Carrizo Plain region (Brown and Williams 2006).

The grasshopper mouse is primarily a carnivore, feeding upon western harvest mice, frogs, scorpions, beetles and other invertebrates and seeds (USFWS 1998). Habitat reduction and fragmentation due to agriculture development, random catastrophic events, and the use of insecticides have all contributed to the decline of the Tulare grasshopper mouse (USFWS 1998).

The nearest record for the species is about 11 miles southeast of the Project site and 7 miles southeast of the access road/Hwy 41 improvement areas (CNDDB 2013). No Tulare grasshopper mice were detected during the reconnaissance or full ground coverage mammal surveys, and the Project site and access road contain only marginally suitable habitat for this species. It is unlikely this species occurs on the Project site or along the access road/Hwy 41 improvement areas.

San Joaquin Pocket Mouse (*Perognanthus inornatus*). Federal Status: None; State Status: Species of Special Concern. Like other heteromyid rodents, this species has a long tail and external fur-lined cheek pouches. The San Joaquin pocket mouse has an orange back with blackish-brown hairs, a pale orange lateral line, and it is white on the ventral underside of the body. This species prefers fine textured friable soils but is known to burrow in rocky soils in the northernmost portion of its range. Habitats include grassland, savannah, and brush lands up to 2000 feet in and around the Central Valley, Carrizo Plains, and Salinas Valley (Best 1993). *Perognanthus inornatus* prefers ridge tops and hillsides with grasslands, shrubs, or blue oak (*Quercus douglasii*) savannah (Hawbecker 1951). Burrows are typically closed during the day and this species is known to use the burrows of larger species, such as a kangaroo rat (Best 1993).

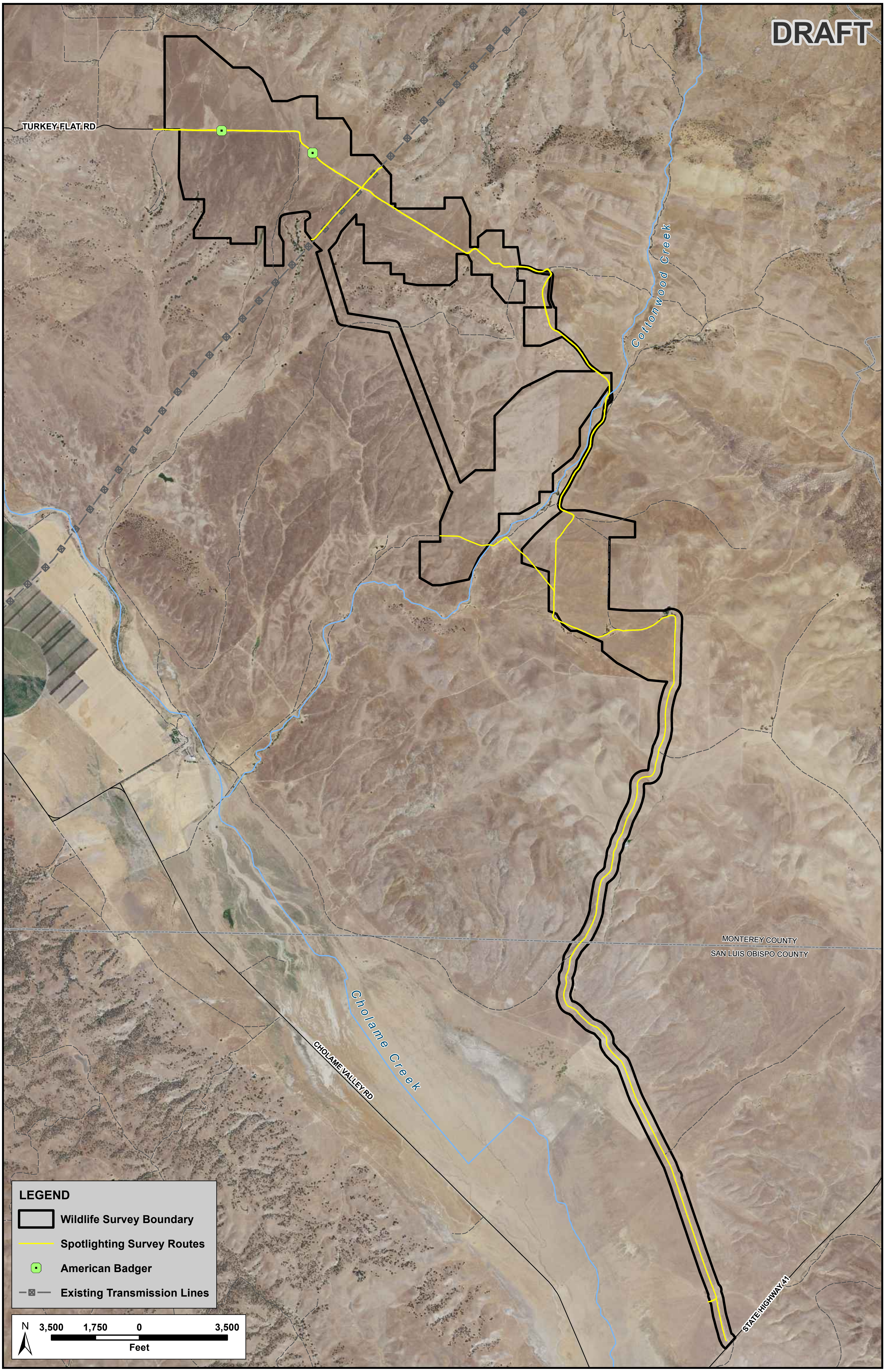
The nearest records for the species are about 14 miles east of the BSA (CNDDB 2013). No San Joaquin pocket mice were detected during the reconnaissance or full ground coverage mammal surveys; however, the

Project site and access road study area contain moderately suitable habitat for this species. This species could occur on the Project site or within the access road/Hwy 41 improvement areas.

American Badger (*Taxidea taxus*). Federal Status: None; State Status: Species of Special Concern. The American badger occurs throughout western North America, including much of California. It is most abundant in grasslands and other habitats dominated by herbaceous vegetation, but it will also use the drier open stages of scrub and woodland habitats. Badgers are generally associated with treeless regions, prairies, park lands, and cold desert areas. They need friable soils suitable for excavation of their burrows and a prey base of small burrowing mammals. Badgers dig dens with single, 8- to 21-inch elliptical entrances in for cover. These animals frequently reuse old burrows; although, some have been known to dig a new den each night, especially in summer. Soil excavated during formation of the den is piled at the entrance.

The American badger is somewhat tolerant of human activities, and clearing of woody vegetation for range may have benefited the species historically. However, intensive cultivation destroys their burrows and makes areas unsuitable for denning; thus, badgers are associated more with rangeland and areas with uncultivated refugia than with broad expanses of cultivated land (CDFG 2009b).

There is abundant evidence of American badgers throughout the Project site and access road/Hwy 41 improvement areas, primarily in the form of prey excavations. Two adult badgers were observed during HTH's spotlight surveys, and a large number of potential dens appeared to have been excavated by badgers as evidenced by claw marks, shape of the excavated deposit, and size of the pieces of excavated material (Figure 15). The entire Project site is suitable habitat for American badgers and the species is believed extant throughout the region, as there are several CNDDB records of badgers from the area around the Project site extending out approximately 20 miles (Figure 8).



J:\Reports\Botany Reports\Biotic Reports\Final Biotic Report May 2013\Fig 15 American Badger_Spotlight Surveys.mxd

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Figure 15: Occurrences of American Badger during 2012 Spotlight Survey Data
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3.6.5 Other Focal Corridor Species

Tule elk (*Cervus elaphus nannodes*). Federal Status: None; State Status: None. The historical range of Tule elk included the San Joaquin and Sacramento Valleys from the foothills of the Sierra Nevada to the Pacific coast (McCullough 1969). The Tule elk, the smallest subspecies of elk in North America and endemic to California, was nearly hunted to extinction by the end of the nineteenth century. Between 1800 and 1895, the California population of Tule elk was reduced from an estimated 500,000 to a small herd of fewer than 30 animals surviving near Bakersfield (Kanewske 2000). Due to the establishment of a Tule elk preserve near Tupman, California, and subsequent reintroduction efforts, California now has an estimated 3800 Tule elk (McCullough 1969, Greco et al. 2009). Tule elk have become a popular game animal in California, and hunting is allowed at several locations, including the Carrizo Plain National Monument (approximately 40 miles southeast of the Project site).

Male Tule elk stand four to five feet tall at the shoulder and weigh 450 to 700 pounds, whereas adult females average 375 to 425 pounds (Kanewske 2000). Tule elk prefer open habitat in semi-arid environments dominated by shrubs, grasses, forbs, and gentle topography, overlapping with rangelands and desert scrub communities in California (Zeiner et al. 1988–1990). Tule elk feed on a variety of herbaceous vegetation, including annual forbs and grasses, perennial forbs and grasses, and grass-like plants (McCullough 1969). Depending on fence design, elk can cross over or go under fences; however, elk typically go over fences, dragging their hind legs over the top wire (McCullough 1969, Ferrier and Roberts 1973). To exclude elk, fences need to be 61 to 75 inches high, much higher than the standard for barbed-wire fence used to control livestock.

During biological field surveys conducted to date, no Tule elk or their sign have been detected on the Project site or within the access road/Hwy 41 improvement areas, nor have Tule elk been observed by Jack Ranch personnel on the Project site. Incidental observations of Tule elk were reported approximately 6 miles southwest of the Project site and 2 miles southwest of the access road/Hwy 41 improvement areas, north of Hwy 46 (B. Boroski and A. Sparks, pers. comm.), and Tule elk have been documented west of Cholame Valley Road (Penrod et al. 2010). Although no Tule elk have been detected east of Cholame Valley Road, no barrier to access exists between the area west of Cholame Valley Road and the access road/Hwy 41 improvement areas. Thus, there is potential for Tule elk, at least on an infrequent basis, to use the access road/Hwy 41 improvement areas for foraging.

Pronghorn (*Antilocapra americana*). Federal Status: None; State Status: None. By the end of the nineteenth century, pronghorn were hunted to extinction in all regions of California except the Modoc Plateau, in the northeast corner of the state. Urbanization and agriculture, including ranching, have reduced habitat availability and suitability throughout much of the pronghorn's historical range in California. Regionally, reintroduction efforts have established small herds in Kern, San Benito, and San Luis Obispo Counties (CDFG and CIWTG 2005).

The pronghorn is the only member of the North American family *Antilocapridae*. Pronghorn measure approximately three feet high at the shoulder and weigh between 88 and 132 pounds. They are among the fastest land animals, reaching speeds of up to 44 mph (Smithsonian 2009). They avoid predators by visual detection and speed, and therefore prefer open grasslands and shrub communities with good horizontal visibility, gentle slopes, and few obstacles to movement. Pronghorn inhabit low-growing vegetation communities, including sagebrush, bitterbrush, open pinyon-juniper, grassland, and alkali desert scrub. They will also use alfalfa fields and other grain croplands, particularly when forage conditions are reduced in natural vegetation communities.

During biological field surveys conducted to date, no pronghorn or their sign were detected on the Project site. Pronghorn have been observed foraging within the access road/Hwy 41 improvement areas. They have also been documented in Cholame Valley, both east and west of the access road/Hwy 41 improvement areas, and infrequently within the southern portion of the Project site (Penrod et al. 2010). Pronghorn in the vicinity of the Project site and access road/Hwy 41 improvement areas are designated by CDFW as occurring within the Cholame Valley group (D. Hacker, pers. comm.). This group comprises approximately 40–50 individuals; CDFW's goal is to manage the herd such that the population grows to approximately 100 individuals (R. Stafford, pers. comm.).

Penrod et al. (2010) modeled habitat suitability for pronghorn in the Project vicinity and along the access road/Hwy 41 improvement area using vegetation type, slope and road density. The model reflected that pronghorn prefer gentle slopes, open terrain, short vegetation and few barriers (Penrod et al. 2010). Cholame Valley, to the west, was delineated as having habitat of medium-high or high suitability. Within the Project site and along the access road/Hwy 41 improvement areas, there are areas with medium, medium-high, and high suitability values (Penrod et al. 2010).

Penrod et al. (2010) also modeled landscape permeability (relative cost for a species to move between target areas), using factors considered most influential on pronghorn movement between the Cholame Valley and Carrizo Plain. In the model, Cholame Valley was identified as a Target Zone, meaning the area represents a known herd range that should remain connected to the Carrizo Plain herd. The model also identified a least-cost movement corridor for pronghorn between the Cholame Valley and Carrizo Plain (Penrod et al. 2010), which the Project site does not overlap.

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Appendix A. Plants Observed within the BSA

Plants Observed within the Biological Study Area

Family Name	Scientific Name	Common Name
Adoxaceae	*Sambucus nigra* ssp. *coerulea*	Blue elderberry
Agavaceae	*Chlorogalum pomeridianum* var. *pomeridianum*	Wavyleaf soap plant
Alliaceae	*Allium crispum*	Crinkled onion
Anacardiaceae	*Schinus molle*	Peruvian peppertree
Apiaceae	*Bowlesia incana*	Hoary bowlesia
	Daucus pusillus	American wild carrot
	Lomatium utriculatum	Common lomatium
	Lomatium macrocarpum	Bigseed biscuitroot
	Sanicula bipinnata	Poison sanicle
	Sanicula crassicaulis	Pacific blacksnakeroot
	Torilis arvensis	Tall sock-destroyer
Apocynaceae	*Asclepias fascicularis*	Narrow-leaf milkweed
	Asclepias californica	California milkweed
Asteraceae	*Achillea millefolium*	Common yarrow
	Achyrachaena mollis	Blow wives
	Acroptilon repens	Russian knapweed
	Agoseris heterophylla var. *cryptopleura*	Annual agoseris
	Agoseris hirsuta	Woolly goat chicory
	Ancistrocarphus filagineus	False neststraw
	Calycadenia (multiglandulosa)	Sticky western rosinweed
	Centaurea melitensis	Maltese star-thistle
	Centaurea solstitialis	Yellow star-thistle
	Centromadia pungens ssp. *pungens*	Common tarweed
	Chaenactis glabriuscula var. *megacephala*	Yellow pincushion
	Chaenactis xantiana	Fleshy pincushion
	Cirsium occidentale var. *californicum*	Cobwebby thistle
	Corethrogyne filaginifolia	Common sandaster
	Cotula coronopifolia	Common brassbuttons
	Deinandra halliana	Hall's tarweed
	Deinandra kelloggii	Kellogg’s tarweed
	Deinandra pallida	Kern tarweed
	Ericameria linearifolia	Narrowleaf goldenbush

Family Name	Scientific Name	Common Name
	Eriophyllum confertiflorum	Golden yarrow
	Euthamia occidentalis	Western goldentop
	Helianthus annuus	Common sunflower
	Hesperevax caulescens	Dwarf-dwarf cudweed
	Hesperevax sparsiflora var. *sparsiflora*	Erect dwarf cudweed
	Heterotheca sessiliflora	Sessile false goldenaster
	Hypochaeris glabra	Smoot cat's-ear
	Isocoma acradenia	Alkali goldenbush
	Isocoma (menziesii)	Coastal goldenbush
	Lactuca serriola	Prickly lettuce
	Lagophylla ramosissima	Branched lagophylla
	Lasthenia californica	California goldfields
	Lasthenia fremontii	Fremont's goldfields
	Lasthenia gracilis	Needle goldfields
	Lasthenia microglossa	Small-ray goldfields
	Lasthenia minor	Coastal goldfields
	Layia platyglossa	Coastal tidytips
	Lepidospartum squamatum	California broomsage
	Leptosyne bigelovii	Bigelow's tickseed
	Lessingia (nemaclada)	Slender stem lessingia
	Malacothrix coulteri	Snake's-head
	Matricaria discoidea	Disc mayweed
	Micropus californicus var. *californicus*	Q-tips
	Microseris (campestris)	San Joaquin siverpuffs
	Microseris douglasii ssp. *douglasii*	Douglas' silverpuffs
	Microseris douglasii ssp. tenella	Douglas' silverpusffs
	Microseris (elegans)	Elegant siverpuffs
	Monolopia lanceolata	Common monolopia
	Pseudognaphalium luteoalbum	Jersey cudweed
	Packera breweri	Brewer's ragwort
	Rigiopappus leptocladus	Wireweed
	Senecio vulgaris	Common groundsel
	Silybum marianum	Blessed milkthistle
	Stephanomeria pauciflora	Brownplume wirelettuce
	Stephanomeria (virgata)	Rod wirelettuce

Family Name	Scientific Name	Common Name
	Taraxacum officinale	Common dandelion
	Tragopogon dubius	Yellow salsigy
	Uropappus lindleyi	Lindley's siverpuffs
	Xanthium strumarium	Cocklebur
Boraginaceae	*Amsinckia douglasiana*	Douglas' fiddleneck
	Amsinckia intermedia	Common fiddleneck
	Amsinckia lycopsoides	Bugloss-flowered fiddleneck
	Amsinckia menziesii	Common fiddleneck
	Amsinckia tessellata var. *gloriosa*	Carrizo fiddleneck
	Amsinckia tessellata var. *tessellata*	Desert fiddleneck
	Cryptantha barbigera var. barbigera	Bearded cryptantha
	Cryptantha (clevelandii var. *florosa)*	Coastal cryptantha
	Cryptantha corollata	Coast range cryptantha
	Cryptantha flaccida	Weak-stemmed cryptantha
	Heliotropium curassavicum	Salt heliotrope
	Nemophila menziesii	Baby blue eyes
	Nemophila pedunculata	Littlefoot nemophila
	Pectocarya linearis ssp. *ferocula*	Sagebrush combseed
	Pectocarya penicillata	Sleeping combseed
	Phacelia ciliata	Great Valley phacelia
	Phacelia distans	Distant phacelia
	Phacelia egena	Kaweah River phacelia
	Phacelia tanacetifolia	Lacy phacelia
	Pholistoma membranaceum	White fiestaflower
	Plagiobothrys sp.	Popcornflower
	Plagiobothrys acanthocarpus	Adobe popcornflower
	Plagiobothrys arizonicus	Arizona popcornflower
	Plagiobothrys canescens	Valley popcornflower
	Plagiobothrys fulvus var. *campestris*	Fulvous popcornflower
	Plagiobothrys infectivus	Dye popcornflower
	Plagiobothrys tenellus	Pacific popcornflower
Brassicaceae	*Athysanus pusillus*	Common sandweed
	Athysanus unilateralis	Ladiestongue mustard
	Brassica nigra	Black mustard
	Capsella bursa-pastoris	Shepherd's purse

Family Name	Scientific Name	Common Name
	Caulanthus lasiophyllus	California mustard
	Descurainia pinnata ssp. *brachycarpa*	Western tansymustard
	Descurainia sophia	Herb sophia
	Erysimum capitatum	Sanddune wallflower
	Lepidium dictyotum	Alkali pepperwort
	Lepidium nitidum	Shining pepperweed
	Lepidium strictum	Upright pepperweed
	Nasturtium officinale	Watercress
	Raphanus sativus	Radish
	Sisymbrium altissimum	Tall tumblemustard
	Sisymbrium orientale	Indian hedgemustard
	Thysanocarpus curvipes	Sand fringepod
	Thysanocarpus laciniatus var. *laciniatus*	Mountain fringepod
	Tropidocarpum gracile	Dobie pod
Caryophyllaceae	*Cerastium glomeratum*	Sticky chickweed
	Herniaria hirsuta	Hairy rupturewort
	Minuartia californica	California sandwort
	Spergularia rubra	Red sandspurry
	Stellaria media	Common chickweed
	Stellaria nitens	Shining chickweed
Ceratophyllaceae	*Ceratophyllum demersum*	Coon’s tail
Chenopodiaceae	*Atriplex argentea*	Silverscale saltbush
	Atriplex coronata var. *coronata*	Crownscale
	Atriplex fruticulosa	Ball saltbush
	Chenopodium album	lambsquarters
	Chenopodium californicum	California goosefoot
	Monolepis nuttalliana	Nuttall's poverty weed
Convolvulaceae	*Calystegia collina* ssp. *venusta*	South coast range morning-glory
	Convolvulus arvensis	Field bindweed
	Convolvulus simulans	Small-flowered morning-glory
Crassulaceae	*Crassula connata*	Sand pygmyweed
Cupressaceae	*Juniperus californica*	California juniper
Cyperaceae	*Carex spp.*	Sedge
	Carex (praegracilis)	Clustered field sedge

Family Name	Scientific Name	Common Name
	Eleocharis parishii	Parish's spikerush
	Schoenoplectus sp.	Bulrush
Euphorbiaceae	*Chamaesyce ocellata*	Contura Creek sandmat
	Croton setiger	Dove weed
	Euphorbia peplus	Petty spurge
Fabaceae	*Acmispon brachycarpus*	Foothill deervetch
	Acmispon wrangelianus	Chilean bird's-foot trefoil
	Astragalus didymocarpus var. *didymocarpus*	Dwarf white milkvetch
	Astragalus douglasii var. *douglasii*	Parish's milkvetch
	Astragalus gambelianus	Gambel's dwarf milkvetch
	Astragalus oxyphysus	Mt. Diablo milkvetch
	Lupinus albifrons	Silver lupine
	Lupinus bicolor	Miniature lupine
	Lupinus concinnus	Bajada lupine
	Lupinus microcarpus var. *microcarpus*	Chick lupine
	Lupinus succulentus	Hollowleaf annual lupine
	Medicago polymorpha	Burclover
	Melilotus indicus	Annual yellow sweetclover
	Trifolium albopurpureum	Rancheria clover
	Trifolium depauperatum var. *amplectens*	Balloon sack clover
	Trifolium depauperatum var. *depauperatum*	Dwarf sack clover
	Trifolium gracilentum	Pinpoint clover
	Trifolium willdenovii	Tomcat clover
	Vicia villlosa	Winter vetch
Fagaceae	*Quercus douglasii*	Blue oak
	Quercus lobata	Valley oak
Frankeniaceae	*Frankenia salina*	Alkali seaheath
Geraniaceae	*California macrophylla*	Roundleaf stork's bill
	Erodium botrys	Longbeak stork's bill
	Erodium brachycarpum	Shortfruit stork's bill
	Erodium cicutarium	Redstem stork's bill
	Erodium moschatum	Musky stork's bill
	Geranium dissectum	Cutleaf geranium
Grossulariaceae	*Ribes aureum* var. *gracillimum*	Bitter gooseberry
Juglandaceae	*Juglans hindsii*	Black walnut

Family Name	Scientific Name	Common Name
Juncaceae	*Juncus balticus*	Baltic rush
	Juncus bufonius var. bufonius	Toad rush
	Juncus mexicanus	Mexican rush
	Juncus xiphioides	Irisleaf rush
Lamiaceae	*Marrubium vulgare*	Horehound
	Salvia columbariae	Chia
	Trichostema lanceolatum	Vinegarweed
Lemnaceae	*Lemna sp.*	Duckweed
Malvaceae	*Malva parviflora*	Cheeseweed mallow
	Malvella leprosa	Alkali mallow
Montiaceae	*Calandrinia ciliata*	Fringed redmaids
	Claytonia exigua ssp. *exigua*	Serpentine springbeauty
	Claytonia parviflora ssp. *parviflora*	Streambank springbeauty
	Claytonia perfoliata ssp. *perfoliata*	Miner's lettuce
Myrtaceae	*Eucalyptus sp.*	Gum
Oleaceae	*Olea europaea*	Olive
Onagraceae	*Camissoniopsis intermedia*	*Intermediate suncup*
	Clarkia affinis	Chaparral clarkia
	Clarkia purpurea ssp. *quadrivulnera*	Winecup clarkia
	Eremothera boothii ssp. *decorticans*	Booth's evening-primrose
	Tetrapteron graciliflorum	Hill suncup
Orobanchaceae	*Castilleja attenuata*	Valley tassels
	Castilleja brevistyla	Shortstyle Indian paintbrush
	Castilleja exserta ssp. *exserta*	Exserted Indian paintbrush
Papaveraceae	*Eschscholzia californica*	California poppy
	Eschscholzia lobbii	Fryingpans
	Platystemon californicus	Creamcups
Phrymaceae	*Mimulus guttatus*	Seep monkeyflower
Plantaginaceae	*Collinsia heterophylla* var. *heterophylla*	Purple Chinese houses
	Collinsia sparsiflora var. *collina*	Spinster’s blue eyed Mary
	Plantago elongata	Prairie plantain
	Plantago erecta	Dotseed plantain
	Veronica anagallis-aquatica	Water speedwell
Poaceae	*Avena barbata*	Slender oat
	Avena fatua	Wild oat

Family Name	Scientific Name	Common Name
	Bromus diandrus	Ripgut brome
	Bromus hordeaceus	Soft brome
	Bromus madritensis	Compact brome
	Bromus tectorum	Cheatgrass
	Crypsis (schoenoides)	Swamp pricklegrass
	Deschampsia danthonioides	Annual hairgrass
	Distichlis spicata	Saltgrass
	Elymus caput-medusae	Medusahead
	Elymus elymoides	Squirreltail
	Elymus (glaucus)	Blue wildrye
	Elymus multisetus	Big squirreltail
	Elymus triticoides	Beardless wildrye
	Festuca microstachys	Squirrelgrass
	Festuca myuros	Annual fescue
	Hordeum brachyantherum	Meadow barley
	Hordeum depressum	Dwarf barley
	Hordeum marinum ssp. *gussonianum*	Mediterranean barley
	Hordeum murinum ssp. *glaucum*	Smooth barley
	Hordeum murinum ssp. *leporinum*	Hare barley
	Lamarckia aurea	Goldentop grass
	Melica californica	California melicgrass
	Phalaris paradoxa	Hood canarygrass
	Poa secunda	Sandberg bluegrass
	Polypogon monspeliensis	Annual rabbitsfoot grass
	Schismus arabicus	Arabian schismus
	Stipa cernua	Nodding needlegrass
	Stipa pulchra	Purple needlegrass
Polemoniaceae	*Gilia clivorum*	Purple spot gilia
	Gilia jacens	Nevada gilia
	Gilia tricolor	Bird's-eye gilia
	Leptosiphon bicolor	True babystars
	Leptosiphon parviflorus	Variable linanthus
	Microsteris gracilis	Slender phlox
	Navarretia mitracarpa	Pincushion plant
	Navarretia nigelliformis spp. *(radians)*	Shining navarretia

Family Name	Scientific Name	Common Name
Polygonaceae	*Chorizanthe biloba* var. *(biloba*	Two-lobe spineflower
	Chorizanthe membranacea	Pink spineflower
	Chorizanthe ventricosa	Potbellied spineflower
	Eriogonum angulosum	Angle-stem wild buckwheat
	Eriogonum nudum var. *indictum*	Protruding buckwheat
	Eriogonum temblorense	Temblor buckwheat
	Hollisteria lanata	False spineflower
	Polygonum aviculare ssp. *aviculare*	Knotweed
	Polygonum aviculare ssp. depressum	Knotweed
	Rumex californicus	Toothed willow dock
	Rumex crispus	Curly dock
Primulaceae	*Androsace elongata* ssp. *acuta*	California rockjasmine
Ranunculaceae	*Delphinium sp.*	Delphinium
	Delphinium (gypsophilum)	Panoche Creek larkspur
	Delphinium parryi ssp. *parryi*	Parry's larkspur
	Ranunculus californicus var. *californicus*	California buttercup
	Ranunculus hebecarpus	Delicate buttercup
Rosaceae	*Aphanes occidentalis*	Field parsley piert
	Prunus (dulcis)	Sweet almond
Rubiaceae	*Galium aparine*	Stickywilly
	Galium parisiense	Wall bedstraw
Salicaceae	*Populus fremontii*	Fremont cottonwood
	Salix laevigata	Red willow
Saururaceae	*Anemopsis californica*	Yerba mansa
Simaroubaceae	*Ailanthus altissima*	Tree of heaven
Solanaceae	*Nicotiana glauca*	Tree tobacco
Themidaceae	*Brodiaea terrestris* ssp. *terrestris*	Dwarf brodiaea
	Dichelostemma capitatum	Blue dicks
Typhaceae	*Typha (latifolia)*	Broadleaf cattail
Urticaceae	*Urtica dioica* ssp. *holosericea*	California nettle
	Urtica urens	Dwarf nettle
Valerianaceae	*Plectritis ciliosa*	Longspur seablush
Zannichelliaceae	*Zannichellia palustris*	Horned pondweed

* use of parentheses indicates uncertainty in the identification of a specimen located on the Project site due to a lack of floral characteristics required for accurate identification (often due to early phenology during the site visit).

Appendix B. Mammals Observed within the BSA

Mammals observed during burrowing animal surveys at the proposed California Flats Solar Project.

Species Common Name	Scientific Name
San Joaquin kit fox	*Vulpes macrotis mutica*
American badger	*Taxidea taxus*
coyote	*Canus latrans*
Heerman's kangaroo rat	*Dipodomys heermanni*
narrow-faced kangaroo rat	*Dipodomys venustus*
raccoon	*Procyon lotor*
feral pigs	*Sus scrofa*
black-tailed jackrabbit	*Lepus californicus*
desert cottontail	*Sylvilagus audobonii*
California ground squirrel	*Otospemrophilus beecheyi*
Botta's pocket gopher	*Thomomys bottae*

Appendix C. Birds Observed within the BSA

Birds observed through May 2013 at the proposed California Flats Solar Project.

Species Common Name	Scientific Name
Mallard	*Anas platyrhynchos*
Green-winged teal	*Anas crecca*
Ring-necked duck	*Aythya collaris*
Bufflehead	*Bucephala albeola*
Ruddy duck	*Oxyura jamaicensis*
California quail	*Callipepla californica*
Great egret	*Ardea alba*
Bald eagle	*Haliaeetus leucocephalus*
Northern harrier	*Circus cyaneus*
Cooper’s hawk	*Accipiter cooperi*
Red-tailed hawk	*Buteo jamaicensis*
Ferruginous hawk	*Buteo regalis*
Swainson’s hawk	*Buteo swainsoni*
Golden eagle	*Aquila chrysaetos*
American kestrel	*Falco sparverius*
Prairie falcon	*Falco mexicanus*
American coot	*Fulica americana*
Killdeer	*Chadadrius vociferus*
Long-billed curlew	*Numenius americanus*
Wilson’s snipe	*Gallinago gallinago*
Mourning dove	*Zenaida macroura*
Rock dove	*Columba livia*
Greater roadrunner	*Geococcyx californianus*
Short-eared Owl	*Asio flammeus*
Great horned owl	*Bubo virginianus*
Burrowing owl	*Athene cunicularia*
Lewis’s woodpecker	*Melanerpes lewis*
Nuttall’s woodpecker	*Picoides nuttallii*
Northern flicker	*Colaptes auratus*
Pacific-slope flycatcher	*Empidonax difficilis*
Black phoebe	*Sayornis nigricans*
Say’s phoebe	*Sayornis saya*
Ash-throated flycatcher	*Myiarchus cinerascens*
Western kingbird	*Tyrannus verticalis*
Loggerhead shrike	*Lanius ludovicianus*
Western scrub-jay	*Aphelocoma californica*
Yellow-billed magpie	*Pica nuttalli*
American crow	*Corvus brachyrhynchos*
Common raven	*Corvus corax*
Horned lark	*Eremophila alpestris*
Tree swallow	*Tachycineta bicolor*
Cliff swallow	*Petrochelidon pyrrhonota*

Oak titmouse	*Baeolophus inornatus*
White-breasted nuthatch	*Sitta carolinensis*
Rock wren	*Salpinctes obsoletus*
Bewick's wren	*Thryomanes bewickii*
Ruby-crowned kinglet	*Regulus calendula*
Mountain bluebird	*Sialia currucoides*
Western bluebird	*Sialia mexicana*
Northern mockingbird	*Mimus polyglottos*
European starling	*Sturnus vulgaris*
American pipit	*Anthus rubescens*
Common yellowthroat	*Geothlypis trichas*
Yellow-rumped warbler	*Setophaga coronata*
Wilson's warbler	*Cardellina pusilla*
Savannah sparrow	*Passerculus sandwichensis*
Lark sparrow	*Chondestes grammacus*
Song sparrow	*Melospiza melodia*
White-crowned sparrow	*Zonotrichia leucophrys*
Dark-eyed junco	*Junco hyemalis*
Western tanager	*Piranga ludoviciana*
Western meadowlark	*Sturnella neglecta*
Red-winged blackbird	*Agelaius phoeniceus*
Tricolored blackbird	*Agelaius tricolor*
Brewer's blackbird	*Euphagus cyanocephalus*
Bullock's oriole	*Icterus bullockii*
House finch	*Carpodacus mexicanus*
Lawrence's goldfinch	*Spinus lawrencei*
American goldfinch	*Spinus tristis*

Appendix D. San Joaquin Kit Fox Recovery Areas (USFWS 2007)

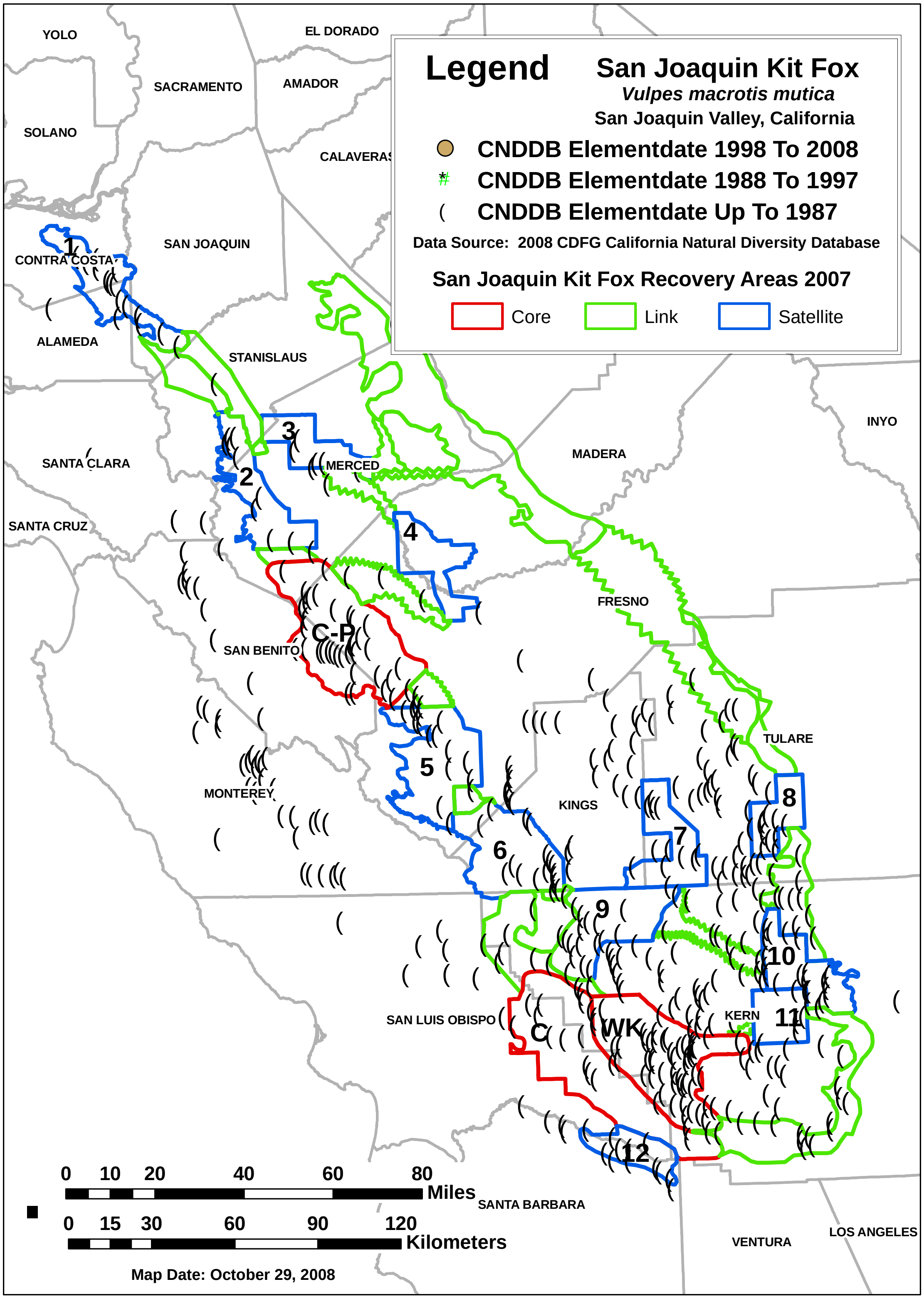

Figure 1A-C: Maps of recorded occurrences of San Joaquin kit fox, for three time periods: 1950-1987 (A), 1988-1997 (B) and 1998-2008 (C). Shown in relation to currently described Recovery Core Areas, Satellite Areas and Linkages. Core Areas: WK (Western Kern County), C (Carrizo Plains), C-P (Ciervo-Panoche); Satellite Areas: 1-12, see Table 1 for Satellite Area names. Satellite 13 (Salinas-Pajaro) has not yet been delineated.

Appendix B

2013 and 2014 Raptor Nest Survey Reports

H. T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

Baseline Raptor Nest Surveys for the Proposed California Flats Solar Project in Monterey County, California: 2013

Project # 3308-01

Prepared for:

California Flats, LLC
135 Main Street, 6th Floor
San Francisco, CA 94105

Prepared by:

H. T. Harvey & Associates

September 2013

Executive Summary

The California Flats Solar Project (Project) is a 280-megawatt photovoltaic solar power plant proposed for development in southeastern Monterey County, California (Figure 1). When approved, the solar facility and related operations infrastructure (Project site) will be built on approximately 1037 hectares (2562 acres) of the 29,137-hectare (72,000-acre) Jack Ranch, which is a working cattle ranch. The overall development will include improvements to an existing access road and its connection to a California Department of Transportation (Caltrans) right-of-way at California State Route 41 (access road/Hwy 41 improvement areas). Together, the Project site and access road/Hwy 41 improvement areas constitute the 1058-hectare (2615-acre) Project impact area (PIA), where all direct, Project-related impacts will occur. A biological study area (BSA) was delineated around the PIA, within which most Project-related biological surveys and assessments are being conducted (Figure 1).

The landscape in the Project vicinity is dominated by gently rolling terrain and grasslands, surrounded by woodlands and shrublands where various trees and rocky outcrops provide nest substrates suited to eagles and other raptors. Before this study, golden eagles (*Aquila chrysaetos*) were known to occur in the area and nest in nearby regions, but their nesting distribution around the proposed Project site was not well known.

This report summarizes the results of baseline surveys for nesting raptors conducted around the Project in 2013. The goals of the surveys were to determine the degree to which Project development might influence the nesting and foraging activities of golden eagles whose home ranges overlap the PIA, and to assess the potential for Project development to adversely affect other raptors that nest or roost on or near the Project site.

The study involved both aerial (helicopter) and ground surveys. The primary objectives of the helicopter surveys, conducted in late March and mid-May, were: 1) achieve a comprehensive, baseline inventory of golden eagle, bald eagle (*Haliaeetus leucocephalus*), and California condor (*Gyps californicus*) occupied nesting territories, nest locations, and nesting activity within 16 kilometers (10 miles) of the Project site (Figure 1); 2) search for potential Swainson's hawk (*Buteo swainsoni*) nesting territories within 8 kilometers (5 miles) of the Project site; and 3) obtain an indication of nesting success and productivity for the local golden eagle population. The objective of the ground surveys, conducted from March through June, was to collect additional information about raptor nesting activity on the Project site and within a 500-meter (1640-foot) buffer area.

The aerial surveys confirmed 12 active (eggs laid) golden eagle nests, one active bald eagle nest, and no condors or Swainson's hawks within the overall survey area (Table 1, Figures 2 and 3). None of the active eagle nests were located in the PIA. The active bald eagle nest was located 6.5 kilometers (4.0 miles) southwest of the nearest PIA boundary. The active golden eagle nest closest to a PIA boundary was located 0.5 kilometer (0.3 mile) from a proposed solar array location. Two other active golden eagle nests were located 3.0 and 3.2 kilometers (1.9 and 2.0 miles) west of the Project site. Five other active golden eagle nests were located ≤8 kilometers (5 miles) from the nearest PIA boundary. The distance from the nearest project-site boundary to a definitive eagle nest (active or inactive) averaged 7.7 kilometers with a standard deviation (SD) of ±5.1 kilometers (4.8±3.1 miles). The distance to the nearest access road/Hwy 41 improvement area averaged 9.2±5.6 kilometers (5.7±3.5 miles). Most eagle nests were in large gray pines (*Pinus sabiniana*), oaks (*Quercus douglasii* or *Q. lobata*), or black cottonwoods (*Populus trichocarpa*).

The available evidence indicated the following for golden eagles within 16 kilometers (10 miles) of the Project site:

- Twelve active (eggs laid) nests
- Two apparently inactive, confirmed territories occupied by distinct pairs of adult eagles and containing a well-maintained, definitive eagle nest
- Two inactive, confirmed territories occupied by an adult eagle and containing a well-maintained or newly constructed, definitive eagle nest
- Two inactive, probable territories occupied by an adult eagle and containing a definitive eagle nest
- Three inactive, probable territories occupied by a pair of adult eagles and containing a potential nest
- Six or seven inactive, possible territories occupied by an adult eagle and containing a potential nest
- One or two other distinct pairs of adult eagles that did not appear to be affiliated with a potential nest site
- Several other individual adult and subadult eagles that appeared to be "floaters" (i.e., potential breeding birds that have not yet established a breeding territory)

Of the 21 confirmed or probable golden eagle nesting territories, 7 (33%) were located in Cholame Valley, 6 (29%) were located in the Cholame Hills, 4 (19%) were located in other areas on the west side of the Diablo Range, 3 (14%) were located on the east side of the Diablo Range, and 1 (5%) was located in the northern Temblor Range (Figure 2). Most likely, at least two other golden eagle nesting areas were located on the east side of the Diablo Range, with other possibilities on the west side of the Diablo Range (1), in the northern Temblor Range (1), in the Cholame Hills (2), and in Cholame Valley (1).

For projects located near active golden eagle nests, the U.S. Fish and Wildlife Service (USFWS) typically recommends observing a 1.6-kilometer (1-mile) no-disturbance buffer around such nests (from 1 February through 31 August), unless vegetative or topographic features screen the nest from direct view, in which case a smaller buffer may be acceptable. Four of the confirmed or probable golden eagle nests (active nest 13A and occupied/inactive nests 18A, 19A, and 20A), and one other potential eagle nest (28A), were located within 1.6 kilometers (1 mile) of the PIA (Figure 4). Topographic features and woodland cover shielded nests 18A and 28A from direct view of the Project. Three other active golden eagle nests were in direct line-of-sight of the PIA, but at distances of 2.8–3.9 kilometers (1.7–2.4 miles; nests 2A, 4A, and 12A; Figures 4 and

5). Intervening hills and woodlands screened two other active golden eagle nests, located at similar distances, from view of the PIA (nests 11A and 14A; Figures 4 and 5).

Nearest-neighbor distances among the 13 active eagle (bald and golden) nests (i.e., the closest distance from one nest to another) ranged from 2.7–10.2 kilometers (1.7–6.3 miles) and averaged 5.8±2.8 kilometers (3.6±1.8 miles). When we included all nesting areas occupied by an adult eagle and containing a confirmed eagle nest, the average decreased to 4.9±2.5 kilometers (3.0±1.1 miles). When we included all potential nesting areas occupied by an adult eagle and containing at least a potential eagle nest, the average decreased to 4.0±1.7 kilometers (2.5±1.1 miles). Understanding that eagle home ranges are not necessarily circular in nature, the nearest-neighbor calculations for this study population suggested that the typical foraging range for territorial eagles that nest in the area might be on the order of 2–3 kilometers (1.2–1.9 miles). This range of values translates to a conservative projection that Project development is likely to affect the foraging home ranges of eagles that nest within 3 kilometers (1.9 miles) of the PIA. In 2013, such nests represented four confirmed (2A, 11A, 13A, and 18A), two probable (19A and 20A), and two possible (24A and 28A) golden eagle nesting territories (Figure 6).

We estimated complete nesting phenology (life-cycle timing) for nine golden eagle nests that produced chicks (Table 2). Incubation began between 5 February and 13 March, with an average start date of 24 February ± 13 days. Estimated hatching dates ranged from 19 March to 24 April (average 7 April ± 13 days), and fledging dates ranged from 25 May to 30 June (average 13 June ± 13 days). The indicated phenology was similar to the timing shown in a similar study area located 48–64 kilometers (30–40 miles) south of the Project, and was similar to that found elsewhere in central and southern California.

The single bald eagle nest failed during incubation or before the chicks reached an age that would have left behind definitive evidence (i.e., whitewash, downy feathers, and prey remains). Three of the 12 active golden eagle nests definitely failed before fledging chicks, two most likely during incubation and one with at least one and possibly two 5–7-week-old chicks dead on the nest (Table 3). By the May surveys, the nine remaining active golden eagle nests had each raised two chicks to ages ranging from 2–8 weeks. If all nine nests with live chicks in May successfully fledged two chicks, apparent nesting success would have been 75% of nest starts fledged, and the estimates of productivity would have been 1.5 fledglings per nest start and 2.0 fledglings per successful nest, a productive season for those pairs that nested.

Besides eagles, the aerial surveys documented numerous active and inactive red-tailed hawk (*Buteo jamaicensis*) nests scattered throughout the survey area (Figure 3). These included five active red-tailed hawk nests located on the Project site or within the 500-meter (1640-feet) buffer area (Table 4, Figure 4). In addition, the ground surveys confirmed an active great horned owl (*Bubo virginianus*) nest just outside the southeast boundary of the Project site, in an ornamental tree grove (Table 4). American kestrels (*Falco sparverius*) also likely nested in several areas of the Project site or buffer zone (Figure 4). The only other non-vulture raptor species documented on or near the PIA during the survey period were several burrowing owls (*Athene cunicularia*), a short-eared owl (*Asio flammeus*), and several prairie falcons (*Falco mexicanus*). It is likely that at least one active burrowing owl nest occurred along the northwest border of the Project site, whereas a lack of suitable grassland cover likely precluded short-eared owls from nesting in the area in 2013. For prairie falcons, we documented no nest locations on or in the immediate vicinity of the PIA. There were, however, active prairie falcon nests 2.1 kilometers (1.3 miles) northwest and 3.2 kilometers (2.0 miles) east of the Project site, and several more active nests 6–10 kilometers (3.7–6.2 miles) from the PIA (Figure 3). We recorded foraging prairie falcons in the Project vicinity on several occasions.

This baseline survey resulted in a solid initial assessment of the apparent territory-occupancy, nest-activity, and productivity patterns of eagles in the overall survey area, and of other raptors on or near the PIA. As such, it provides a sound basis for formulating initial projections of the potential for Project development to affect nesting raptors.

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List of Contributors

Brian Boroski, Ph.D., Vice President and Senior Wildlife Ecologist—Principal-in-Charge
Scott B. Terrill, Ph.D., Vice President and Senior Ornithologist—Technical Advisor
Jeff P. Smith, Ph.D., Senior Wildlife Ecologist—Project Manager and Report Author
Jeff Zirpoli, M.S., Wildlife Ecologist—Assistant Surveyor and Report Author
Colleen Lenihan, Ph.D., Wildlife Ecologist—Assistant Surveyor

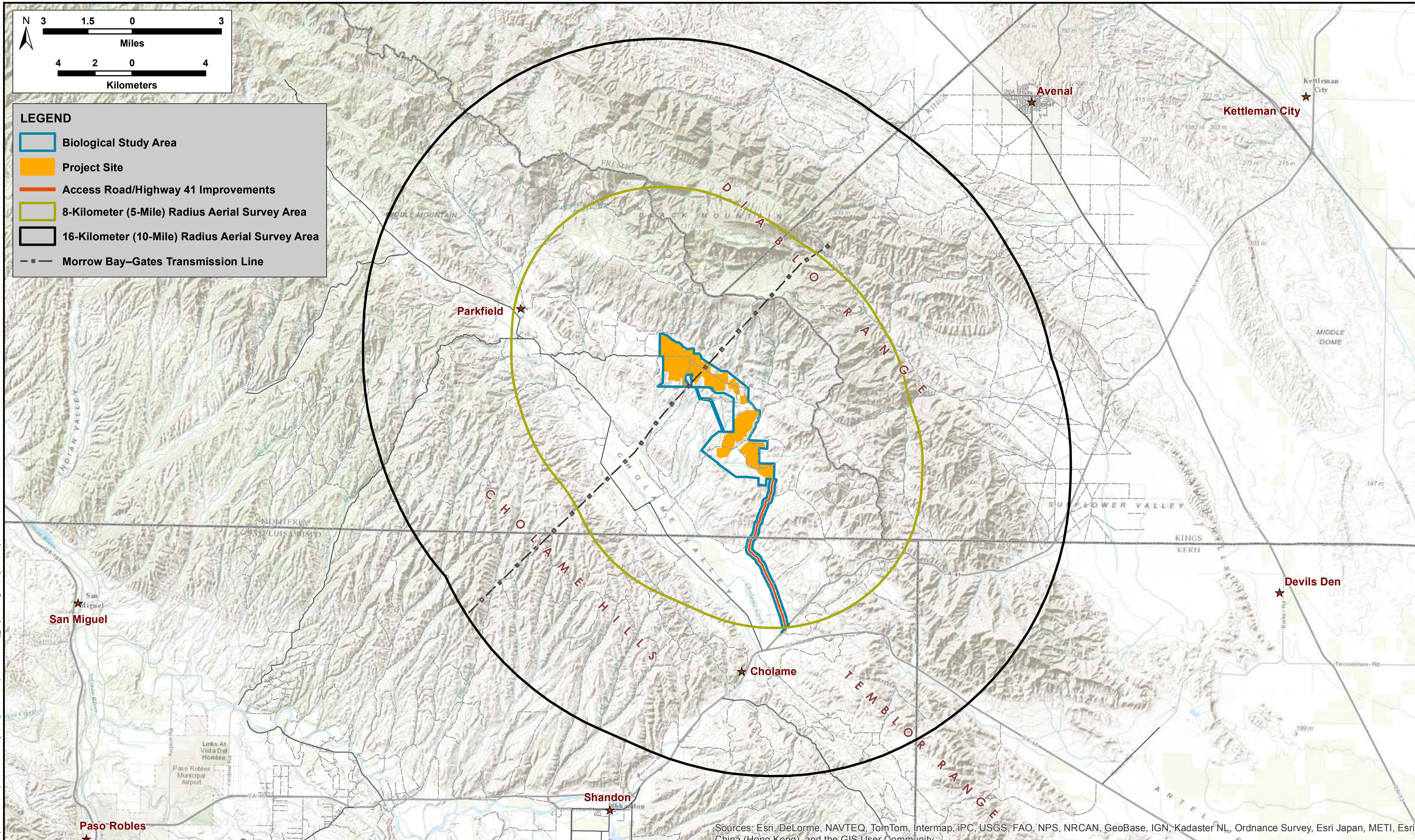
Section 1.0 Introduction

The California Flats Solar Project (Project) is a 280-megawatt photovoltaic solar power plant proposed for development in southeastern Monterey County, California (Figure 1). When approved, the solar facility and related operational infrastructure (Project site) will be built on approximately 1037 hectares (2562 acres) of private ranchland. The 29,137-hectare (72,000-acre) Jack Ranch is a working cattle ranch located in an unincorporated area of southeastern Monterey County and northeastern San Luis Obispo County, near the borders of Kings and Fresno counties (Figure 1). The Project will include construction, installation, and operation of energy-related infrastructure (e.g., solar panels, inverters, substations, and new power poles and lines) and improvements needed to operate and maintain energy-related facilities (e.g., buildings, internal roadways, access roads, fencing, and lighting). The overall development will also include improvements to an existing access road and its connection to the California Department of Transportation (Caltrans) right-of-way at California State Route (Hwy) 41, approximately 8 kilometers (5 miles) south of the Project site (Figure 1). The access road/Hwy 41 improvement areas will encompass approximately 21.4 hectares (53 acres). Together, the Project site and access road/Hwy 41 improvement areas constitute the 1058-hectare (2615-acre) Project impact area (PIA), where all direct, Project-related impacts will occur. A biological study area (BSA) also was delineated around the PIA, within which most Project-related biological surveys and assessments are being conducted (Figure 1).

California Flats Solar, LLC, has developed a plan to construct and operate the proposed Project within the Competitive Renewable Energy Zone under the State's Renewable Energy Transmission Initiative. The site elevation and generally flat, south-facing topography creates an ideal place for solar development. Sunlight is plentiful year-round because the elevation places the site above the coastal marine layer, and the site does not receive winter fog from the Central Valley. The flat, south-facing topography minimizes the need for mass grading and alteration of landforms to position panels in a way that favors collection of solar energy. In addition, the Morrow Bay–Gates 230-kilovolt transmission line crosses the Project site, with capacity sufficient to accommodate the new power plant (partially represented in Figure 1).

The Project site is a landscape dominated by gently rolling terrain and grasslands, interspersed with several, mostly ephemeral, riparian corridors and drainages. The Project site is surrounded by woodlands and shrublands where various trees and rocky outcrops provide nest substrates suited to a variety of raptors.

This report summarizes the results of baseline surveys for nesting raptors conducted by H. T. Harvey & Associates (HTH) ecologists during the 2013 breeding season. The goals of the surveys were to determine the degree to which Project development might influence the nesting and foraging activities of golden eagles (*Aquila chrysaetos*) whose home ranges overlap the PIA, and to assess the potential for Project development to adversely affect other raptors that nest or roost on or near the PIA. Other special-status raptors of interest included bald eagle (*Haliaeetus leucocephalus*; state-listed as endangered), California condor (*Gyps californicus*; federally and state-listed as endangered), Swainson's hawk (*Buteo swainsoni*; state-listed as threatened), white-



J:\Reports\Wildlife Reports\Avian Activity Surveys\Annual Raptor Nest Survey_July 2013\Fig 1 Study Area Map.mxd

H. T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

First Solar

Figure 1: Study Area Map

California Flats Solar Project, California - Annual Raptor Nest Survey Report (3308-01)
September 2013

tailed kite (*Elanus leucurus*; fully protected in California), northern harrier (*Circus cyaneus*; California species of special concern [CSSC]), long-eared owl (*Asio otus*; CSSC), and short-eared owl (*Asio flammeus*; CSSC). Burrowing owls (*Athene cunicularia*; CSSC) also occur on the Project site (HTH 2013).

The survey work involved aerial (helicopter) and ground surveys. The objectives of the aerial surveys were: 1) achieve a comprehensive, baseline inventory of occupied golden eagle, bald eagle, and California condor nesting territories, nest locations, and nesting activity within 16 kilometers (10 miles) of the Project site (Figure 1); 2) search for potential Swainson's hawk nesting territories within 8 kilometers (5 miles) of the Project site; and 3) obtain an initial indication of nesting success and productivity for all active (eggs laid) eagle nests. The objective of the ground surveys was to collect additional information about raptor nesting activity on the Project site and within a 500-meter (1640-foot) buffer area, emphasizing species not easily discerned from the air, such as the cavity-nesting American kestrel (*Falco sparverius*).

Golden eagles forage throughout the year in the Project vicinity (HTH 2013). Golden eagles that forage in the area probably include both area residents and seasonal visitors; however, the relative contributions of year-round residents, seasonal residents, and transients to the population are unknown, as are the ranging dynamics of eagles that nest in the area. The Bald and Golden Eagle Protection Act (Eagle Act; U.S. Fish and Wildlife Service [USFWS] 2009a, 2009b, 2010) restricts actions that compromise the survival and productivity of both golden and bald eagles. Such actions include those that cause direct mortality of adults, eggs, or young, as well as those that, based on sound science, are known to lead indirectly to reduced eagle productivity and survival. The latter actions include modifying foraging habitat to a degree sufficient to cause abandonment of nesting territories, reduced nesting success and productivity, and/or lower juvenile or adult survival. Golden eagles are also designated by the State of California as fully protected, which affords the species additional protection (California Department of Fish and Wildlife [CDFW] 2013a).

To delineate the local nesting population of eagles in a proposed project area, the USFWS (2009a, 2012, 2013) recommends conducting baseline surveys throughout a 16-kilometer (10-mile) radius surrounding the proposed project site. The gathered information is used to estimate the average nearest-neighbor distance between nesting territories in the area. This metric is used as a coarse-scale indicator of average home-range size for the local population, which in turn is used as an indicator of the likely spatial sensitivity of specific nesting pairs to disturbance within their home ranges. Heretofore, the primary focus of the USFWS guidance has been wind-energy projects; however, the principles translate well to setting the stage for evaluating the potential impacts of other developments, such as solar facilities.

Prior to this survey work, the California Natural Diversity Database (CNDDB) (CDFW 2013b) contained no nesting records for golden or bald eagles within 32 kilometers (20 miles) of the Project, with the closest golden eagle nest located approximately 35 kilometers (22 miles) southwest, and the closest bald eagle nest located approximately 70 kilometers (27 miles) west of the site. Breeding bird atlas results for Monterey County (Roberson and Tenney 1993) did, however, indicate several confirmed and probable golden eagle breeding locations around the periphery of Cholame Valley and the Project site, and golden eagles are a known breeder in the mountains of this region and farther south (Thelander 1974, Latta 2010, HTH 2012).

Historically, Swainson's hawks nested throughout much of California in foothill and lowland areas where riparian woodlands and oak savannahs provided key nesting substrates and adjacent or intermixed native bunchgrass prairies were used as foraging habitat (Bloom 1980). Currently, however, only a fraction of once-prevalent native prairie and suitable riparian habitats remain in the state. As a result, nesting Swainson's hawks have been extirpated from most of their former range in southern California and now nest primarily in the Central Valley (Bradbury 2009). The nearest nesting records reported in the CNDDB (CDFW 2013b) were located more than 32 kilometers (20 miles) northeast and southeast of the Project site in the western San Joaquin Valley. Roberson (2002) reported that a few pairs nested around Cholame Valley until the mid-1970s, but since then there has been no confirmed nesting of Swainson's hawks in Monterey County, with most nesting in the general region shifted to the agricultural habitats of the Central Valley. There has, however, been one Swainson's hawk nesting territory active just west of Shandon (see Figure 1) in San Luis Obispo County for the past several years, approximately 21 kilometers (13 miles) southwest of the Project site and 19 kilometers (12 miles) from the beginning of the access road at Hwy 41 (Edell 2013). This activity and another nest in southern San Luis Obispo County represent a recent return of Swainson's hawk nesting activity to San Luis Obispo County (Edell, personal communication).

Moderately suitable nesting habitat for Swainson's hawks remains in the riparian and oak woodland portions of Cholame Valley, and the grasslands and nearby agricultural habitats (alfalfa) could again provide potential foraging habitat. The CDFW typically requires compensatory mitigation for any development that compromises Swainson's hawk nesting or foraging habitat within 5–10 miles of a known, recently active (within ≤5 years) nest site (California Department of Fish and Game [CDFG] 1994, CDFG and Yolo County HCP/NCCP Joint Powers Agency 2002, California Energy Commission and CDFG 2010). For these reasons, a secondary objective of this study was to search for nesting Swainson's hawks within 8 kilometers (5 miles) of the Project site.

The Project site lies within the historic and current range of the California condor, and provides potentially suitable foraging habitat for the species. Recent global positioning system (GPS) tracking data indicate that captive-released California condors periodically occur in the mountain ranges that border the Project site to the west, north, and east, and that condors were recorded in the Project vicinity in 2005 and 2006 (California Condor Wind Energy Work Group 2011, USFWS 2011). Because of this knowledge and the presence of potentially suitable roosting and nesting habitat in the surrounding mountain ranges, another objective of this study was to search for evidence of nesting or roosting condors throughout the aerial survey area.

Section 2.0 Methods

2.1 Study Area

The aerial survey area encompassed all of Cholame Valley (herein considered to encompass the PIA); roughly 42 kilometers (25 miles) of the southern Diablo Range to the east, north, and northwest; a small portion of the northern Temblor Range to the south; and the Cholame Hills to the west and southwest (Figure 1). Most of the drainages found in Cholame Valley are seasonally ephemeral, including most of Cholame Creek, which runs the length of the valley. Cottonwood Creek, which drains the southeastern Diablo Range and crosses the southeastern portion of the Project site, is semi-perennial. A sparse array of livestock ponds and other small, artificial reservoirs also dot the landscape.

The rural community of Parkfield is 7.6 kilometers (4.7 miles) northwest of the Project site, in upper Cholame Valley. The Hwy 41 and Hwy 46 corridors converge in the southeastern section of the survey area; the single two-lane highway then continues west through the town of Shandon, about 4.2 kilometers (2.6 miles) outside the southwestern margin of the survey area, and on to Paso Robles and the north-south U.S. Interstate 101 corridor, about 28 kilometers (17.5 miles) farther west. Otherwise, most of the survey area and surrounding landscape consists of working cattle ranches with sparse residential settlements, as well as other private landholdings containing small farms and remote hunting/recreation areas with cabins. In addition, portions of Jack Ranch and other landholdings around Parkfield, in the floodplain areas of Cholame Valley, support limited areas of dry-farmed and variably-irrigated grain crops and hayfields.

The overall survey area and Project site provide habitat for diverse plant and animal species, including several federal and California special-status species besides the raptors already discussed. These species include San Joaquin kit fox (*Vulpes macrotis mutica*; federally and state-listed as endangered), western pond turtle (*Actinemys marmorata*; CSSC), loggerhead shrike (*Lanius ludovicianus*; CSSC), and shining navarretia (*Navarretia nigelliformis*; California Native Plant Society Rank 1B). Several other raptor species also use the area for nesting, foraging, and wintering.

The Project site supports primarily California annual grassland dominated by non-native grasses typical of the region, but also a healthy complement of native forbs. Other habitats found on the Project include wildflower field, serpentine bunchgrass grassland, Valley needlegrass grassland, grassland riparian, interior Coast Range goldenbush scrub, willow–cottonwood riparian woodland, gray pine woodland, ornamental non-native woodland, blue oak woodland, valley oak riparian woodland, ephemeral stream, intermittent stream, perennial stream, perennial marsh, seasonal wetland, and developed/ruderal grassland.

The portion of the Diablo Range that runs through the aerial survey area rises to a maximum elevation of approximately 1180 meters (3871 feet) about 9.2 kilometers (5.7 miles) north-northwest of the Project site. In the survey area, the eastern portions of the Diablo Range contain a variety of rocky outcrops and ridgelines potentially suited to nesting golden eagles, prairie falcons (*Falco mexicanus*), and common ravens (*Corvus corax*). Otherwise, much of the middle- and high-elevation portions of the Diablo Range are covered by dense chaparral and scrubby oak woodlands, interspersed with gray pines (*Pinus sabiniana*) in many areas. The gray pines and cliffs/outcrops in such habitat may support an occasional golden eagle nest, if located close enough to suitable foraging areas, but such densely vegetated areas do not constitute suitable foraging habitat for eagles. In contrast, the lower-elevation areas, with open oak savannas (blue oak [*Quercus douglasii*] and some valley oak [*Q. lobata*]), scattered stands of gray pines, and riparian corridors with large black cottonwoods (*Populus trichocarpa*) and valley oaks surrounded by grassland, provide combinations of suitable nesting substrates (large oaks, pines, and cottonwoods) and nearby, open foraging habitat with prey favored by golden eagles, such as California ground squirrels (*Otospermophilus beecheyi*) and black-tailed jackrabbits (*Lepus californicus*). A few areas along the southwestern flanks of the Diablo Range, southeast of the Project site, also contain relatively extensive collections of small to moderately sized rocky outcrops that potentially could support nesting eagles, but are more apt to support prairie falcons, American kestrels, barn owls (*Tyto alba*), common ravens, and possibly great horned owls (*Bubo virginianus*) and red-tailed hawks (*Buteo jamaicensis*). In addition to natural nest substrates, the electrical transmission and distribution lines that cross the survey area support nesting red-tailed hawks, common ravens, and potentially golden eagles.

West of the Project site and Cholame Valley, the Cholame Hills (representing the southwestern tip of the Diablo Range) grade northward into dense chaparral, oak, and gray pine vegetation communities unsuited to foraging eagles. However, most of this portion of the survey area, and continuing southward across the Hwy 41/46 corridor to the northernmost section of the Temblor Range, supports favorable oak woodland and interspersed grassland habitat.

2.2 Survey Methods

2.2.1 Aerial Surveys

HTH ecologists conducted aerial surveys from a Bell Jet Ranger Model B206BII helicopter, following guidelines outlined in Pagel et al. (2010) and Driscoll (2010). All surveys included Dr. Jeff Smith as the lead surveyor in the front seat, responsible for survey coordination, navigation, data management, and nest finding. Dr. Smith has more than 15 years of experience coordinating and conducting extensive golden eagle and other raptor nest surveys in the western U.S., and has conducted aerial surveys in a variety of circumstances. He also has more than 25 years of experience studying the movement ecology of various raptors, including golden eagles, in western North America. Dr. Colleen Lenihan served as assistant surveyor on all flights. Situated in the backseat behind the lead surveyor, she was responsible for taking photos, recording data, and helping to find nests. Dr. Lenihan has more than 20 years of experience monitoring and studying nesting golden eagles and other raptors in California and elsewhere, including by helicopter.

During each survey, we flew with the doors removed or open on the surveyor side to maximize visibility. We used an iPad equipped with a GPS, GIS Kit® software (Garafa LLC, Provo, UT), relevant project files, and aerial imagery available through Google Earth to facilitate navigation and record notes, survey tracks, and Universal Transverse Mercator (UTM) coordinates for all nests. We used a Canon 60D digital single-lens reflex (SLR) camera, equipped with a Canon EF 18–135-millimeter lens and an image-stabilized 100–400-millimeter lens, to further document nest locations, structures, and contents.

We conducted two rounds of aerial surveys. The first general-reconnaissance survey occurred in late March and focused on locating eagles and eagle nests, and on documenting initial territory occupancy and nest initiation. The second survey occurred in mid-May and focused on confirming eagle territory occupancy, the activity status of occupied but inactive eagle territories/nest sites, and the hatching success and nestling production of active eagle nests.

During the March surveys, we flew over all habitats potentially suited to nesting eagles and condors within the 16-kilometer-radius (10-mile-radius) survey area, as well as all habitats potentially suited to nesting Swainson's hawks within 8 kilometers (5 miles) of the Project site and access road (Figure 1). We flew at low speeds over all areas that included trees, rocky substrates, or electrical transmission towers of sufficient stature to support an eagle or Swainson's hawk nest. We often needed to make several passes at different altitudes to cover areas of complex terrain. During the May surveys, we prioritized areas of known eagle nesting activity, revisited several areas where we had previously noted eagle activity but no active nest, rechecked all areas within 8 kilometers (5 miles) of the Project site that were potentially suited to nesting Swainson's hawks, and collected additional photographs and other data to complete our records. During these surveys, we did not focus equal attention on documenting the nests of non-eagle species, but we did record the nesting locations of numerous red-tailed hawks and several other species.

To age golden eagle nestlings to the nearest week, we used the photographic guides provided in Hoechlin (1976) and Driscoll (2010). We used photographs to confirm or adjust our initial field estimates of both activity status and nestling ages.

For identification purposes, we assigned species-specific number series to nesting territories and a distinct letter to each alternate nest site within a territory. For example, golden eagle nests 12A, 12B, and 12C identified three alternate nest sites within golden eagle nesting territory number 12.

2.2.2 Ground Surveys

Ground surveys occurred periodically from March through June, generally around the times during which HTH ecologists conducted standardized point counts to quantify general avian activity on the Project site. Initially, these surveys involved a combination of driving along dirt roads and walking within the BSA wherever trees occurred, and using binoculars and a spotting scope to observe potential nesting activity from a distance. Beginning in late May and early June, when most raptor species have produced chicks and are less susceptible to disturbance, we walked through all wooded areas located within the BSA to further discern the specific locations and activity status of any nesting raptors.

2.3 Data Analysis

2.3.1 Delineation of Golden Eagle Nesting Areas

Accurate delineation of golden eagle nesting territories (here defined as a cluster of nests presumed to represent the unique, core nesting area of a specific breeding pair; USFWS 2013) typically requires several years of intensive monitoring (e.g., see Smith and Slater 2010). Valuable information can be gleaned from a single season of surveys in the Project region despite that established breeding pairs often do not nest every year, nesting territories often encompass multiple, alternate nest sites, and limited surveys may produce biased assessments because successful pairs are easier to locate and identify than pairs that have failed (Steenhof et al. 1997, Kochert et al. 2002, Steenhof and Newton 2007, Watson 2010, Smith and Slater 2010, Pagel et al. 2010). Especially in central California, where most adult eagles are non-migratory residents, territory distributions tend to remain fairly stable, and established breeding pairs tend to remain in the vicinity of their nesting territories year-round to maintain a hold on their domain (Hunt 2002). In general, golden eagles show high breeding-site fidelity as established breeders. Even in non-breeding years, established breeding pairs often make discernible improvements to their nests (e.g., adding bits of greenery or refurbishing nest margins), especially early in the year as part of pair-bonding rituals (Watson 2010). Accordingly, careful, repeated surveys to locate pairs of adult eagles that appear associated with obvious but currently inactive eagle nests can reveal much about the probable distribution of territories, even if some pairs are not actively nesting. To the trained eye, eagle nests often can be easily distinguished from those of other raptors by their location on the substrate, their overall size, and the types and sizes of sticks used in their construction. Confident identification is more difficult, however, where trees of modest size and durability (e.g., oaks, cottonwoods, and gray pines) are commonly used as nest substrates, because the nature of the substrate often limits the size and durability of the nest, which in turn limits the nest's distinctiveness). Such is often the case throughout much of central California.

We used the initial March survey to document occurrences of apparent mated pairs of adult eagles, displaying males, associated nest sites, and active nests. We considered a smaller male and larger female observed together in close proximity on multiple occasions to be a mated pair. We used this information to delineate the approximate distribution of likely nesting territories. We then followed up with the second survey in May to determine if a similar distribution of adult eagles was still apparent, re-verify the activity status of individual nests (emphasizing the need for at least two surveys conducted ≥30 days apart to confirm that a given nest/territory was inactive; Pagel et al. 2010), search for additional nests potentially missed during the first survey, and confirm the productivity status of all active nests. In some cases, the ground surveys provided additional insight about eagle activity patterns and potential nest locations on and in the immediate vicinity of the Project site. We used this additional information to refine the delineation of likely territories. For summary purposes, we considered a nesting territory "occupied" if a pair of breeding-age adults or a displaying, territorial, adult male was present near a confirmed or probable eagle nest during any survey period, or if a single breeding-age adult was present near such a nest during both survey periods.

This delineation then formed the basis for estimating the nearest-neighbor distances between golden eagle nesting areas using the measurement capabilities of ArcGIS 10.1 (ESRI, Redlands, CA). For this purpose, if a given nesting territory contained more than one known or probable alternate nest site, we calculated nearest-neighbor distances based on the centroid location for the cluster of alternate nest sites. Otherwise, we calculated nearest-neighbor distances based on three hierarchical classification levels: 1) active nests only; 2) all nesting areas occupied by a pair of adult eagles and containing a confirmed eagle nest (based on nest characteristics or eagle activity at the nest), whether currently active or not; and 3) all potential nesting areas occupied by an adult eagle and containing a potential eagle nest.

2.3.2 Nest Success and Productivity

We considered an active nest, or nest start, to be one where the available evidence suggested eggs were laid (e.g., an adult observed in an incubating posture on a nest). Typically, a raptor nest is considered successful if one or more chicks reach 80% of the average fledging age for the species, and productivity is typically quantified as the number of chicks raised to 80% of fledging age per occupied territory, nest start, or successful nest (Steenhof and Newton 2007). The fledging age for golden eagles in California often is stated as 10 weeks (Hoechlin 1976, Peeters and Peeters 1995, Kochert et al. 2002, Hunt 2002), which translates to 56 days as the 80% fledging age. This value is the standard recommended for confirming fledging in USFWS (2012) and Driscoll (2010). In some areas of interior western North America, however, 9 weeks (64 days) has been shown to be the average fledging age (Kochert et al. 2002, Smith and Slater 2010), which translates to just over 7 weeks (51 days) as the 80% fledging age. This value is the standard recommended for confirming fledging in Pagel et al. (2010). Recent monitoring suggests that earlier fledging (9–9.5 weeks) may also be common among golden eagles raised around the Carrizo Plain, roughly 48–64 kilometers (30–40 miles) south of the Project (HTH 2012, in preparation). Therefore, for the purpose of this assessment, we equated a successful nest with producing one or more 7-week-old nestlings. To characterize the phenology of the 2013 nesting season, we estimated initiation of incubation, hatching, and fledging dates based on nestling ages, using 42 days as the average incubation period and 64 days as the average brood-rearing period (Kochert et al. 2002, Smith and Slater 2010).

Section 3.0 Results

3.1 Survey Effort

Surveys conducted from 20–23 March involved 27.7 hours of flight time (including ferry time from Paso Robles airport and refueling time at a helipad site on the Jack Ranch property), including 11 individual flights that each lasted 2.2–2.8 hours. Surveys conducted from 14–16 May involved 13.5 hours of flight time, including six individual flights that each lasted 2.2–2.3 hours. Driving and walking surveys that focused specifically on detecting and observing nesting raptors occurred on 26 March, 17 April, 7 May, and 6 June. Additional observations of golden eagle activity were recorded during other standardized avian activity counts.

3.2 Eagles

3.2.1 Distribution of Nesting Territories

We confirmed 12 active golden eagle nests, one active bald eagle nest, and no Swainson's hawks or California condors within the overall aerial survey area (Table 1, Figure 2). None of the active eagle nests were located in the PIA. The single bald eagle nest was located along the eastern edge of the Cholame Hills, 6.5 kilometers (4.0 miles) southwest of the nearest Project boundary. Active golden eagle nest 13A was located in Cholame Valley on an oak-covered hillside southwest of the Project site and 0.5 kilometer (0.3 mile) from a proposed solar array location. Active golden eagle nests 11A and 12A were located 3.0–3.2 kilometers (1.9–2.0 miles) west of the Project site in Cholame Valley, in a gray pine and oak, respectively. Five other active golden eagle nests were located on oak hillsides ≤8 kilometers (5 miles) from the Project site or access road/Hwy 41 improvement areas: golden eagle nests 14A and 15A were located south of the Project in the western foothills of the Diablo Range; golden eagle nests 2A and 4A were located in the southeastern Cholame Hills overlooking Cholame Valley; and golden eagle nest 3A was located in the southwestern Cholame Hills. The four remaining, active golden eagle nests were located >8 kilometers (5 miles) from the Project or access road/Hwy 41 improvement areas: golden eagle nest 10A was located in a gray pine along an edge of upper Cholame Valley, north of Parkfield; golden eagle nest 9A was located in a gray pine in the northwestern Cholame Hills; golden eagle nest 16A was located in a cottonwood riparian area next to Hwy 41 in the southeastern Diablo Range; and golden eagle nest 23A was located on the northeastern face of a large rock outcrop in the eastern Diablo Range, 14.6 kilometers (9.1 miles) north-northwest of the Project site. Another alternate nest structure was located a few meters away from active nest 23A on the same outcrop. We found no other probable alternate nests in any of the other active golden eagle territories.

Table 1. Location Information for Golden Eagle Nests Monitored Near the California Flats Solar Project in 2013

Territory/ Nest	2013 Status	Location[1]	Distance to Project Site (km)	Distance to Access Road (km)	Nest Substrate	Habitat
1A	Occupied pair—inactive	N Temblor Range	15.3	7.3	Oak	Oak woodland/savanna and grazed grassland
2A	Active—nestlings	Cholame Hills	8.3	2.8	Oak	Oak woodland/savanna and grazed grassland
3A	Active—nestlings—failed	Cholame Hills	10.0	5.5	Oak	Oak woodland/savanna and grazed grassland
4A	Active—nestlings	Cholame Hills	7.3	3.9	Oak	Oak woodland/savanna and grazed grassland
5A	Occupied—inactive	Cholame Hills	13.9	12.7	Oak	Oak woodland/savanna and grazed grassland
6A	Occupied pair—inactive	Cholame Hills	14.7	14	Oak	Oak woodland/savanna and grazed grassland
7A	Occupied—inactive	Cholame Hills	13.6	13.6	Transmission tower	Oak woodland/savanna and grazed grassland
8A	Occupied?—inactive	Cholame Hills	12.1	15.1	Gray pine	Gray pine/oak woodland and grazed grassland
9A	Active—fledged	Cholame Hills	13.5	18.9	Gray pine	Gray pine/oak woodland and grazed grassland
10A	Active—nestlings	Upper Cholame Valley	8.8	18.3	Gray pine	Gray pine/oak woodland, chaparral, and grazed grassland
11A	Active—incubating / brooding—failed	Cholame Valley	3.0	9.5	Gray pine	Gray pine/oak woodland and grazed grassland
12A	Active—nestlings	Cholame Valley	3.2	6.5	Oak	Oak woodland/savanna and grazed grassland
13A	Active—nestlings	Cholame Valley	0.5	2.9	Oak	Oak woodland/savanna and grazed grassland
14A	Active—nestlings	W Diablo Range	5.4	3.6	Oak	Oak woodland/savanna and grazed grassland

Territory/ Nest	2013 Status	Location[1]	Distance to Project Site (km)	Distance to Access Road (km)	Nest Substrate	Habitat
15A	Active—nestlings	W Diablo Range	13.6	7.7	Oak	Oak woodland/savanna and grazed grassland
16A	Active—fledged	E Diablo Range	13.6	11.9	Cottonwood	Willow-cottonwood riparian
17A	Occupied—nest building/ inactive	E Diablo Range	8.6	8.7	Oak	Oak woodland/savanna and grazed grassland
17B	Occupied—inactive	E Diablo Range	10.9	11.0	Oak	Valley oak riparian/grassland and chaparral
18A	Occupied pair—inactive	W Diablo Range	1.1	6.7	Gray pine	Gray pine/oak woodland and grazed grassland
19A	Occupied pair—inactive	W Diablo Range	0.3	8.5	Oak	Oak woodland/savanna and grazed grassland
20A	Occupied pair—inactive	Cholame Valley	0.4	5.8	Oak	Oak woodland/savanna and grazed grassland
21A	Occupied?—inactive	Cholame Valley	5.7	12.5	Gray pine	Gray pine/oak woodland and grazed grassland
22A	Occupied pair?—inactive	Upper Cholame Valley	8.2	7.2	Gray pine	Gray pine/oak woodland, chaparral, and grazed grassland
23A	Active—incubating/ brooding—failed	E Diablo Range	14.6	24.4	Cliff/outcrop	Gray pine/oak woodland, chaparral, and grazed grassland
24A	Occupied?—inactive	W Diablo Range	2.8	3.1	Oak	Oak woodland/savanna, grazed grassland, and desert scrub
25A	Occupied?—inactive	N Temblor Range	12.2	4.3	Oak	Oak woodland/savanna and grazed grassland
26A	Occupied?—inactive	E Diablo Range	6.3	14.4	Cliff/outcrop	Gray pine/juniper woodland and chaparral
27A	Occupied?—inactive	E Diablo Range	12.1	19.9	Cliff/outcrop	Gray pine/oak woodland and chaparral
28A	Occupied?—inactive	Cholame Valley	0.5	8.3	Oak	Oak woodland/savanna and grazed grassland

[1] Please contact the Monterey County Planning and Building Department to request specific location data (map and UTM coordinates) and photographs for all nest sites.

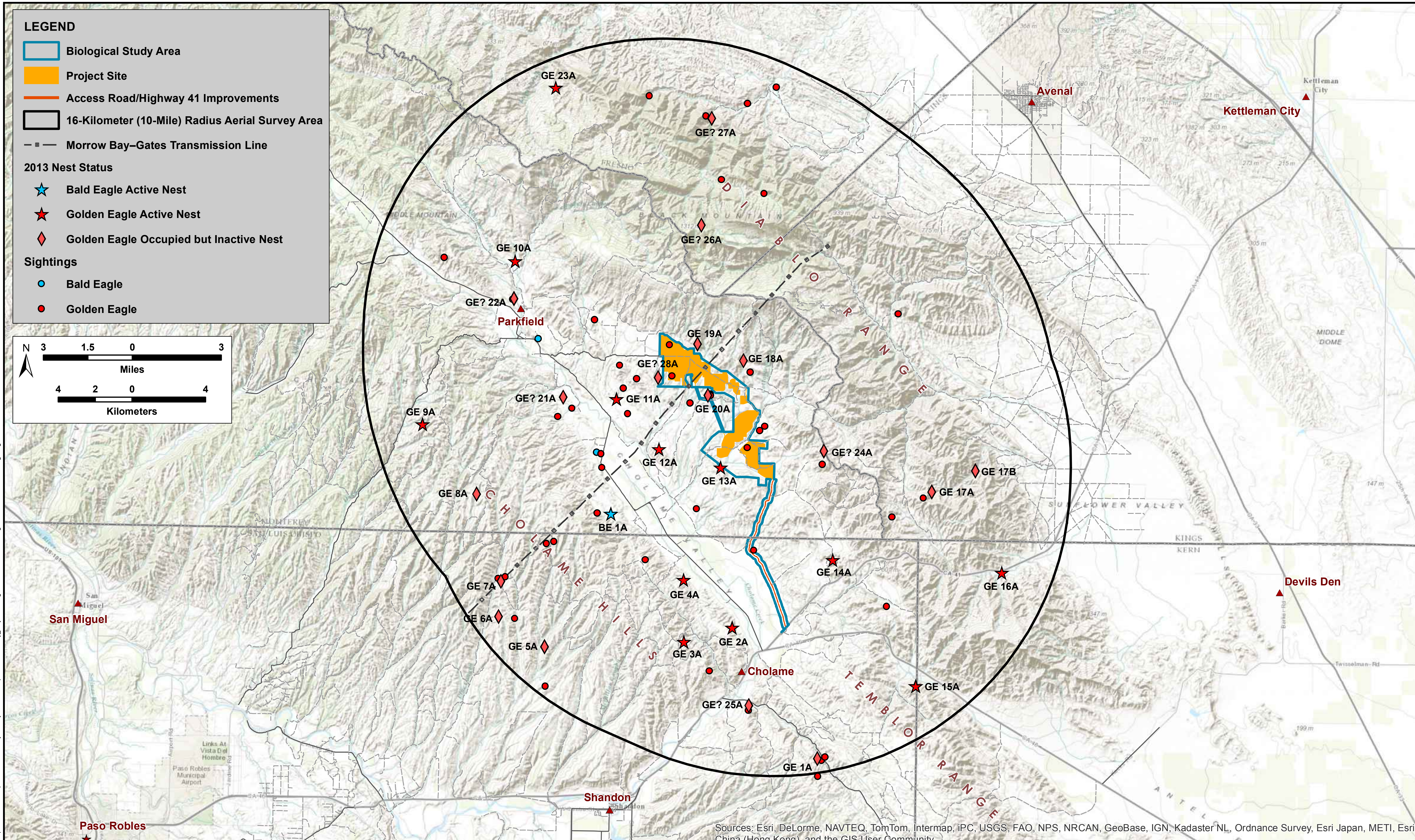


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Figure 2: Bald and Golden Eagle Nest Locations and Sightings: March – June 2013
California Flats Solar Project, California - Annual Raptor Nest Survey Report (3308-01)
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In addition to the 12 pairs tending active nests, we documented five other pairs of adult golden eagles near an inactive nest or nests that clearly did not belong to another pair's core nesting area. Two of these pairs were associated with large, distinctive eagle nests (1A and 18A) that were in good shape and had been built up over several years. Nest 18A was located in a gray pine in the hills 1.1 kilometers (0.7 mile) east of the Project site (Figure 2), with the pair of eagles routinely present around this site. Nest 1A was located on an oak hillside adjacent to Bitterwater Road in the north Temblor Range, 15.3 kilometers (9.5 miles) south of the Project site and 7.3 kilometers (4.5 miles) from the south end of the access road. When first found, the two eagles in this area were using well-worn perch sites. In May, we also found nest 25A, a likely eagle nest in fair shape located 4.7 kilometers (2.9 miles) north-northwest of nest 1A, with an adult eagle hunting nearby at the time. It is possible that nests 1A and 25A are part of the same nesting territory; however, we documented closer or comparable spacing of active nests in similar oak woodland habitat in both the southern Cholame Hills and Cholame Valley.

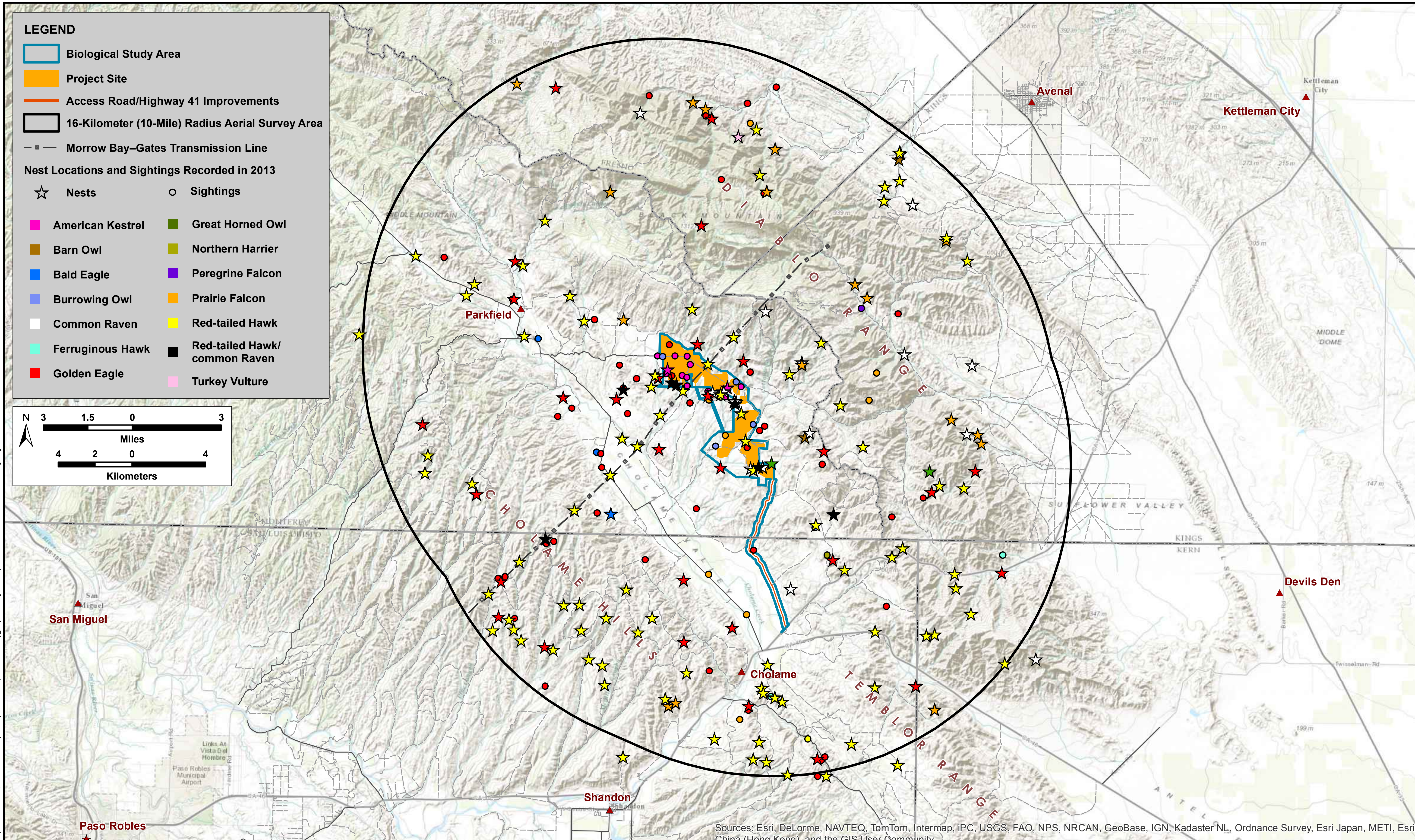
Other nest sites with apparent pairs of golden eagles found in the area included 6A, 19A, and 20A (Figure 2). At the 6A site, which was located in the Cholame Hills 14.7 kilometers (9.1 miles) west of the Project site, there were actually two different nest structures in oaks. In only fair shape, neither of these was unequivocally classifiable as an eagle nest. We found a pair of adult eagles perched in the immediate vicinity of these nests in March, but did not find any eagles in the area again in May. On several occasions, we saw another pair of golden eagles perched and hunting near nest 19A, which was located on an oak hillside 0.3 kilometer (0.2 mile) east of the Project site. This nest was in good shape, but not unequivocally classifiable as an eagle nest. Although not reliably distinguished from a red-tailed hawk nest based on only an aerial assessment, this nest was similar in stature to other active eagle nests found during the study. Nest 20A was located in the central portion of the BSA, 0.4 kilometer (0.2 mile) from the Project site. Ground observations confirmed structural characteristics that supported classification of this nest as a former eagle nest, but it was in disrepair and had not been tended recently. We recorded eagles foraging and flying in this area on several occasions and, during a ground survey, we found an adult female perched near the nest, with an apparent male hunting in the nearby hills; however, whether or not these eagles were established, resident breeders is uncertain.

Two other locations clearly represented other distinct golden eagle nesting areas, but we were unable to confirm the presence of established breeding pairs. In March, roughly 10 kilometers (6.1 miles) southeast of the Project site in the southern Diablo Range, we found an adult golden eagle building nest 17A (Figure 2) on an oak hillside in the upper portion of a drainage (we later found the nest incomplete in May). At that time, we also found probable alternate nest 17B in a cottonwood riparian area 2.6 kilometers (1.6 miles) farther down the same drainage. Inactive and in good shape, this nest could have been a red-tailed hawk nest, but eagles were the only raptors we saw in the area. During March, we also saw an adult eagle hunting west of the 17A area, but in May we found only a subadult eagle hunting near nest 17A. Nest 5A, which was located in the Cholame Hills 13.9 kilometers (8.6 miles) from the Project site, also was a definitive golden eagle nest, inactive and in good shape. In March, we observed an adult male displaying near this nest while a subadult female soared and hunted nearby, and in May we again found an adult eagle perched near the nest.

In several other locations, we found confirmed or potential eagle nests with one or more eagles in the general area, but we were unable to confidently classify the situation as an occupied territory, because either eagle presence in the area was inconclusive, we could not confidently classify the nest as a definitive eagle nest, or we could confidently classify the situation as separate from another confirmed territory. In the western Cholame Hills, we located several nests on towers supporting the Morrow Bay–Gates transmission line. These included three active red-tailed hawk nests, with inter-nest spacing of 2.5 and 4.0 kilometers (1.5 and 2.5 miles; Figure 3). Potential golden eagle nest 7A was in fair shape and located roughly midway between the western and central red-tailed hawk nests (Figures 2 and 3). This nest was not unequivocally classifiable as an eagle nest, but an adult eagle resided in the area in both March and May. On the other side of the central red-tailed hawk nest, about midway between it and the eastern red-tailed hawk nest, we found another pair of adult eagles in March; however, we were unable to find a probable nest site in this area and found no eagles in the area in May. About midway between this area and active golden eagle nest 9A, in March we found another, different adult eagle perched near nest 8A, which was potentially an old remnant, eagle nest in a gray pine. This situation may have reflected another distinct nesting area, but it is also possible that this eagle and nest were part of territory 9.

In upper Cholame Valley, 2.1 kilometers (1.3 miles) south of active golden eagle nest 10A, we found nest 22A in a gray pine, inactive, in fair shape, and almost certainly a former eagle nest (Figure 2). In May, we found two adult golden eagles (not from nest 10A) just west of nest 22A, feeding on a cow carcass with about 20 turkey vultures (*Cathartes aura*). Earlier in March, we found a pair of adult golden eagles (not from nest 10A) perched together atop a ridgeline about 4 kilometers (2.5 miles) northwest of nest 22A, after which the eagles flew off to the south. We found no other probable eagle nests in upper Cholame Valley in the Parkfield area, farther north, or farther northwest up Vineyard Canyon. Therefore, it is possible that both sightings involved the same pair of golden eagles, associated with nest 22A. That said, in March we also found a pair of adult bald eagles perched together about 2.5 kilometers (1.6 miles) south of nest 22A, which were not associated with the active bald eagle nest we documented farther south in a gray pine. Therefore, nest 22A may have been a former golden eagle nest, but it also may have been a former bald eagle nest.

Farther south in Cholame Valley, 3.6 kilometers (2.2 miles) north of the Jack Ranch hay barn, nest 21A was located in a gray pine and appeared to be another definite eagle nest, inactive and in fair shape (Figure 2). We recorded single adult golden eagles flying just south of this nest site on three occasions in March. About 0.5 kilometer (0.3 mile) west of the northwestern portion of the Project site, we found potential golden eagle nest 28A and another inactive nest in two oaks (Figures 2 and 3). Both of these nests could have been either golden eagle or red-tailed hawk nests. In March, we found a single golden eagle flying to the northwest, and in May we noted a pair of adult eagles active in this area. In both cases, these individuals appeared to be different eagles than those affiliated with the other nearby confirmed or potential golden eagle nests (11A, 19A, and 20A; Figure 2).



J:\Reports\Wildlife Reports\Avian Activity Surveys\Annual Raptor Nest Survey_July 2013\Fig 3 All Raptor and Raven Nest Locations and Sightings Recorded in 2013.mxd

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Figure 3: All Raptor and Raven Nest Locations and Sightings: March – June 2013

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In May, we discovered nest 24A on an oak hillside 2.8 kilometers (1.7 miles) east of the southern portion of the Project site, with an adult golden eagle foraging nearby (Figure 2). It is possible that this nest represented another distinct golden eagle nesting area; however, it was not unequivocally classifiable as an eagle nest, and the foraging eagle may have been from active nest 13A, located 5.5 kilometers (3.4 miles) to the west.

Finally, besides around active nest 23A, we recorded adult golden eagles on several occasions in the northeastern Diablo Range (Figure 2). This flank of the Diablo Range features extensive cliff lines with numerous potholes suitable for golden eagle nests. Nest 26A was located in a pothole on a cliff line near the top of the highest ridge in the area and at the upper margin of a distinct drainage. Roughly 5.8 kilometers (3.6 miles) farther north, near the lower margin of the same drainage, nest 27A was located in a pothole on another cliff line. Although neither of these was easily confirmed as an eagle nest, we noted adult golden eagles on several occasions in both areas, as well as farther northeast out on the flats where the drainage turned to cottonwood riparian habitat. We also found an adult golden eagle in March near the head of another drainage 3.5 kilometers (2.2 miles) to the northeast, but found no probable nest site in this area. Many of the cliffs in these areas were so pockmarked with potholes potentially suited to an eagle nest that, despite the rigorous aerial survey effort, we might have overlooked other inactive nests. Regardless, this region of the survey area was clearly occupied by at least two and possibly several adult golden eagles, and may have contained as many as three other potential golden eagle nesting areas.

In summary, the available evidence indicated the following for golden eagles within 16 kilometers (10 miles) of the Project site:

- Twelve active (eggs laid) nests
- Two apparently inactive, confirmed territories occupied by distinct pairs of adult eagles and containing a well-maintained, definitive eagle nest
- Two inactive, confirmed territories occupied by an adult eagle and containing a well-maintained or newly constructed, definitive eagle nest
- Two inactive, probable territories occupied by an adult eagle and containing a definitive eagle nest
- Three inactive, probable territories occupied by a pair of adult eagles and containing a potential nest
- Six or seven inactive, possible territories occupied by an adult eagle and containing a potential nest
- One or two other distinct pairs of adult eagles that we were unable to affiliate with a potential nest site
- Several other individual adult and subadult eagles that may have been "floaters" (i.e., potential breeding birds that have not yet established a breeding territory)

Of the 21 confirmed or probable golden eagle nesting territories, 7 (33%) were located in Cholame Valley, 6 (29%) were located in the Cholame Hills, 4 (19%) were located in other areas on the west side of the Diablo Range, 3 (14%) were located on the east side of the Diablo Range, and 1 (5%) was located in the northern Temblor Range (Figure 2). Most likely, at least two other distinct golden eagle nesting areas are located on the east side of the Diablo Range, with other possibilities on the west side of the Diablo Range (1), in the northern Temblor Range (1), in the Cholame Hills (2), and in Cholame Valley (1).

The distance from the nearest Project boundary to an active golden eagle nest averaged 8.5 kilometers with a standard deviation (SD) of ±4.8 kilometers (5.3±3.0 miles), and ranged from 0.5–14.6 kilometers (0.3–9.1 miles]). The distance from the nearest access road/Hwy 41 improvement areas to an active golden eagle nest averaged 9.7±7.2 kilometers (6.0±4.5 miles) and ranged from 2.8–24.4 kilometers (1.7–15.2 miles). If we include in these calculations all definitive eagle nests (bald and golden eagle), the distance to the nearest Project boundary averaged 7.7±5.1 kilometers (4.8±3.1 miles), and the distance to the nearest access road/Hwy 41 improvement areas averaged 9.2±5.6 kilometers (5.7±3.5 miles).

USFWS Region 8 recommends a 1.6-kilometer (1-mile) no-disturbance buffer between proposed projects and active golden eagle nests (from 1 February through 31 August), unless vegetative or topographic features screen the nest from direct view, in which case a smaller buffer may be acceptable (Beeler, personal communication; also see Suter and Joness 1981, Richardson and Miller 1997, and Romin and Muck 2002). Four confirmed or probable golden eagle nests were located within 1.6 kilometers (1 mile) of the Project (active nest 13A and occupied but inactive nests 18A, 19A, and 20A; Table 1, Figure 4). In addition, although highly tentative in terms of both demonstration of occupancy and species ownership, potential eagle nest 28A also was located within 1.6 kilometers (1 mile) of the Project. Of these, only nests 18A and 28A were shielded from direct view of the Project by topographic features and woodland cover.

Three other active golden eagle nests were farther away but also in line-of-sight of the Project site or access road/Hwy 41 improvement areas. Active nest 12A was 3.2 kilometers (2 miles) away and in line-of-sight of the Project site (Figure 4). Active nests 2A and 4A were 2.8 kilometers (1.7 miles) and 3.9 kilometers (2.4 miles) away and in line-of-sight of the access road/Hwy 41 improvement areas (Figure 5). Conversely, intervening hills and woodlands effectively screened active nest 11A from view of the Project (3.1 kilometers [1.9 miles] away) and active nest 14A from view of the access road/Hwy 41 improvement areas (3.6 kilometers [2.2 miles] away). Nevertheless, it is possible that the foraging home ranges of all of these breeding pairs overlapped either the Project site or access road/Hwy 41 improvement areas.

To further refine projections of the likely spatial sensitivity of specific nesting pairs to disturbance within their home ranges, the USFWS (2012, 2013) recommends using nearest-neighbor distances among occupied core nesting areas to estimate the size of foraging home ranges. The nearest-neighbor distances for the 13 active eagle nests ranged from 2.7–10.2 kilometers (1.7–6.3 miles) and averaged 5.8±2.8 kilometers (3.6±1.8 miles). Including all nesting areas occupied by an adult eagle and containing at least one confirmed eagle nest, the range of values remained the same, but the average decreased to 4.9±2.5 kilometers (3.0±1.1 miles). Including all potential nesting areas occupied by an adult eagle and containing at least one confirmed or potential eagle nest, the range of values changed slightly to 1.9–8.6 kilometers (1.2–5.3 miles), and the average decreased to 4.0±1.7 kilometers (2.5±1.1 miles). Eagle home ranges are not necessarily circular in nature, but half the average nearest-neighbor distance is used as a coarse-scale indicator of the approximate radial area covered by a typical, individual home range. This understood, the nearest-neighbor calculations for this study population suggest that the typical foraging range for territorial eagles that nest in the area may be on the order of 2–3 kilometers (1.2–1.9 miles). In turn, these values translate to a conservative projection that Project development is likely to affect the foraging home ranges of any eagles that nest within 3 kilometers (1.9 miles) of the Project site or access road/Hwy 41 improvement areas. Four confirmed, two probable, and two possible golden eagle territories were located within this range (Figure 6).

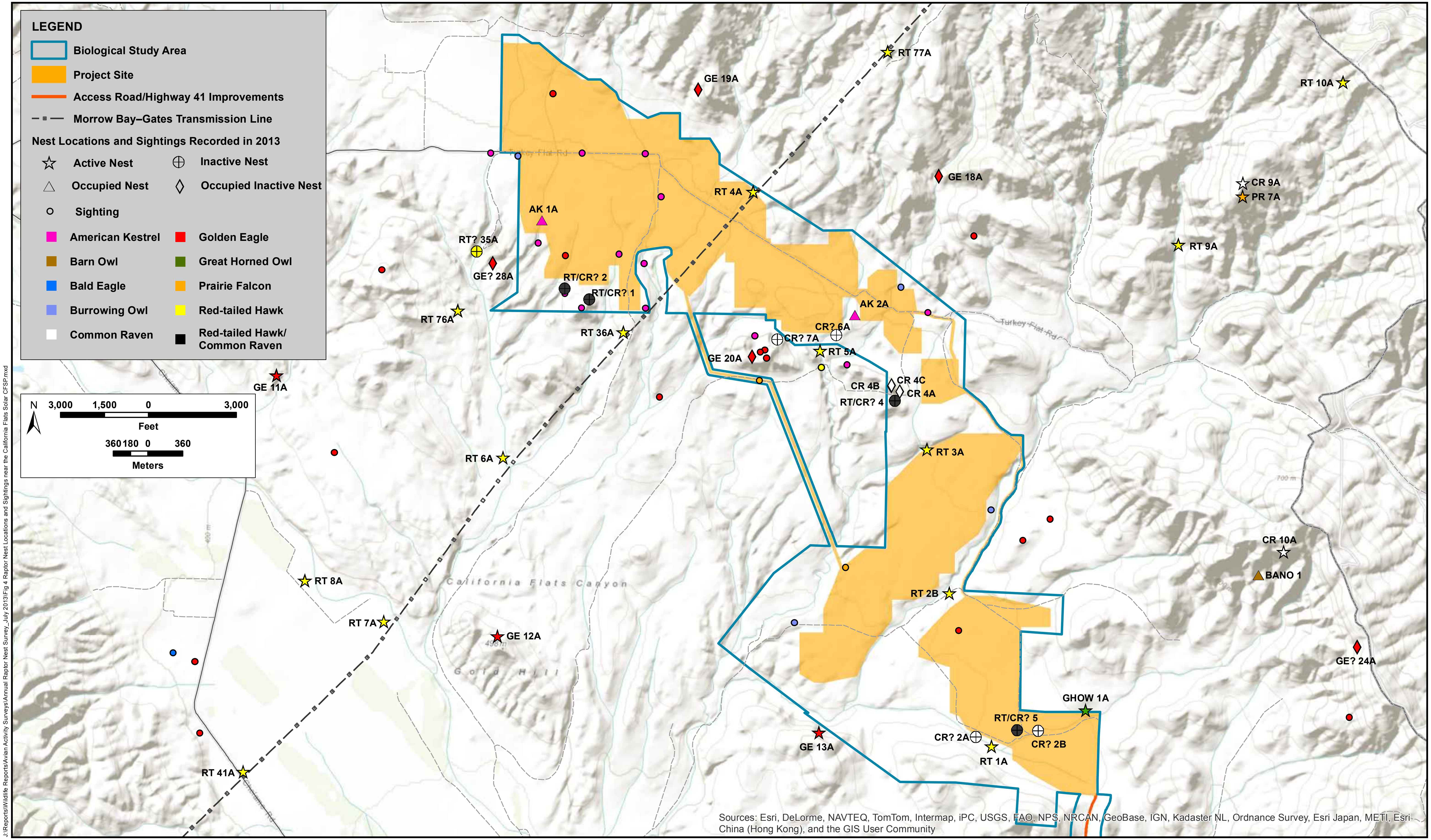

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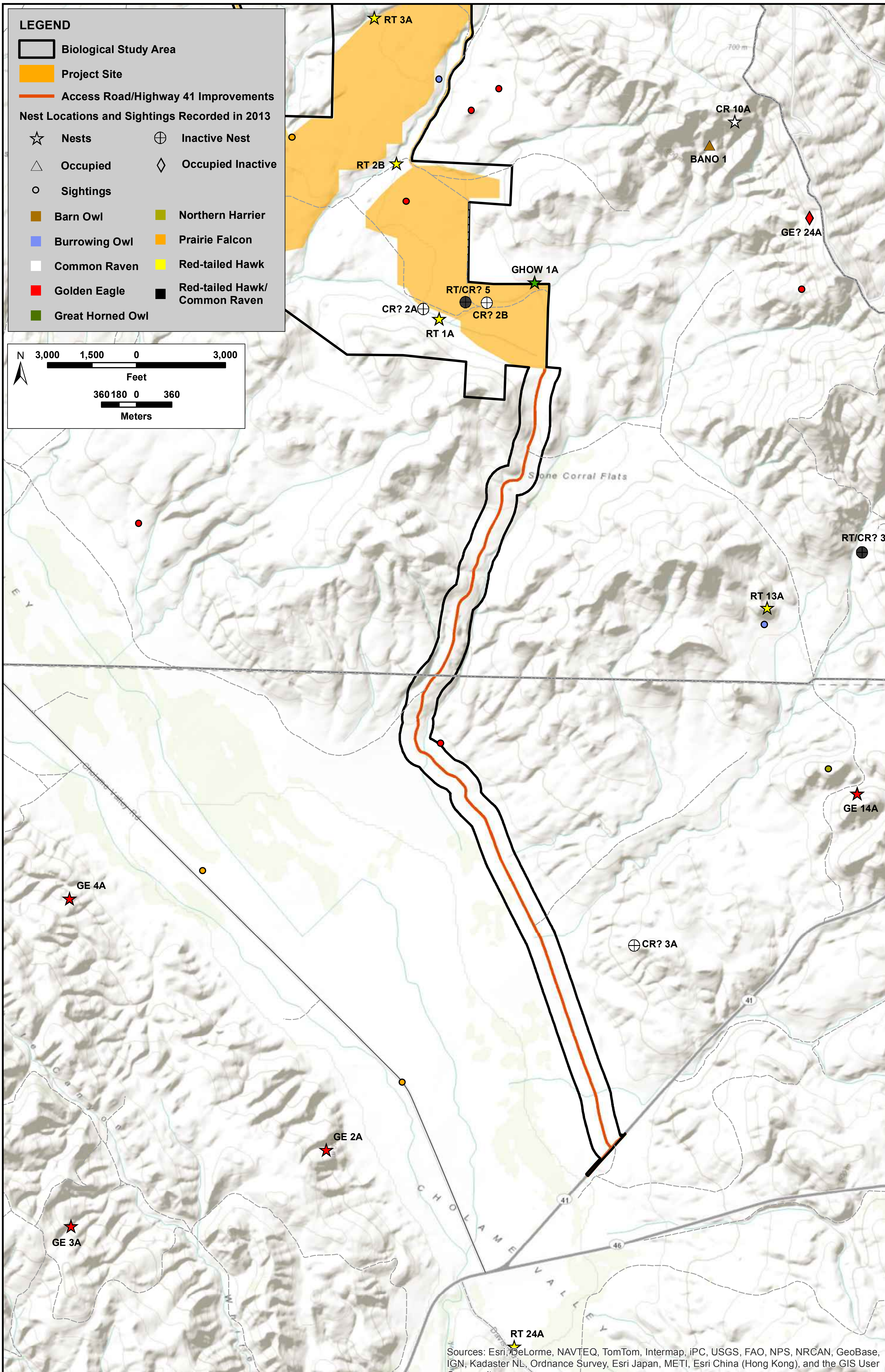
Figure 4: Raptor Nest Locations and Sightings near the California Flats Solar Project: March – June 2013

California Flats Solar Project, California - Annual Raptor Nest Survey Report (3308-01)
September 2013



J:\Reports\Wildlife Reports\Avian Activity Surveys\Annual Raptor Nest Survey_July 2013\Fig 5 Raptor Nest Locations and Sightings near the Access Road/Hwy 41 Improvement Area.mxd

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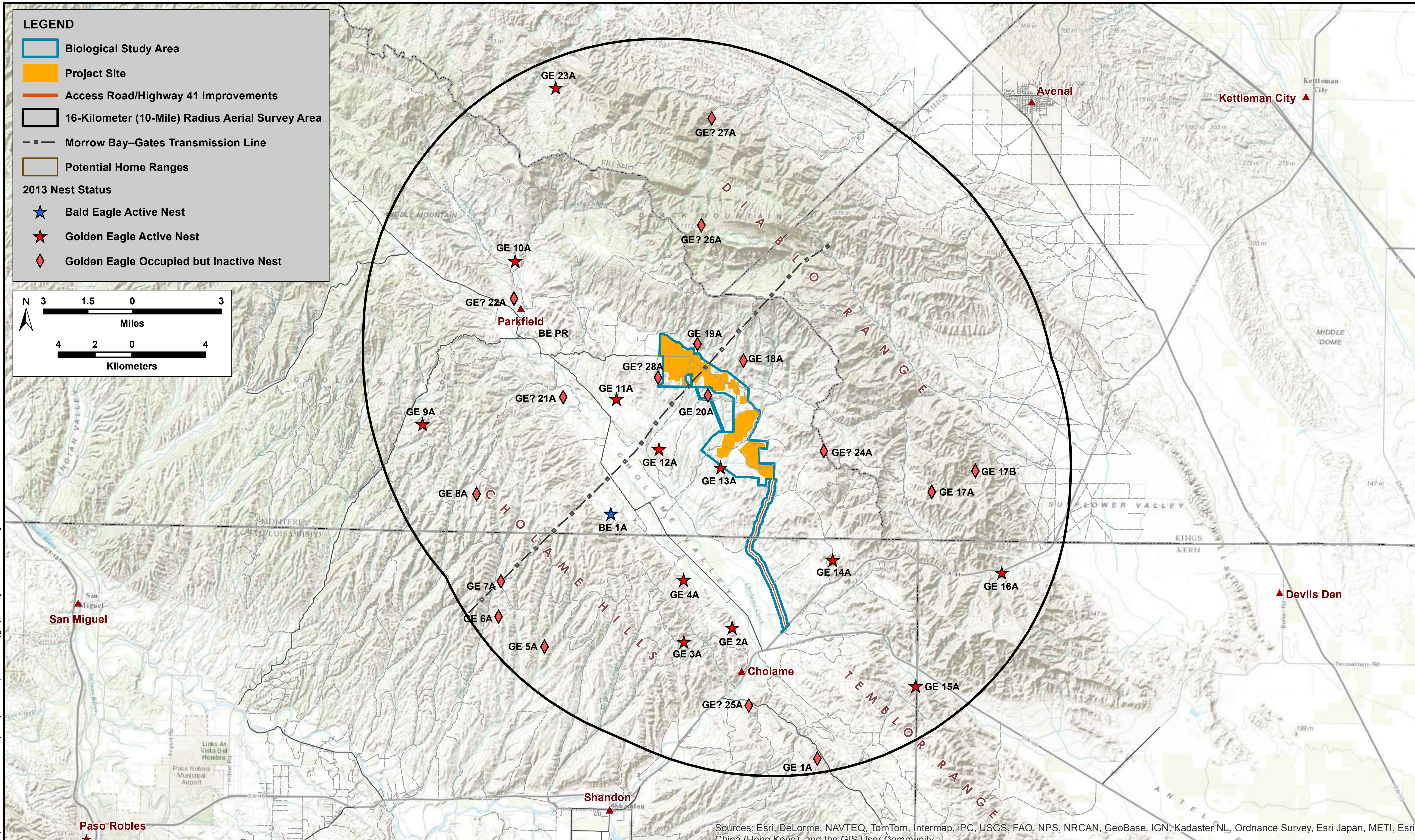
Figure 5: Raptor Nest Locations and Sightings near the Access Road/Hwy 41 Improvement Areas: March – June 2013

California Flats Solar Project, California - Annual Raptor Nest Survey Report (3308-01)

September 2013



J:\Reports\Wildlife Reports\Avian Activity Surveys\Annual Raptor Nest Survey_July 2013\Fig 6 Potential Home Ranges .mxd

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Figure 6: Hypothetical Eagle Home Ranges Based on Average Nearest-Neighbor Distances of Territories Occupied during the 2013 Breeding Season

California Flats Solar Project, California - Annual Raptor Nest Survey Report (3308-01)

September 2013

3.2.2 Nest-Site Characteristics

The single, active bald eagle nest was located in a large gray pine in an area of mixed pines, oaks, and various shrubs, interspersed with open grassy areas grazed by cattle. The nearest aquatic habitats, which occasionally support limited numbers of waterfowl, included a 0.5-hectare (1.3-acre) variably watered livestock pond located 1.7 kilometers (1.1 miles) northwest; a 1.0-hectare (2.5-acre) perennial livestock pond located 5.0 kilometers (3.1 miles) northeast; a stretch of semi-perennial, small stream/pond areas located 3.4–4.5 kilometers (2.1–2.8 miles) east; and a variably watered marshy/pond area located 3.6 kilometers (2.2 miles) southeast. Given the limited water features, it appeared that the bald eagles in Cholame Valley, including two subadults that resided in the area, were focused on hunting rabbits and ground squirrels, rather than the species' more typical prey of fish and waterfowl.

Among the 12 active golden eagle nests documented in 2013, 7 (58%) were located in oaks (e.g., Figure 7), 3 (25%) in gray pines (e.g., Figure 8), 1 (8%) in a cottonwood (e.g., Figure 9), and 1 (8%) on a rock outcrop (e.g., Figure 10) (Table 1). Although cliff nesting is more common elsewhere, tree nesting is common in central California (Hunt et al. 1995, Kochert et al. 2002). Most of the other confirmed or potential golden eagle nests were located in oaks or gray pines, but two were located in cliff potholes and one was located on an electrical transmission tower (Table 1). The most common habitat association for nesting golden eagles throughout most of the survey area was a low-elevation, hillside oak or pine/oak woodland adjacent to open grassland, with a large riparian oak or cottonwood adjacent to open grassland also occasionally used. The probability that golden eagles would nest on a cliff or large outcrop was higher on the east side of the Diablo Range, where rock features were more prevalent.

Figure 7. Active Golden Eagle Nest (Female with Two 4-Week-Old Nestlings) in a Blue Oak in the Cholame Hills

Figure 8. Active Golden Eagle Nest (Two 6-Week-Old Nestlings) in a Gray Pine in Cholame Valley

Figure 9. Active Golden Eagle Nest (Two 7–8-Week-Old Nestlings) in a Black Cottonwood in the Southern Foothills of the Diablo Range

Figure 10. Active Golden Eagle Nest (Incubating Adult) on a Rock Outcrop in the Diablo Range

3.2.3 Nesting Phenology

We estimated nesting phenology (life cycle timing) for 10 golden eagle nests that produced chicks (Table 2). For nine of these nests, for which we aged live chicks, the estimates were fairly precise (±2–3 days). For the tenth nest, the estimates were less precise because they were based on only the remains of older, dead chicks. For two other nests that failed during incubation, we can only be certain of when we first found them incubating.

The estimated start of incubation for the nine nests with live nestlings ranged from 5 February to 13 March, and averaged 24 February ± 12.7 days (Table 2). Two pairs began incubating in early February, four in mid-to-late February (including the one with dead chicks), and four in early-to-mid March. For the nine nests with live nestlings, estimated hatching dates ranged from 19 March to 24 April (average 7 April ± 12.7 days), and estimated fledging dates ranged from 25 May to 30 June (average 13 June ± 12.7 days).

Table 2. Phenology of Golden Eagle Nests Monitored near the California Flats Solar Project in 2013

Nest	Began Incubation	Hatched	Fledged
2A	5 Mar	16 Apr	22 Jun
3A	~9–19 Feb	~23 Mar–2 Apr	failed
4A	20 Feb	3 Apr	9 Jun
9A	5 Feb	19 Mar	25 May
10A	20 Feb	3 Apr	9 Jun
11A	<20 Mar	failed	–
12A	6 Mar	17 Apr	23 Jun
13A	13 Mar	24 Apr	30 Jun
14A	27 Feb	10 Apr	16 Jun
15A	6 Mar	17 Apr	23 Jun
16A	6 Feb	20 Mar	26 May
23A	<22 Mar	failed	–
Minimum	5 Feb	19 Mar	25 May
Maximum	13 Mar	24 Apr	30 Jun
Average	24 Feb	7 Apr	13 Jun
SD (days)	12.72	12.72	12.72

3.2.4 Nesting Success and Productivity

The single bald eagle nest failed either during incubation or before the chicks reached an age that would have left behind definitive evidence of their presence (i.e., whitewash, downy feathers, or prey remains).

Our calculations suggested that incubation began at some nests as much as six weeks before we started our survey in early March, and that some nests would not have fledged until as much as five weeks after the May surveys (Table 2). Accordingly, the gathered data allow for only tentative estimates of success and productivity, because the late-May survey resulted in only two nests being tracked long enough to confirm chicks at 80% of fledging age (Table 3).

Three of the 12 active golden eagle nests definitely failed prior to fledging (Table 3). Nests 11A and 23A failed either during incubation or before the chicks left behind definitive evidence. In May, we discovered at least one and possibly two 5–7-week-old chicks dead on nest 3A. It was difficult to discern what may have happened without a detailed ground-based assessment, but the one obvious carcass clearly had been eaten or scavenged, with feathers that had been clipped off at the base apparent, and feathers scattered about the nest. We suspect a mammalian predator/scavenger was able to climb into the nest and render the damage after the adults abandoned the effort. Golden eagles generally do not abandon large chicks unless one or both of the adults dies or is otherwise incapacitated; consistent with this pattern, there were no adults present in the area when we found the dead chick(s).

Table 3. Success and Productivity of Golden Eagle Nests Monitored Near the California Flats Solar Project in 2013

Nest	Status First Check	Nest Fate	Dead Eggs	Nestlings	Nestling Age (weeks)	80% Fledglings
2A	Nestlings	Nestlings	0	2	4	?
3A	Incubating	Nestlings—Failed	0	1–2	5–7	0
4A	Incubating	Nestlings	0	2	6	?
9A	Incubating	80% Fledglings	0	2	8	2
10A	Incubating	Nestlings	0	2	6	?
11A	Incubating	Failed	?	0	–	0
12A	Incubating	Nestlings	0	2	4	?
13A	Incubating	Nestlings	0	2	2–3	?
14A	Incubating	Nestlings	0	2	4–5	?
15A	Incubating	Nestlings	0	2	4	?
16A	Nestlings	80% Fledglings	0	2	7–8	2
23A	Incubating	Failed	?	0	–	0

Otherwise, by the May surveys, two other nests (9A and 16A) each had raised two chicks to at least 80% of fledging age (7–8 weeks), two nests (4A and 10A) each had two chicks aged about 6 weeks, four nests (2A, 12A, 14A, and 15A) each had two chicks aged 4–5 weeks, and one nest (13A) had two chicks aged 2–3 weeks. These strong productivity records further suggest that one or both of the adults at nest 3A suffered an ill fate.

If all nine nests with live chicks in May successfully fledged two chicks, then the estimate of apparent nesting success would be 75% of nest starts fledged, and the estimates of productivity would be 1.5 fledglings per nest start and 2.0 fledglings per successful nest, a productive season for those pairs that were able to nest (e.g., see Hunt et al. 1997, Kochert et al. 2002, Smith and Slater 2010, and HTH 2012). This potential insight would be tempered, however, by evidence that perhaps as many as 40–50% of the pairs present in the survey area either did not nest or nested but failed quickly, before we began our surveys. The proportion of territorial pairs that lay eggs typically is the most sensitive and variable indicator of interannual productivity for golden eagles (Steenhof et al. 1997, McIntyre and Adams 1999, Kochert et al. 2002).

3.3 Other Raptors

During the aerial surveys, we documented 62 active and dozens more probable, inactive red-tailed hawk nests scattered throughout much of the 16-kilometer (10-mile) survey area (Figure 3). Moreover, this tally is only a partial representation of this species' nesting activity in the overall survey area, because we focused on comprehensive documentation of red-tailed hawk nests only in the immediate vicinity of the Project site. Documentation elsewhere was simply a byproduct of searching for eagle and Swainson's hawk nests. Regardless, the red-tailed hawk is by far the most common raptor nesting in the area.

We documented five active red-tailed hawk nests in the BSA and on, or within 500 meters (1640 feet) of, the Project site (Table 4, Figure 4). Two of these nests were located on the boundary of the Project site as currently delineated, with nest 4A on a transmission tower along the northeastern border of the Project site, and nest 3A in a cottonwood in the center portion of the site. Nest 4A produced two nestlings, with their final fate unknown; nest 3A fledged three young (Table 4). Another active red-tailed hawk nest (1A) was located in a riparian corridor just outside the southwestern margin of the Project site; we did not confidently determine if this nest fledged chicks. Near this nest, within the Project boundary, there were two other inactive raven/buteo nests in the ornamental tree grove and on the windmill located in this area. We also found an active great horned owl nest (formerly a raven nest) in the ornamental grove located just outside the southeastern boundary of the Project site (Table 4). The fourth active red-tailed hawk nest (2B, with alternate 2A nearby in a cottonwood) was located on a windmill near another riparian corridor in the southwestern portion of the BSA, about 125 meters (410 feet) from the nearest Project-site boundary. This nest fledged three young. The fifth active red-tailed hawk nest (5A; with an alternate nest nearby) was located in an oak about 180 meters (591 feet) from the central portion of the Project site. This nest produced two nestlings, but we did not determine their final fate.

Table 4. Characteristics of Non-Eagle Raptor Nests Confirmed Active within 500 Meters of the California Flats Solar Project in 2013

Species	Nest	Nest Substrate	2013 Status	Distance to Project (km)	Distance to Access Road (km)	Nestlings	Fledglings	Nestling Age (weeks)
Red-tailed hawk	1A	Cottonwood	Failed/fledged?	0.1	1.2	?	?	?
Red-tailed hawk	2B	Windmill	Fledged	0.1	2.6	3	3	10
Red-tailed hawk	3A	Oak	Fledged	0	4.0	3	3	6
Red-tailed hawk	4A	Transmission tower	Nestlings	0	7.7	2	?	5
Red-tailed hawk	5A	Oak	Nestlings	0.2	5.4	2	?	4
Great horned owl	1A	Tree of heaven	Failed	0.02	0.9	?	0	?

The surveys revealed American kestrels in several portions of the Project site or immediate buffer areas (Figure 4). In two cases, pairs were associated with known or probable nest cavities in oak snags, with one such site located in the northwestern section of the Project site and the other located 50 meters (164 feet) from the Project site in the central portion of the BSA. We observed another pair of kestrels about 500 meters (1640 feet) south of the latter location, near a rock outcrop that also may have supported a nest. Other sightings within and just outside the boundaries of the Project site involved mostly males but some females, and may or may not have represented other nesting areas (Figure 4). We did not engage in intensive efforts to verify actual nesting by this species, but it appeared that several kestrel home ranges overlapped the Project site.

The only other non-vulture raptors documented on or near the Project site and access road/Hwy 41 improvement areas during the survey period were several burrowing owls, a short-eared owl, and several prairie falcons. Our surveys did not focus on documenting possible nesting by burrowing owls or short-eared owls, but it is likely that at least one active burrowing owl nest occurred along the northwest border of the Project site. In contrast, the short-eared owl was likely a lingering winter resident or spring transient, because a lack of suitable grassland cover largely precluded nesting by short-eared owls in the area in 2013.

We documented no prairie falcon nest locations on, or in the immediate vicinity of, the Project site or access road/Hwy 41 improvement areas. We did, however, document an active nest with chicks 2.1 kilometers (1.3 miles) northwest of the Project site, another nest with chicks 3.2 kilometers (2.0 miles) east of the Project site, and several more active nests with chicks within 6–10 kilometers (3.7–6.2 miles) of the Project site and access road/Hwy 41 improvement areas, to the southwest, south, and east (Figure 3). Multiple observations of foraging birds in the Project vicinity likely reflected overlap of the foraging home ranges of at least the most proximate of these nesting pairs (Figures 4 and 5).

Section 4.0 Discussion

4.1 Distribution of Nesting Territories and Use of Project Site

Adult golden eagles may easily range several kilometers from their nest sites in search of prey, and their breeding-season home ranges often extend across tens of square kilometers (Kochert et al. 2002). The available data suggest that adult eagles most often forage within 1–3 kilometers (0.6–1.9 miles) of their nest site while provisioning chicks (Marzluff et al. 1997, Hunt 2002). That said, the nearest-neighbor analysis indicated that the approximate average home range of golden eagles nesting in the Project area encompasses a radial area of only 2–3 kilometers (1.2–1.9 miles), which translates to home-range sizes of 13–28 square kilometers (5–11 square miles). These home-range sizes suggest that the Project area supports a high density of nesting golden eagles. The highest known density of nesting golden eagles is located in central California in the northern Diablo Range, in oak savannah and woodland habitat similar to that found in the Project area (Hunt and Hunt 2006). In this study area, extensive radio-telemetry research demonstrated home-range sizes that are similar to those that our initial assessment suggested may be the case for the population nesting in Cholame Valley and the southern Diablo Range (Hunt et al. 1995, 1999; Hunt 2002). Elsewhere in the western U.S., population densities have ranged from 29–251 square kilometers/pair (11–97 square miles/pair; Kochert et al. 2002).

Given the initial projections of average home-range size and apparent density of nesting eagles in Cholame Valley and the adjacent hills, it appears unlikely that the golden eagles nesting in the Cholame Hills, in the eastern and southern portions of the Diablo Range, and in the northern Temblor Range would routinely, if ever, travel onto the Project site to provision their chicks. Instead, foraging on the Project site during the nesting season appears likely only for eagles occupying the confirmed and potential territories located in the eastern half of Cholame Valley and the adjacent western foothills of the Diablo Range (i.e., potentially territories 11, 12, 13, 18, 19, 20, 24, and 28; Figures 2 and 6). There is, however, a reasonable likelihood that the foraging home ranges of golden eagle territories 2, 4, and 14 overlap the access road area (Figures 2 and 6). Regardless, the oak and pine woodlands and interspersed savannas that characterize Cholame Valley and the adjacent foothills of the Cholame Hills and Diablo Range provide ideal nesting and foraging habitat for golden eagles, as well as red-tailed hawks, American kestrels, prairie falcons (using scattered rock outcrops for nest substrates), great horned owls, and even an atypical (but see, for example, Boal et al. 2006) pair of bald eagles (possibly two). The ground squirrels, jackrabbits, and feral pigs found in the region provide abundant food resources for the eagles.

The availability of suitable, natural nesting substrates clearly constrains most nesting golden eagles to the wooded and cliff/outcrop areas located primarily outside the PIA. The electrical transmission line that crosses the Diablo Range and the Project site from northeast to southwest is a possible exception (Figure 1). In 2013, although there were several active red-tailed hawk and common raven nests on the transmission towers, we found no active golden eagle nests on this transmission line within the survey area. Probable inactive eagle nest 7A was located on a transmission tower, however, and an adult eagle was present nearby each time we passed through the area. Surveys conducted for a nearby project located on the Carrizo Plain revealed several active golden eagle territories centered on transmission-tower nests (HTH 2012). Therefore, the potential clearly exists for golden eagles to nest on the transmission towers in the Project area.

Golden eagles are less territorial outside the breeding season and may extend their foraging range considerably during this time of year (Kochert et al. 2002). Therefore, the Project site and access road/Hwy 41 improvement areas may support additional golden eagle foraging activity outside the breeding season, because of both greater ranging by local residents and influxes of transients and winter residents. The point counts being conducted by HTH biologists on the Project site through March 2014 may reveal additional, relevant insight.

4.2 Nesting Phenology

The estimated timing of when incubation began for the nine golden eagle nests that produced chicks ranged from 5 February to 13 March, and averaged 23 February (Table 2). The Carrizo Plain golden eagle population showed a similar pattern, except that the latest nest was relatively early in 2012 (incubation began between 3 February and 1 March, averaging 20 February; HTH 2012) but relatively late in 2013 (incubation began between 4 February and 20 March, averaging 22 February; HTH in preparation). The estimated hatching dates in the Project study area ranged from 19 March to 24 April, averaging 7 April, and predicted fledging dates ranged from 28 May to 3 July, averaging 15 June. Again, these date ranges are similar to those documented by the Carrizo Plain study to the south (HTH 2012, in preparation). The indicated timing also is similar to that observed in other parts of central and southern California (Dixon 1937, Hunt et al. 1995). It is also important to understand that, among resident breeders, territorial displays, courtship rituals, and nest building/tending activities may occur at any time of year, but generally begin in earnest at least several weeks before egg-laying commences (Hunt et al. 1995, Kochert et al. 2002).

These data provide insight about favorable timing for documenting and monitoring golden eagle nesting activity in the study area. They also provide important insight about when Project construction and maintenance activities have the greatest potential to influence the behavior and activities of eagles that nest near the PIA. Raptors, in general, are most sensitive to disturbance during the early stages of the nesting cycle (Fyfe and Olendorff 1976, Richardson and Miller 1997). Once the eggs hatch, and especially once the chicks are 2–3 weeks old and can be left alone, the adults tend to be more tenacious and do not easily abandon their nesting effort. The CDFW typically equates 15 January through 31 August as the breeding season for eagles, during which time proximate disturbance of nests is prohibited; however, the period from mid-January through early May, by which time most chicks have hatched and grown for at least a couple of weeks, is the most critical time to avoid disturbing nesting eagles.

4.3 Nesting Success and Productivity

The gathered data allowed for tentative estimates of the nesting success and productivity of golden eagles in the Project area in 2013. Some of the occupied golden eagle territories, with well-maintained but apparently inactive nests, might have been active but failed before our first survey. Similarly, one or more additional surveys would have been necessary to confirm the level of nesting success and fledgling production achieved (Steenhof and Newton 2007). Nevertheless, the completed surveys did provide a solid, initial impression of the productivity of the local nesting population. Although 2013 was a very dry year, it was a year in which field evidence suggested that ground squirrels fared well and likely helped support good productivity among the golden eagles that chose to nest.

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California Flats Solar Project
2014 Eagle Nest Survey Report

Prepared for:

California Flats Solar, LLC

135 Main Street, 6th Floor
San Francisco, CA 94105
Attn: Scott Dawson

Prepared by:

Western EcoSystems Technology, Inc.
415 W 17th St, Suite 200
Cheyenne, WY 82001

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1.0 INTRODUCTION

California Flats Solar, LLC (California Flats) proposes to construct and operate a 280-megawatt (MW) photovoltaic (PV) solar generating facility referred to as the California Flats Solar Project in southeastern Monterey County, California. When approved, the solar facility and related operations infrastructure (Project site) will be built on approximately 2,562 acres (1,037 hectares) of the 72,000-acre (29,137-hectare) Jack Ranch, which is a working cattle ranch.

Under the direction of California Flats, Western EcoSystems Technology, Inc. (WEST) prepared the following report summarizing the results of the 2014 aerial (helicopter based) eagle nest survey conducted for the proposed Project.

2.0 METHODS

WEST conducted the aerial eagle nest survey following survey recommendations provided by the U.S. Fish and Wildlife Service (USFWS; USFWS 2013, Pagel et al. 2010). The nest survey was conducted within the California Flats project boundary and a 10-mile (mi; 16.1 kilometer [km]) buffer that covered approximately 458 square miles (hereafter: survey area; Figure 1). An intensive search of suitable nesting substrates was conducted during the eagle nest survey and all nests considered potentially suitable for supporting eagles were documented. In addition to conducting a full eagle-nest search of the survey area, nest locations from the 2013 nest survey for the Project were visited (see H.T. Harvey 2013).

Basic nest use was categorized consistent with Steenhof and Newton (2007). Nests were classified as occupied if any of the following were observed at the nest structure: (1) an adult eagle in an incubating position, (2) eggs, (3) nestlings or fledglings, (4) occurrence of a pair of adult eagles (or, sometimes subadults), (5) a newly constructed or refurbished stick nest in the area where territorial behavior of an eagle had been observed early in the breeding season, or (6) a recently repaired nest with fresh sticks (clean breaks) or fresh boughs on top, and/or droppings and/or molted feathers on its rim or underneath. A nest that is not occupied is termed unoccupied. Occupied nests were further classified as active if an egg or eggs had been laid or nestlings were observed, or inactive if no eggs or chicks were present.

WEST conducted the 2014 aerial survey on three days in April (April 15, 16, and 17). Nests found to be potentially active in April were checked again on May 23 to further assess whether the nest failed or successful fledged young. WEST flew the aerial survey using two observers and one pilot in a Robinson R44 Raven I single-engine helicopter. During the surveys, observers scanned suitable habitats (including trees, rocks, cliffs, transmission line poles, etc.) for new nests. When a nest structure was observed, the helicopter was moved to a position where nest status and species, if active, could be determined. A tablet computer with Global Positioning System (GPS) software was used to record nest locations and

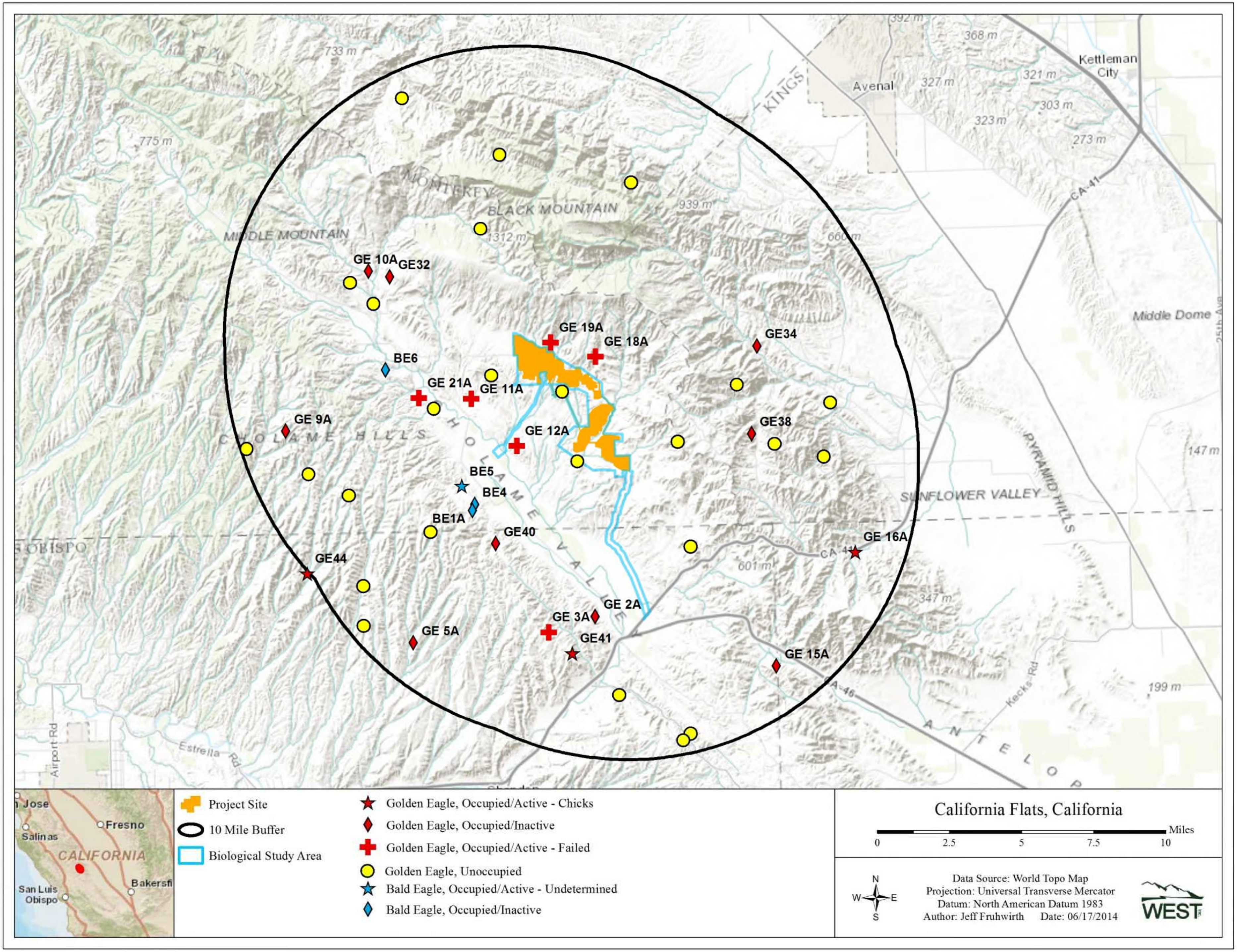

Figure 1. Eagle nest monitoring results from 2014 surveys at the proposed California Flats Solar Project

the flight paths flown by the helicopter during the survey. To minimize disturbance to nesting eagles, the helicopter maintained a maximum distance from the nests from which the nest status could still be ascertained.

3.0 RESULTS

During the April 2014 survey, WEST visited all 29 previously identified golden eagle nests and one previously identified bald eagle nest (Table 1). In addition to the previously identified eagle nests, an additional 18 previously unidentified golden eagle nests and an additional three previously unidentified bald eagle nests were encountered during the April survey (Table 1). Nine golden eagle nests and one bald eagle nest were found to be occupied and active during the April survey, for a density of 0.022 active eagle nests/square mile, and 0.020 active golden eagle nests/square mile. Six nests found to contain eggs were tentatively recorded as having failed as these nests should have contained chicks at the time of the survey; however, to be sure that an adult had not flushed unseen by the surveyors from one of these nests as the helicopter approached, the nests were revisited during the May follow-up flight. Another 9 golden eagle nests were categorized as occupied-inactive due to the presence of one or more adult golden eagles in the immediate vicinity of an otherwise inactive nest. The density of occupied (active and inactive) golden eagle nests was therefore 0.039 occupied nests/square mile. An additional 25 unoccupied golden eagle nests were documented in the 2014 survey, resulting in an overall golden eagle nest density (occupied and unoccupied) of 0.094 nests/square mile.

During the follow-up nest check flight in May, the six nests that had been found to contain eggs but were tentatively recorded as having failed in April appeared to have indeed failed and the eggs were gone from the nests in all but one case. The remaining nest (GE21A) still contained two eggs, but no adults were again seen in the area. Three golden eagle nests that contained nestlings during the April survey were found to contain maturing nestlings (> 51 days old) during the May follow-up flight and these nests were therefore recorded as having successfully fledged young (USFWS 2013). One additional nest, that of a bald eagle, that contained an adult sitting tight in incubating/brooding posture during the April survey, was found to contain a maturing nestling (approximately 45 days old) during the May follow-up flight. As the age of the bald eagle nestling was less than the 51 days recommended by the USFWS to make a determination of nest success (USFWS 2013), the fate of this nest was recorded as undetermined. However, the bald eagle nestling appeared healthy and was attended by at least one adult so it is likely that this nest will prove successful.

3.1 Nest-Site Characteristics

WEST located the single active bald eagle nest in a large gray pine in an area of mixed pines, oaks, and various shrubs, interspersed with open grassy areas grazed by cattle. Among the nine active golden eagle nests documented in 2014, four (44%) were located in oaks (*Quercus douglassii or Q. lobata*), four (44%) in gray pines (*Pinus sabiniana*), and one (11%) in a black cottonwood (*Populus trichocarpa*; Table 1). Although cliff nesting is more common elsewhere, tree nesting is common in central California (Hunt et al. 1995, Kochert et al. 2002). Most of the other confirmed or potential golden eagle nests were located in oaks or gray pines, but several were located in cliff potholes (Table 1). The most common habitat association for nesting golden eagles throughout most of the survey area was a low-elevation, hillside oak or pine/oak woodland adjacent to open grassland, with a large riparian oak or cottonwood adjacent to open grassland also occasionally used.

3.2 Nesting Territories

One-half the mean inter-nest distance has been used as a coarse estimate for the territory boundary in a number of raptor studies (e.g., Soutullo et al. 2013). As such, the USFWS (2012, 2013) recommends using nearest-neighbor distances among occupied nests to estimate approximate territory size in the vicinity of a project. Typically, this involves measuring the distances between occupied nests and calculating a mean inter-nest distance, with half this value being the radius of an eagle territory. For this Project, both occupied bald eagle and golden eagle nests were used to calculate this distance, since it appears that the bald eagles in the Project are using similar foraging and breeding habitat as the golden eagles, and would therefore be assumed to affect the territory of adjacent breeding golden eagles. Nearest-neighbor distances among occupied nests (active and inactive) ranged from 0.38 to 7.71 km (0.24 – 4.79 mi) with a mean inter-nest distance of 3.42 km [2.12 mi]). Note that two of the occupied-inactive bald eagle nests (BE1A and BE4) are located 0.38 km from each other; based on field observations it is assumed that both of these nests and nest BE5 are all occupied by the same bald eagle pair. Therefore, the overall range and mean is likely conservative (i.e., indicating a smaller/denser territory size than is actually the case). In comparison, in 2013, the nearest-neighbor distances for occupied eagle nests (active and inactive) had a mean of 4.9 km (3.0 mi; HTH 2013).

Understanding that eagle territories are not perfectly circular, the nearest-neighbor calculations for this study population nevertheless suggest that the typical distance that nesting eagles are defending is on the order of 1.05 to 1.5 miles from the nest. This range of values suggests that the territories of eagles that nest within 1.5 miles could overlap the Project site.

In other areas of the country where golden eagles are relatively common, the 3.42 to 4.9 km (2.12 – 3.0 mi) mean internest distances recorded at the California Flats Project area in 2013 and 2014 appear comparable. For example, in 12 areas of Wyoming, mean distances between adjacent occupied golden eagle nests ranged from 3.1 to 8.2 km (1.9 – 5.1 mi, mean 5.3 km [3.3 mi]; Phillips et al. 1984). In Denali National Park, Alaska, among 72 golden eagle pairs, nearest-neighbor distances ranged from 1.5 to 8 km (0.9 – 5.0 mi, mean 6 km [3.7 mi]), and among 56 golden eagle pairs in southwest Idaho, nearest-neighbor distances were 0.8 to 16 km (0.5 – 9.9 mi, mean 4.3 km [2.7 mi]; Kochert et al. 2002).

One of the greatest densities of nesting golden eagles in California was documented in a radio-telemetry study conducted in Central California's oak savannah and woodland habitat near the Altamont Wind Resource Area near the northern end of the Diablo Mountain range (Hunt et al.

1995, 1999; Hunt 2002, Hunt and Hunt 2006). In this study area near Altamont, extensive radio-telemetry research demonstrated minimum densities of about 1 golden eagle pair per 30 square kilometers (Hunt 2002). While the data collected in the California Flats project area does not provide for a direct comparison, it appears habitats and likely eagle nesting densities (and presumably territory sizes) in the Cholame Valley and the southern Diablo Range is roughly comparable to that found in similar habitats in the northern Diablo Range.

The relatively high density of occupied golden eagle territories recorded at the Project (2.12 to 3.0 mile mean inter-nest distance compared to 2.7 – 3.7 mile for other studies in the western U.S.) is likely in part due to the abundance of high quality foraging habitat located throughout the area. Preferred habitats include mountainous canyon land, rim-rock terrain of open desert and grassland areas, particularly those areas that are greater than 457 m (1,499 ft) in elevation (Kochert et al. 2002). In central California, the species nests primarily in open grasslands and oak savanna and to a lesser degree in oak woodland and open shrublands (Hunt et al. 1995, 1999), all habitats to be found in abundance surrounding the Project. In addition, golden eagles are common in grazed areas and much of the remaining habitat in central and southern California is found in patches of relatively inaccessible mountainous country, primarily livestock ranches (Thelander 1974) like those found within and surrounding the Project.

3.3 Nest Success and Productivity

The single bald eagle nest was last checked on 23 May when it was found to have one maturing nestling approximately 6–7 weeks old. While the nestling was too young to definitively state that this nest was successful, at 6–7 weeks old, the nestling was well on its way to fledging and the nest likely succeeded.

Six of the nine active golden eagle nests definitely failed prior to fledging (Table 3). Nests 3A, 11A, 12A, 18A, 19A, and 21A failed during incubation. At the time of the May survey, three other nests (16A, 13, and 19) each had raised one (16A) or two (13 and 19) chicks to at least 80% of fledging age (8 weeks).

If all three golden eagle nests with live chicks in May 2014 successfully fledged chicks, then the estimate of apparent nesting success would be 33% of nest starts fledged, and the estimates of productivity would be 0.55 fledglings per nest start and 1.7 fledglings per successful nest. In comparison, if all nine nests with live chicks in May 2013 successfully fledged two chicks, then the estimate of apparent nesting success would have been 75% of nest starts fledged, and the estimates of productivity would have been 1.5 fledglings per nest start and 2.0 fledglings per successful nest (HTH 2013). As was the case in 2013 (HTH 2013), it is likely that as many as 40–50% of the pairs present in the survey area either did not nest or nested but failed quickly, before surveys began. Only one golden eagle nest (16A) successfully fledged young in both 2013 and 2014. Golden eagle nest 16A is located high in a cottonwood on private property just south of Highway 41 southeast of the Project.

California is in the midst of a severe drought and it is possible this has had some impact upon golden eagles residing in the Project vicinity. However, golden eagle prey resources, particularly ground squirrels, appeared abundant during aerial surveys conducted in April and May 2014. While possibly related to the recent drought conditions, it is unclear why reproducing eagles fared better in 2013 than they did in 2014. However, it must be noted that these are rough estimates of nest success as it is unknown whether any nests that appeared to be relatively well maintained but did not contain eggs or young at the time of surveys, may have failed before surveys began.

Table 1. Eagle nests monitored during the 2014 survey for the California Flats Solar Project.

Nest ID	2014 Species	Substrate	2014 Status	2014 No. Eggs	2014 No. Young	2014 notes
BE1A[a]	BAEA	Gray Pine	Occupied/Inactive	-	-	Likely same pair as BE14, BE15
GE1A	GOEA	Oak	Unoccupied	-	-	Nest looked very old – poor condition
GE2A	GOEA	Oak	Occupied/Inactive	-	-	GOEA close to nest.
GE3A	GOEA	Oak	Occupied/Active/Failed	2	-	No GOEA seen
GE4A	GOEA	Oak	?			Could not locate
GE5A	GOEA	Oak	Occupied/Inactive	-	-	2 adult GOEA nearby
GE6A	GOEA	Oak	Unoccupied	-	-	Nest too small for eagle
GE7A	GOEA	Transmission tower	Unoccupied			Nest too small for eagle – ravens occupying
GE8A	GOEA	Gray Pine	Unoccupied	-	-	Appears too small for eagle – poor condition
GE9A	GOEA	Gray Pine	Occupied/Inactive	-		Adult GOEA perched near nest
GE10A	GOEA	Gray Pine	Occupied/Inactive	-		2 adult GOEA close by
GE11A	GOEA	Gray Pine	Occupied/Active/Failed	3	-	2 nests, adult GOEA present
GE12A	GOEA	Oak	Occupied/Active/Failed	1	-	No GOEA seen
GE13A	GOEA	Oak	Unoccupied	-	-	No GOEA seen
GE14A	GOEA	Oak	Unoccupied	-	-	Nest very old – very poor condition
GE15A	GOEA	Oak	Occupied/Inactive	-	-	Adult flying above nest
GE16A	GOEA	Cottonwood	Occupied/Active/Fledged	-	1	Nestling @60 days old May 23rd – standing in nest
GE17A	GOEA	Oak	-			Nest apparently blown out of tree or collapsed
GE17B	GOEA	Oak	Unoccupied	-	-	No GOEA seen
GE18A	GOEA	Gray Pine	Occupied/Active/Failed	1		No GOEA seen
GE19A	GOEA	Oak	Occupied/Active/Failed	1		No GOEA seen
GE20A	GOEA	Oak	Unoccupied	-	-	Nest appeared old – poor condition
GE21A	GOEA	Gray Pine	Occupied/Active/Failed	2	-	No GOEA seen
GE22A	GOEA	Gray Pine	Unoccupied	-	-	No GOEA seen
GE23A	GOEA	Cliff	Unoccupied	-	-	3 nests – no GOEA in area
GE24A	GOEA	Oak	Unoccupied	-	-	No GOEA seen
GE25A	GOEA	Oak	Unoccupied	-	-	No GOEA seen

Table 1. Eagle nests monitored during the 2014 survey for the California Flats Solar Project.

Nest ID	2014 Species	Substrate	2014 Status	2014 No. Eggs	2014 No. Young	2014 notes
GE26A	GOEA	Cliff	?			Could not locate
GE27A	GOEA	Cliff	?			Could not locate
GE28A	GOEA	Oak	Unoccupied	-	-	Nest in very poor condition
GE29[b]	GOEA	Gray Pine	Unoccupied	-	-	No GOEA seen – nest in good condition
GE30	GOEA	Gray Pine	Unoccupied	-	-	No GOEA seen
GE31	GOEA	Gray Pine	Unoccupied	-	-	No GOEA seen
GE32	GOEA	Gray Pine	Occupied/Inactive	-	-	1.5 km east of GE10A
GE33	GOEA	Gray Pine	Unoccupied	-	-	No GOEA seen
GE34	GOEA	Cliff	Occupied/Inactive	-	-	Nest tucked in cave - adult nearby
GE35	GOEA	Oak	Unoccupied	-	-	No GOEA seen
GE36	GOEA	Gray Pine	Unoccupied	-	-	No GOEA seen
GE37	GOEA	Oak	Unoccupied	-	-	No GOEA seen
GE38	GOEA	Oak	Occupied/Inactive	-	-	Adult GOEA close to nest
GE39	GOEA	Oak	Unoccupied	-	-	No GOEA seen
GE40	GOEA	Gray Pine	Occupied/Inactive	-	-	Eagle close to nest
GE41	GOEA	Oak	Occupied/Active/Fledged	-	2	Nestlings @55 days old May 23rd – one in nest one perched on branch
GE42	GOEA	Gray Pine	Unoccupied	-	-	No GOEA seen
GE43	GOEA	Gray Pine	Unoccupied	-	-	No GOEA seen
GE44	GOEA	Gray Pine	Occupied/Active/Fledged	-	2	Nestlings @55 days old May 23rd – adult feeding in nest
GE45	GOEA	Gray Pine	Unoccupied	-	-	No GOEA seen
GE46	GOEA	Gray Pine	Unoccupied	-	-	No GOEA seen
BE4	BAEA	Gray Pine	Occupied/Inactive			Likely same pair as BE1A, BE15
BE5	BAEA	Gray Pine	Occupied/Active/Undetermined	-	1	Nestling @45 days old May 23rd – looked healthy – will likely fledge
BE6	BAEA	Gray Pine	Occupied/Inactive	-	-	Adult at nest but nothing in it

[a] Nest ID numbers followed by a letter (A or B) are nests that were identified in 2013 or earlier.
[b] Nest numbers not followed by a letter are nests that were first identified during the April 2014 survey.

Table 2. Success and Productivity of the Eagle Nests Monitored Within a 10-mile Buffer of the California Flats Solar Project in 2013.[a]

Nest ID	Status First Check	Nest Fate	Dead Eggs	Nestlings	Nestling Age (weeks)	80% Fledglings
GE2A	Nestlings	Nestlings	0	2	4	?
GE3A	Incubating	Nestlings-Failed	0	1 – 2	5 – 7	0
GE4A	Incubating	Nestlings	0	2	6	?
GE9A	Incubating	80% Fledglings	0	2	8	2
GE10A	Incubating	Nestlings	0	2	6	?
GE11A	Incubating	Failed	?	0	-	0
GE12A	Incubating	Nestlings	0	2	4	?
GE13A	Incubating	Nestlings	0	2	2 – 3	?
GE14A	Incubating	Nestlings	0	2	4 – 5	?
GE15A	Incubating	Nestlings	0	2	4	?
GE16A	Nestlings	80% Fledglings	0	2	7 – 8	2
GE23A	Incubating	Failed	?	0	-	0

[a] From HTH 2013.

Table 3. Success and Productivity of the Eagle Nests Monitored Within a 10-mile Buffer of the California Flats Solar Project in 2014.

Nest ID	Status First Check	Nest Fate	Dead Eggs	Nestlings	Nestling Age (weeks)	80% Fledglings
GE3A[a]	Eggs in nest	Failed	2	0	-	0
GE11A	Eggs in nest	Failed	3	0	-	0
GE12A	Egg in nest	Failed	1	0	-	0
GE16A	Nestlings	80% Fledgling	0	1	8	1
GE18A	Egg in nest	Failed	1	0	-	0
GE19A	Egg in nest	Failed	1	0	-	0
GE21A	Eggs in nest	Failed	2	0	-	0
GE41[b]	Nestlings	80% Fledglings	0	2	8	2
GE44	Nestlings	80% Fledglings	0	2	8	2
BE5	Brooding	Nestling	0	1	6 – 7	0

[a] Nest ID numbers followed by the letter A are nests that were identified in 2013 or earlier.
[b] Nest numbers not followed by a letter are nests that were identified during the April 2014 survey.

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Appendix C

2013 - 2014 Avian Baseline Activity Report

H.T. HARVEY & ASSOCIATES
Ecological Consultants

Baseline Avian Activity Surveys for the Proposed California Flats Solar Project in Monterey County, California: March 2013–March 2014

Project #3544-01
Task Orders 7-1 and 11-4

Prepared for:

California Flats Solar, LLC
135 Main Street, 6th Floor
San Francisco, CA 94105

Prepared by:

H. T. Harvey & Associates

June 2014

Cal Poly Technology Park • Bldg. 83, Ste. 1B • San Luis Obispo, CA 93407 • Ph: 805.756.7400 • F: 805.756.7441

Executive Summary

The California Flats Solar Project (Project) is a 280-megawatt photovoltaic solar power plant proposed for development in southeastern Monterey County, California (Figure 1). When approved, the solar facility and related operations infrastructure (Project site) will be built on approximately 1058 hectares (2615 acres) within a working cattle ranch. The overall development will include improvements to an existing access road and its connection to a California Department of Transportation (Caltrans) right-of-way at California State Route 41 (access road/Hwy 41 improvement areas), and development of a new utility line corridor. Because the utility corridor was added to the Project plan after the avian activity surveys reported here began, we did not survey that portion of the Project, and the Project-area statistics presented here are based on pre-utility corridor figures. In that light, the Project site and access road/Hwy 41 improvement areas constitute the original 1122-hectare (2772-acre) Project impact area (PIA), where all direct, Project-related impacts were projected to occur. A Biological Study Area (BSA) was then delineated around the PIA, within which most Project-related biological surveys and assessments are being conducted (Figure 1).

This final report summarizes the results of 12 months of baseline surveys for avian activity conducted on and around the Project site from March 2013 through March 2014. The goal of the surveys was to quantify general avian activity and establish a baseline for assessing the potential for Project development to adversely affect birds that nest and forage on or in the immediate vicinity of the proposed Project site.

The specific objectives of this study were as follows:

1) Quantify avian species composition and activity rates across the Project landscape and adjacent areas during a full annual cycle prior to initiation of Project development.
2) While accounting for natural seasonal variation in avian activity patterns, evaluate use of different habitat types in relation to specific areas proposed for development.
3) Gather information on avian flight patterns to evaluate the risk of collisions with the overhead powerlines proposed for installation to connect the Project to the existing transmission line that crosses the site.
4) Integrate data collected during these surveys with nest-survey data collected in 2013 to help evaluate the home-range dynamics of raptors that nest on and adjacent to the Project site.

Methods

H. T. Harvey & Associates (HTH) ecologists conducted modified point counts (bird use counts [BUC]) at eight sites chosen to represent the proposed Project site, including the area proposed for installation of a new transmission line (Table 1). The 800-meter-radius (0.5-mile-radius) viewsheds of the eight survey areas collectively covered approximately 44% of the Project site and 30% of the BSA (as described above), effectively representing the proposed development areas and the primary habitats found in the BSA (Table 2; Figure 2).

Each month, beginning in late March 2013, we sought to conduct two counts at each BUC site, one during morning hours (AM) and one during afternoon hours (PM). Counts generally occurred semimonthly, on one day each, during the first and third weeks of the month. The order in which surveys occurred each month was based on a random-start, systematic-progression protocol designed to ensure equitable coverage of all sites during morning and afternoon hours. Data recording included documenting all birds seen or heard within 800 meters (0.5 miles) of each count location; estimating approximate detection distances, flight heights, and flight directions; recording standardized behavior information and habitat associations, including use of specific perching substrates; noting details about bird interactions with Project infrastructure and any predator-prey interactions observed; and recording weather data at the beginning of each survey.

For summary purposes, we translated raw counts into sightings per hour, and examined patterns of variation for five distinct species groups: raptors (hawks, eagles, falcons, owls, and vultures), shorebirds (sandpipers, plovers, and allies), corvids (Corvidae: ravens, crows, magpies, and jays), icterids (Icteridae: blackbirds, orioles, and starlings), and other, mostly smaller, birds (passerines, hummingbirds, swallows/swifts, woodpeckers, quail, etc.) (Appendix B lists the common and scientific names of all bird species recorded in the Project area during the survey period). We also organized the data according to quarterly seasons, as follows:

Spring: March through May
Summer: June through August
Fall: September through November
Winter: December through February

We evaluated metrics of activity for the five groups of birds as a function of site and season. For each group of birds, we summarized the data by averaging sightings across all surveys at each of the eight points within seasons. We then fit a linear model (ANOVA) to the data for raptors, corvids, and other small birds, and Kruskal-Wallis rank sum tests to the data for shorebirds and icterids. We evaluated significance at $\alpha = 0.05$, but also considered marginally significant results at $\alpha = 0.10$. We did not evaluate interactions between the predictor variables quantitatively because of limited degrees of freedom following data summarization; however, we qualitatively evaluated possible interactions through graphical comparisons of average sightings rates by season and site.

Results

From late March 2013 through early March 2014, we conducted 200 twenty-minute surveys, with each count site surveyed 25 times across the four seasons (Table 3; Appendix A). Throughout the survey period, moderate to severe drought conditions prevailed across the entire region and Project site. The low precipitation resulted in minimal to no growth of grassland vegetation and limited seasonal development of wetlands and intermittent streams preceding and during the survey period.

We recorded 4061 individual birds of 45 species during the surveys (Table 4; Appendix C). We observed five special-status species during the scheduled surveys: Swainson's hawk (State-listed as threatened), golden eagle (California fully protected), northern harrier (California species of special concern [CSSC]), burrowing owl (CSSC), and loggerhead shrike (CSSC). We also observed two short-eared owls (CSSC) on the Project site outside of the scheduled survey times. Species diversity was higher in spring and winter than in summer and fall (Table 4). Combined-species activity rates summarized across all seasons averaged highest at BUC Site 4 (117 sightings/hour) and BUC Site 8 (82 sightings/hour), with slightly lower rates at BUC Sites 2, 3, and 7 (51–64 sightings/hour), and the lowest rates at BUC Sites 1, 5, and 6 (38–41 sightings/hour) (Appendix C).

We recorded nine species of raptors and vultures during the surveys (Table 4). American kestrels and red-tailed hawks were relatively abundant and recorded during all seasons. We also recorded golden eagles during all seasons and at most sites, and turkey vultures generally were present year round. We observed ferruginous hawks relatively frequently during fall and winter; prairie falcons between October and June (they nested in the nearby foothills); and northern harriers, burrowing owls, and Swainson's hawks only once or twice each during the scheduled fall, winter, and spring counts. We detected golden eagles 16 times during the scheduled counts (Table 4; Appendix C). Six observations occurred at BUC Site 5, which we chose to represent the central portion of the proposed transmission line, but none occurred at BUC Site 2, which overlapped the southern portion of the proposed transmission corridor.

The ANOVA results confirmed marginally significant seasonal variation in overall raptor activity, as well as significant variation across sites (Table 5, Figure 5). Average raptor activity was lower in fall and lower at BUC Sites 2, 5, 7, and 8. Sites 1, 3, and 4 encompassed active red-tailed hawk nests, and Sites 1 and 3 were among the survey areas closest to an active golden eagle nest. The Kruskall-Wallis analysis of shorebird activity rates indicated no overall seasonal variation, but indicated marginally higher activity at BUC Site 3 compared to the sites where we observed no shorebird activity (Sites 5, 6, and 8; Table 6, Figure 6). The ANOVA results for corvids indicated significant seasonal and site-to-site variation in activity rates, with activity higher in spring than in summer and fall, and activity marginally higher at BUC Sites 6 and 7 than at Sites 2, 4, and 5. The Kruskall-Wallis analysis of icterid activity rates confirmed similar seasonal variation as for corvids, but no significant overall variation across sites; however, overall icterid activity tended to higher at BUC Site 4, and lower at Sites 5, 6, and 8 (Table 8, Figure 8). The ANOVA analysis for the other small birds group also indicated significant seasonal variation, but no significant variation across sites (Table 9, Figure 9). In this case, however, the group activity rate increased from spring through winter, with the high winter activity reflecting primarily a large influx of horned larks. Although no significant overall site effect was apparent based on the combined-species analysis, the post-hoc assessment suggested that the average other-small-bird activity rates at BUC Site 4 and 8 were at least marginally higher than at other sites, reflecting relatively high activity of several species at BUC Site 4, and primarily high horned lark activity at BUC Site 8, especially in fall and winter (Appendix C).

Of 4061 bird sightings recorded during the year-long survey period, 91% occurred in or over grassland habitats, 4% in natural, upland woodlands, 3% in riparian woodlands, 2% in ornamental non-native woodlands, and <1% each in marsh/wetland habitats, interior Coast Range goldenbush scrub, and developed habitats (Table 10). The diversity of habitats used by birds was lowest in summer. Shorebirds used grassland habitats exclusively, and we sighted raptors (red-tailed hawks, in particular) more frequently than other groups in woodland habitats. For all primary species groups, proportional use of grassland habitat generally matched its relative availability in the BSA (Figure 10), whereas natural and ornamental woodlands were used more often than expected based on availability, except by shorebirds (Figure 10). Delineated marsh, wetland, and aquatic habitats were poorly represented during the surveys, owing to a combination of drought conditions and the distance of these habitats from the survey points.

We recorded 285 observations of perched birds during the surveys (Table 11). Across all species, 69% of these observations involved trees as the perch substrate, with an additional 4% of the observations involving other vegetation or rock substrates. Six percent of the observations involved perching on the existing transmission towers or lines, primarily by red-tailed hawks (26% of the species-specific observations). Both red-tailed hawks and common ravens nested on the existing transmission line during the survey period. Perching on other artificial substrates composed the remaining 21% of the relevant observations: fences (9.5%), windmills (6%), water troughs (2.5%), other structures (2.5%), and one observation (<1%) of a raven perched on a ranch building.

Thirty-six percent of all flying birds were recorded in the altitude range of ±10 meters (33 feet) of the observer's position, and for all species groups except corvids and raptors, the highest proportion of flight observations occurred in this altitude range (Figure 5). Thirty-five percent of all flight observations occurred in the range of 10–50 meters (33–164 feet)—the projected powerline-collision risk zone—and, for all species groups, between 20% and 40% of the observations occurred in this altitude range. Raptors and corvids were the only groups to show high proportions of activity at higher flight altitudes (49% and 66%, respectively).

Discussion

Although populations were probably somewhat depauperate because of the drought, the observed species constituted a diurnal assemblage typical of the open grassland, oak savanna woodland, and riparian habitats of the inner Coast Ranges of central California, with species representation varying by season. The observed seasonal patterns were similar to those shown in point counts conducted concurrently at another solar project in grassland habitat 64 kilometers (40 miles) to the south. Most species, including all of the special-status species, had been observed previously in the Project area during the preliminary surveys and reconnaissance work conducted since November 2011. The surveys confirmed broad use, by a variety of species, of the grassland habitats proposed as sites for array installation, but also underscored the importance of woodland habitats in the area, especially for the raptors, ravens, Brewer's blackbirds, woodpeckers, and other birds that nest and roost in such habitats. The survey areas that supported the highest species diversity and general abundances of birds tended to be those that contained mixes of grassland, riparian, and woodland habitats. If drought conditions had not prevailed throughout the survey period, the use of seasonal wetland and riparian habitats also likely would have been even greater than what we observed.

Based on these surveys, the species most likely to have their habitat modified by installation of the solar arrays in grassland habitat are horned larks, western meadowlarks, Savannah sparrows, and long-billed curlews, but each of these species is relatively common and abundant and unlikely to be substantially influenced by the habitat modification resulting from this Project. For most of the species tied primarily to woodland habitats, development of this Project is not expected to pose a substantial threat, because woodland habitat will not be directly affected. Golden eagles nest in woodland areas in the Project vicinity; the BUC data revealed limited activity on and over several areas proposed as sites for installation of solar arrays, with the greatest flight activity recorded in the area proposed for the new transmission line. Further assessment work during non-drought periods may reveal additional patterns of habitat use in relevant areas.

The occurrence of other special-status avian species in the Project vicinity has been limited to date. Drought conditions probably constrained the activity patterns of birds in the Project area during the survey period. This may be particularly important for accurately assessing use of the Project site by golden eagles, as well as for ascertaining the occurrence patterns of other special-status species that were scarce or not detected during this breeding season, such as burrowing owls, grasshopper sparrows, loggerhead shrikes, and tricolored blackbirds.

We recorded the highest golden eagle flight activity at BUC Site 5, in the central portion of the proposed transmission line. Because the line will be designed and constructed to standards recommended by the Avian Powerline Interaction Committee to prevent electrocution and collisions, the new transmission line may be more of an asset than a liability for eagles, because the new towers may provide useful hunting perches. The data on perch use and the occurrence of active nests on the existing transmission line suggest that red-tailed hawks and ravens, as well as American kestrels, also will generally find the new transmission line a benefit rather than a liability. The new transmission lines, as well as the new utility corridor powerlines, may represent a greater collision risk for other species, particularly for relatively ungainly fliers such as the long-billed curlews and whimbrels that use the grassland habitats in the area. Moreover, monitoring at another nearby solar facility has revealed that even smaller songbirds such as horned larks are susceptible to powerline collisions. Lastly, although it is not evaluated in this study, the recently proposed utility corridor may represent a collision threat to waterfowl and other waterbirds that use the large stock pond immediately adjacent to the central portion of the corridor. The utility corridor also runs within approximately 600 meters (<0.5 miles) of a golden eagle nest that was active and productive in 2013 in an adjacent oak woodland area; therefore, additional consideration of eagle activity in this area also is warranted.

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Preparers

Brian Boroski, Ph.D., Vice President and Senior Wildlife Ecologist
Scott B. Terrill, Ph.D., Vice President and Senior Ornithologist
Jeff P. Smith, Ph.D., Project Manager, Senior Wildlife Ecologist
Jeff A. Zirpoli, M.S., Wildlife Ecologist
Libby Porzig, Ph.D., Quantitative Ecologist

Section 1.0 Introduction

The California Flats Solar Project (Project) is a 280-megawatt photovoltaic solar power plant proposed for development in southeastern Monterey County, California (Figure 1). When approved, the solar facility and related operational infrastructure (Project site) will be built on approximately 1058 hectares (2615 acres) of private ranchland. The Project will include construction, installation, and operation of energy-related infrastructure (e.g., solar panels, inverters, substations, and new power poles and lines) and improvements needed to operate and maintain energy-related facilities (e.g., buildings, internal roadways, access roads, fencing, and lighting). The overall development will also include improvements to an existing access road and its connection to the California Department of Transportation (Caltrans) right-of-way at California State Route (Hwy) 41, approximately 8 kilometers (5 miles) south of the Project site, as well as a new utility corridor. Because the utility corridor was added to the Project plan after the avian activity surveys reported here began, we did not survey that area and the Project-area statistics presented here are based on pre-utility-corridor figures. In that light, the Project site and access road/Hwy 41 improvement areas constituted the original 1122-hectare (2772-acre) Project impact area (PIA), where all direct, Project-related impacts were projected to occur. A Biological Study Area (BSA) delineated around the PIA identified the area in which most Project-related biological surveys and assessments were to be conducted (Figure 1).

California Flats Solar, LLC, has developed a plan to construct and operate the proposed Project within the Competitive Renewable Energy Zone, under the State's Renewable Energy Transmission Initiative. The Project site's elevation and generally flat, south-facing topography creates an ideal place for solar development. Sunlight is plentiful year round because the elevation places the site above the coastal marine layer, and the site does not receive winter fog from the Central Valley. The flat, south-facing topography minimizes the need for mass grading and alteration of landforms to position panels in a way that favors collection of solar energy. In addition, the Morro Bay–Gates 230-kilovolt transmission line crosses the Project site, with capacity sufficient to accommodate the new power plant (partially represented in Figure 1).

This report summarizes the results of baseline avian activity surveys conducted on the Project site by H. T. Harvey & Associates (HTH) ecologists from late March 2013 through early March 2014. We modeled the avian activity surveys after the "long-duration, large-plot" bird surveys or "bird use counts" (BUCs) typically recommended for assessments of avian activity at wind-energy facilities in California and elsewhere (California Energy Commission and California Department of Fish Game 2007; Strickland et al. 2011; U.S. Fish and Wildlife Service [USFWS] 2012). BUCs are modified point counts during which an observer records bird detections from a single vantage point over an 800-meter (0.5-mile) radial area for 20–30 minutes. The survey technique provides information on bird species composition, relative abundance, and behavior relative to different habitat elements and Project infrastructure. The primary value of counts conducted in this fashion is documenting the distribution, relative abundance, and activity patterns of larger birds such as raptors and waterbirds. The counts also provide useful insight about the general distribution, relative

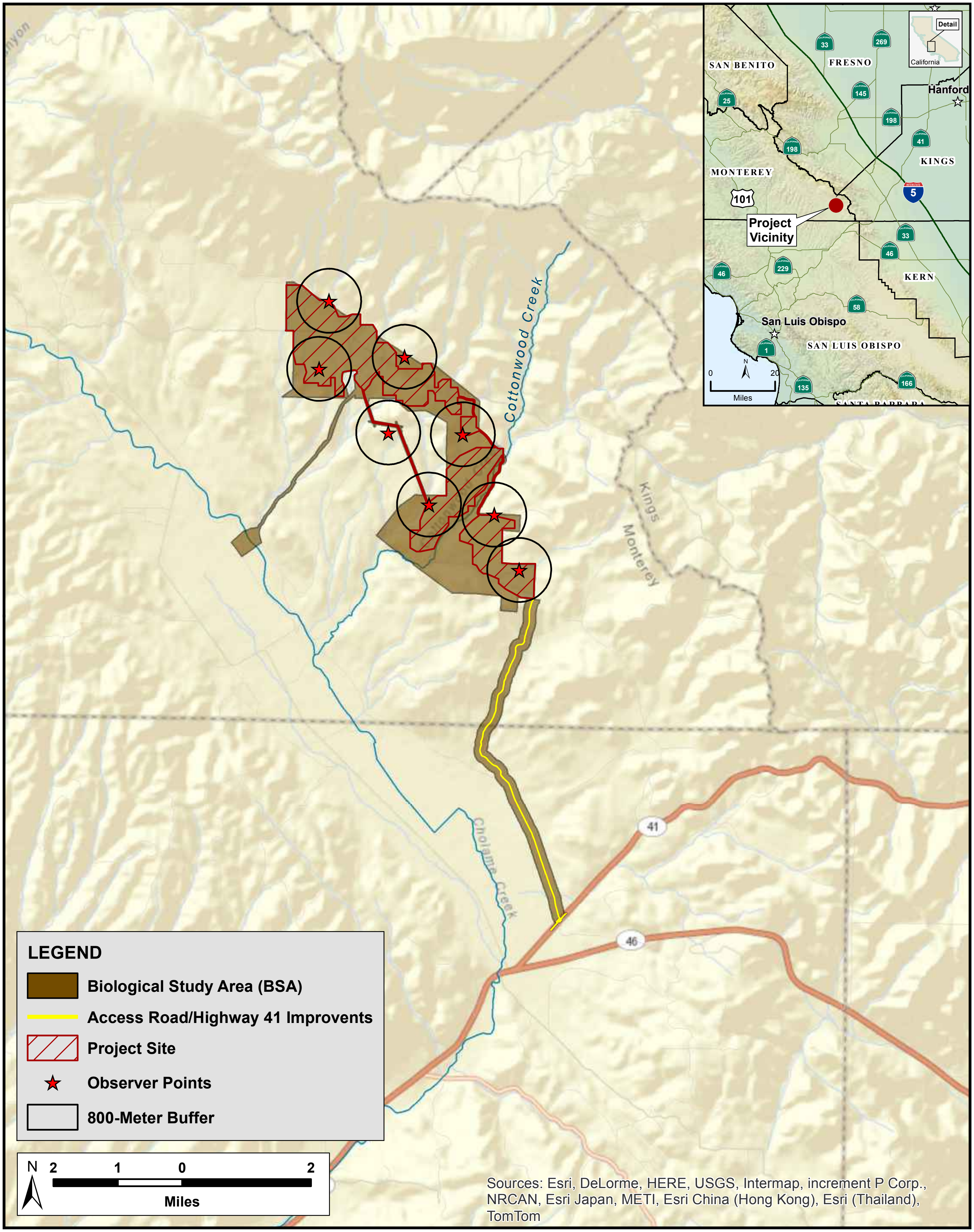

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Figure 1: Project Vicinity Map
California Flats Solar Project, California (3544-01)
June 2014

abundance, and habitat associations of smaller birds (Strickland et al. 2011). Even longer counts (3–4 hours) typically are recommended for conducting intensive activity assessments for larger birds such as eagles. In choosing the count protocols for this study, we adopted a methodology that would provide solid baseline information about the overall avian activity patterns in the proposed development area.

The specific objectives of this study are as follows:

1) Quantify avian species composition and activity rates across the Project landscape for one full year before Project construction begins.
2) Evaluate the potential influence of Project development on birds by:
    a. comparing species composition and activity rates across seasons and in different habitat types,
    b. recording flight heights to evaluate the potential risk of bird collisions with overhead powerlines,
    c. recording data on perch use to evaluate the potential for new Project infrastructure to elevate the risk of bird electrocutions and augment the availability of hunting perches for raptors, and
    d. recording data on predator-prey interactions to evaluate possible changes in community dynamics.
3) Collect avian activity data to facilitate comparisons with the raptor nesting data collected as part of other biological monitoring tasks for the Project.

Section 2.0 Methods

2.1 Study Site

Cholame Valley, wherein the Project site is located, is a landscape dominated by gently rolling terrain, open grassland, oak savannah, and hillsides supporting mixed oak (*Quercus douglasii* and *Q. lobata*) and gray pine (*Pinus sabiniana*) woodlands. Cholame Valley lies within the southern Diablo Range and meets the northern extent of the Temblor Range toward its lower, southern margin. East of the Project site, the higher-elevation portions of the Diablo Range are mostly covered by relatively dense oak and gray pine woodlands, scrubby oak and juniper (*Juniperus* spp.) woodlands, and dense chaparral. West of the Project site and Cholame Valley, the Cholame Hills (representing the southwestern tip of the Diablo Range) feature primarily oak woodlands interspersed with open grassland habitat to the south, but grade into dense chaparral, oak, and gray pine communities to the north. The rural community of Parkfield is 7.6 kilometers (4.7 miles) northwest of the Project site, in upper Cholame Valley. Otherwise, the landscape surrounding the Project site consists of working cattle ranches with sparse residential settlements, as well as other private landholdings containing small farms and remote hunting/recreation areas with cabins. In addition, portions of Jack Ranch and other landholdings around Parkfield, in the floodplain areas of Cholame Valley, support limited areas of dry-farmed and variably irrigated grain crops and hayfields.

Cholame Valley also features several riparian corridors and drainages, some of which traverse the Project site. Most of the drainages found in Cholame Valley are seasonally ephemeral, including most of Cholame Creek, which runs the length of the valley. Cottonwood Creek, which drains the southeastern Diablo Range and crosses the southeastern portion of the Project site, is semi-perennial. Some of the area's riparian corridors support riparian woodlands consisting primarily of willows (*Salix* spp.), black cottonwoods (*Populus trichocarpa)*, and valley oaks (*Q. lobata*). A sparse array of livestock ponds and other small, artificial reservoirs dot the valley and adjacent foothills landscape.

For this study, we chose seven count sites (BUC Sites 1–4 and 6–8) to represent the area proposed for installation of the solar arrays and associated facility infrastructure, and BUC Site 5 to represent the central portion of the corridor proposed for installation of a new transmission line, which will connect the power generation facility to the existing transmission line that crosses the Project site (Table 1; Figure 2). The BUC Site 2 survey area also encompassed a portion of the proposed transmission corridor. We did not select any count sites to assess activity patterns along the access road/Hwy 41 improvement area; the relatively sparse, open grassland/scrub habitats along this corridor likely support similar, but less dense and diverse, bird communities as those present in the remainder of the BSA. The proposed utility corridor was not specifically covered by any of the BUC sites, because the corridor was not planned for development until the surveys were more than half complete. Habitats along this corridor likely support similar bird communities as are found in the original BSA, except that the utility corridor runs adjacent to a relatively large pond that attracts waterfowl and other waterbirds (Figure 1).

Table 1. Count Site Locations

Site[1]	UTM East[2]	UTM North[2]	Location Description
1	745227	3967853	Open grassy knoll in southeastern BSA
2	742908	3969394	Open grassy knoll in southwestern BSA near terminus of proposed transmission line
3	744549	3969210	Open grassy knoll in southeastern BSA
4	743681	3971183	Open grassy knoll in central BSA
5	741814	3971151	Open grassy knoll ~200 meters (656 feet) south of proposed transmission line
6	742145	3973061	Open rocky hillside along northeastern border of BSA, ~40 meters (131 feet) east of existing transmission line
7	740024	3972669	Open grassland in northwestern BSA with views of oak woodlands, ephemeral streams, wooded riparian corridors, and a perennial marsh area
8	740204	3974380	Open grassy knoll in northern BSA with coverage including portions of foothills adjacent to Project site, including areas of gray pine/oak woodland

[1] See Figure 2 for mapped locations.

[2] Universal Transverse Mercator coordinates, zone 10S, datum NAD83.

We strategically located the count sites to provide largely unobstructed, nonoverlapping views of the surrounding terrain out to a radius of 800 meters (0.5 miles). The viewsheds of the eight count sites collectively covered approximately 44% of the Project site and 30% of the original BSA, effectively representing the proposed development areas and the primary habitats found in the BSA (Figure 2).

HTH (2013a) botanists and geographic information system (GIS) specialists used ground surveys (spring–summer 2012) to map habitats in the BSA (Figure 2). The Project site supports primarily California annual grassland (covering all areas of the BSA not occupied by other habitat types specifically identified in Figure 2; hereafter called simply "annual grassland"), dominated by non-native grasses typical of the region, but also a healthy complement of native forbs. Other habitats found in the BSA include wildflower field, serpentine bunchgrass grassland, Valley needlegrass grassland, grassland riparian, interior Coast Range goldenbush scrub, willow–cottonwood riparian woodland, ornamental non-native woodland, blue oak woodland, valley oak riparian woodland, ephemeral stream, intermittent stream, perennial stream, perennial marsh, seasonal wetland, and developed/ruderal grassland (Figure 2).

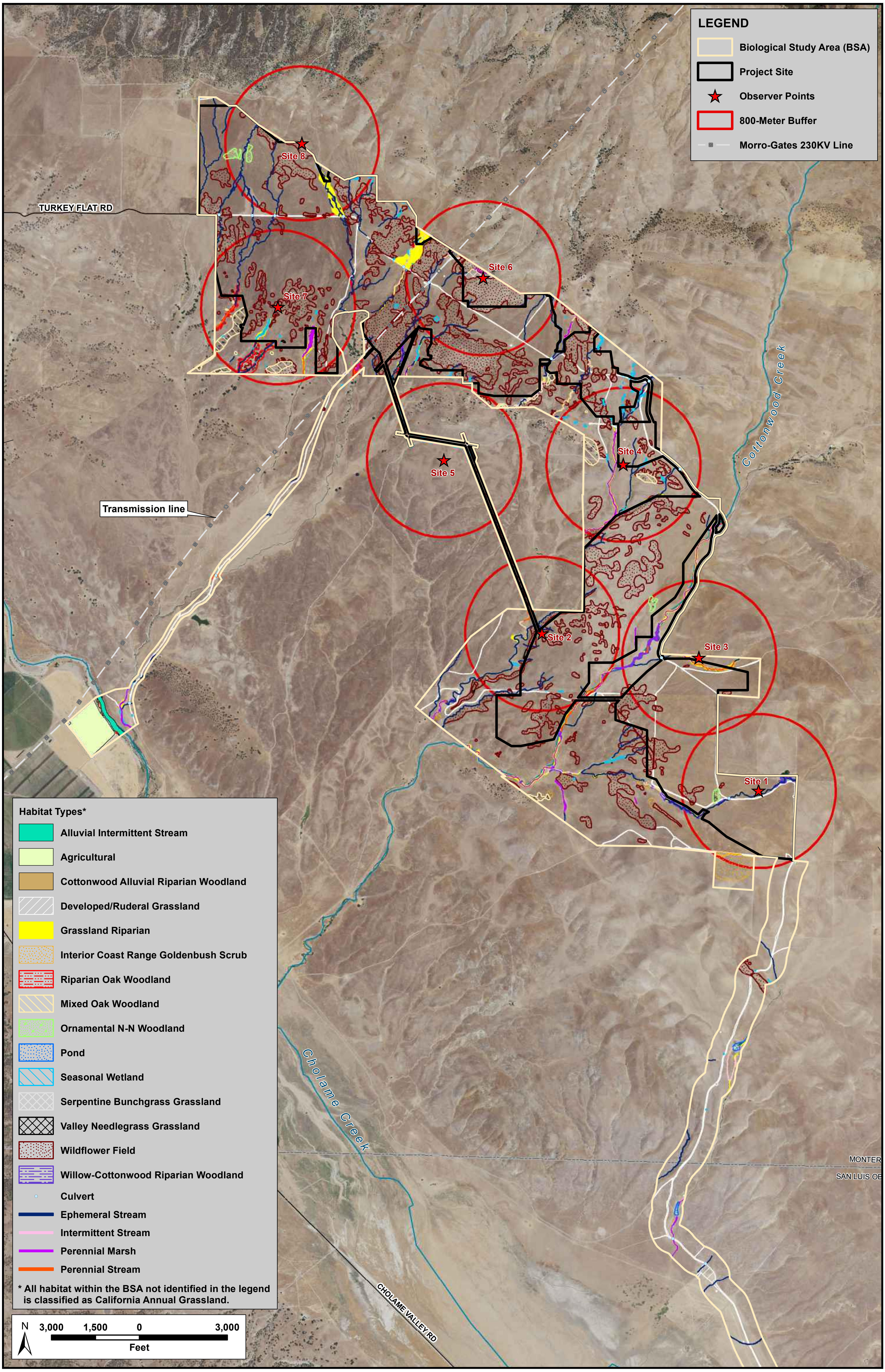

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Figure 2: Distribution of Bird Count Sites in Relation to Project Infrastructure and Mapped Habitats

California Flats Solar Project, California (3544-01)

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Each of the 800-meter-radius (0.5-mile-radius) survey areas extended outside the BSA, such that the habitat mapping excluded portions (10–85%) of all BUC survey areas (Figure 2). Nevertheless, the available data provide a good sense of the habitat coverage involved. Two habitat types were found in the survey areas (BUC Sites 6 and 8; Figure 2) but not in the mapped BSA: juniper woodland and gray pine woodland. In addition, a 2012 fire removed approximately 50% of the grass/forb cover in the BUC Site 1 and 3 survey areas, with signs of the fire still evident in these locations during the remainder of the surveys.

Annual grassland is by far the most common habitat type in both the overall BSA/PIA and in the BUC survey areas (Table 2; Figure 2). This category made up 91% of the habitat mapped in the BSA and 51–91% of the habitat mapped in individual BUC survey areas. Several other distinctive grassland variants made up the remainder of the overall grassland habitat matrix in the Project area, and combined constituted 96% of the mapped habitat in the BSA and 92–98% of the mapped habitat in individual BUC survey areas (Table 2). Among the variants included in the grassland category, wildflower field was the second most abundant individual habitat type in the BSA (4%) and BUC survey areas (2–42% of mapped habitat). Wildflower fields were mapped in all survey areas except BUC Site 1, but most likely are represented, at least ephemerally, in all survey areas. When installed, the solar arrays will be situated primarily in the dominant annual grassland habitat and in smaller areas of wildflower field (Figure 2).

Woodlands constituted 2% of the BSA habitat and were found in all BUC survey areas, but were not part of the mapped habitat in the BUC Site 6 survey area (Table 2; Figure 2). The percentage of woodland among the mapped habitats varied from <1% to 6%, depending on the BUC survey area. Mixed oak woodland was the most prevalent woodland type within mapped portions of the BUC survey areas, followed by riparian oak woodland, ornamental non-native woodland, and willow–cottonwood riparian woodland. For BUC Sites 5, 6, and 8, the known proportion of woodland would be noticeably higher if the habitats in the survey areas were completely mapped. Also, as alluded to previously, BUC Sites 6 and 8 encompassed juniper and gray pine woodlands, which were not represented in the BSA mapping.

All other habitat types mapped in the BSA constituted <1% of the total, whether classified individually or in groups; i.e., shrublands, aquatic, marsh, and developed/ruderal (Table 2; Figure 2). The same pattern generally applied to habitats mapped in the BUC survey areas; however, interior Coast Range goldenbush scrub made up 3% of the mapped habitat around BUC Site 1; marsh/wetland habitats made up 1–3% of the mapped habitat around BUC Sites 4 and 5; and developed/ruderal habitats made up 1–2% of the mapped habitat around BUC Sites 1, 3, and 6.

We presumed that unmapped portions of each BUC survey area supported habitat mixes roughly similar to those in the mapped portions, except for the juniper and gray pine woodlands found outside the BSA but within the survey areas of BUC Sites 6 and 8.

Table 2. Proportional Representation of Primary Habitat Types in the Biological Study Area (BSA) and Bird Use Count (BUC) Survey Areas

Habitat Type	BSA[1]	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7	Site 8	All Sites
California annual grassland	0.904	0.486	0.617	0.534	0.574	0.119	0.297	0.688	0.348	0.458
Wildflower field	0.038	0.009	0.112	0.019	0.106	0.025	0.246	0.135	0.085	0.092
Serpentine bunchgrass grassland	0.001	–	0	–	–	–	0.009	–	–	0.001
Valley needlegrass grassland	0.001	–	0.001	–	–	–	–	<0.001	–	<0.001
Grassland riparian	0.013	0.003	0.008	0.011	0.011	0.001	0.021	0.011	0.021	0.011
Mixed oak woodland	0.008	–	–	–	0.024	0.001	0	0.034	–	0.007
Riparian oak woodland	0.003	–	–	–	<0.001	0	0	0.024	–	0.003
Willow–cottonwood riparian woodland	0.002	0.004	<0.001	0.006	–	–	–	–	–	0.001
Ornamental non-native woodland	0.002	0.004	–	0.004	–	–	–	–	0.010	0.002
Interior Coast Range goldenbush scrub	0.006	0.018	–	–	–	–	–	–	–	0.002
Ephemeral stream	0.002	0.001	0.002	<0.001	0.001	<0.001	0.001	0.002	0.002	0.001
Intermittent stream	<0.001	–	<0.001	–	–	<0.001	<0.001	–	–	<0.001
Perennial stream	<0.001	–	<0.001	0.001	–	–	–	<0.001	–	<0.001
Pond	<0.001	–	–	–	–	–	–	–	–	0
Seasonal wetland	0.001	–	0.001	–	0.006	0.004	0.001	0.002	0.001	0.002
Perennial marsh	0.002	<0.001	<0.001	0.003	0.004	0	<0.001	0.005	0	0.002
Developed/ruderal grassland	0.013	0.012	0.003	0.008	0.007	0.001	0.006	0.002	0.002	0.005
Not mapped	0	0.463	0.255	0.414	0.266	0.849	0.417	0.097	0.532	0.412

[1] As defined prior to addition of the new utility corridor.

Following are summary descriptions of the habitats in the BUC survey areas:

Site 1: Mostly annual grassland, with patches of ornamental non-native woodland and interior Coast Range goldenbush scrub, and a willow–cottonwood riparian corridor along a mostly ephemeral stream

Site 2: Mostly annual grassland, with large patches of wildflower field, and a mostly grassland riparian corridor that includes patches of perennial marsh and strips of willow–cottonwood riparian woodland

Site 3: Mostly annual grassland, with patches of wildflower field, a willow–cottonwood riparian corridor with sections of perennial marsh, another grassland riparian corridor with small sections of perennial stream, and a patch of ornamental non-native woodland

Site 4: Mostly annual grassland, with large patches of wildflower field, oak woodland, grassland riparian corridors with areas of perennial marsh, and several seasonal wetlands

Site 5: Mostly annual grassland, with patches of wildflower field and oak woodland, and an intermittent, grassland riparian corridor

Site 6: Mostly annual grassland, with large patches of wildflower field, small areas of serpentine bunchgrass grassland, several ephemeral, grassland riparian corridors, and patches of juniper woodland and partially wooded (oak) riparian corridors in the foothills east of the BSA

Site 7: Mostly annual grassland, with large sections of wildflower field, patches of mixed oak woodland, several riparian corridors with mixes of grassland riparian and riparian oak woodland, and various patches of intermittent and perennial stream, perennial marsh, and seasonal wetland

Site 8: Mostly annual grassland, with patches of wildflower field, ornamental non-native woodland, and seasonal wetland, several ephemeral, grassland riparian corridors, and mixed oak, gray pine, and juniper woodlands in the foothills east of the BSA

2.2 Data Collection

We began the counts in March 2013 and thereafter sought to conduct two counts per month at each of the eight BUC sites, once during morning hours (8:00 AM to 12:00 PM Pacific Standard Time [PST]) and once during afternoon hours (12:00 to 4:00 PM PST). The counts generally occurred on one day during the first week of each month and a second day during the third week of each month. Each individual count lasted 20 minutes. Counts did not occur during excessively inclement or windy weather; they occurred only during periods when there was little or no precipitation, lateral visibility was ≥1 kilometer (0.8 mile) and vertical visibility was ≥250 meters (0.2 mile) in all directions, and wind speeds were ≤40 kilometers/hour (25 miles/hour). The choice of 40 kilometers/hour as a wind-speed threshold represented a balance between recognizing that wind makes it difficult to detect birds by ear, but at least moderately strong winds often create ideal foraging conditions for larger raptors, such as red-tailed hawks and golden eagles.

To avoid time-of-day biases and ensure equitable coverage of all sites in both morning and afternoon hours, each month the observer followed a standardized protocol for selecting a start point and then proceeding systematically in the most efficient manner through the remainder of that month's surveys:

1) For the first round of surveys each month, choose a random start point.

2) If the randomly chosen start is an odd number, survey all odd-numbered sites in the morning and all even-numbered sites in the afternoon; vice versa if an even-numbered start.

3) After conducting the first count, proceed through the remaining morning and afternoon counts according to the appropriate sequence, identified below, to maximize travel efficiency:

   - 1, 3, 5, 7 AM, 8, 6, 4, 2 PM
   - 2, 4, 6, 8 AM, 7, 5, 3, 1 PM
   - 3, 1, 5, 7 AM, 8, 6, 4, 2 PM
   - 4, 2, 6, 8 AM, 7, 5, 3, 1 PM
   - 5, 7, 3, 1 AM, 2, 4, 6, 8 PM
   - 6, 8, 4, 2 AM, 1, 3, 5, 7 PM
   - 7, 5, 3, 1 AM, 2, 4, 6, 8 PM
   - 8, 6, 4, 2 AM, 1, 3, 5, 7 PM

4) For the second round of surveys in the month, if the random start point for the first round of surveys was an odd number, start at a point randomly chosen from among the even-numbered sites and proceed according to the relevant sequence above.

One highly experienced observer conducted the March and April counts, while accompanied by, and ensuring necessary training of, a second capable observer. The second observer then conducted the remainder of the surveys from May 2013 to March 2014.

The observers recorded data on a standard form. The counts involved documenting all birds seen or heard within 800 meters (0.5 mile) of each count site. For informational purposes, the observers also occasionally and separately recorded larger birds, such as eagles, seen beyond the 800-meter (0.5-mile) radius, but we did not include such sightings in the analyses and summaries presented herein. The observers classified all sightings according to the approximate distance (to the nearest 10 meters [33 feet]) from the count center.

When relevant, they also recorded the flight direction (N, NE, E, SE, S, SW, W, NW, or V[ariable]) and flight height of each bird or group of birds, with flight height estimated relative to the observer's ground-level position as follows:

- -1 = more than 10 meters (33 feet) below observer's eye level
- 0 = within ±10 meters (33 feet) of observer's position
- 1 = 10–50 meters (33–164 feet) above observer's position (upper limit roughly equivalent to the maximum height where risk of collision with the transmission line may occur)
- 2 = 50–150 meters (164–492 feet) above observer's position (local-area movers/commuters and some foraging raptors)
- 3 = >150 meters (492 feet) above observer's position (high-soaring ravens/raptors and migrants/regional movers)

The observers recorded basic behavior information for all birds observed, using the following codes:

(P)erched: (r)esting, (p)reening, (f)eeding, (c)ourting/mating
(G)round: (r)esting, (p)reening, (f)oraging/feeding, (c)ourting/mating
(F)lying: (m)igrating, (t)ransit, (s)oaring, (f)oraging, (c)ourtship/territorial, (d)efensive/escape
(N)esting: (b)uilding, (c)opulating, (i)ncubating, (t)ending young, (f)eeding
(V)oice only: (c)alling, (s)inging

The observers also recorded the current habitat associations for all observations, based primarily on the categories outlined in HTH (2013a) (e.g., see Table 2). When relevant, the observers also recorded details about bird use of specific perching substrates (e.g., shrub, tree, fence, powerline or pole, or building) and any predator-prey interactions observed (e.g., species involved, setting, and outcome).

During all counts, the observers sought to minimize double counting of individual birds or groups of birds by keeping track of individual sightings and locations. For small birds whose entire home ranges were generally contained in an individual survey area, observers simply tallied individual occurrences. For larger birds such as raptors and ravens, whose home ranges often extended well beyond the bounds of a single survey area, the observers also recorded time-on-plot estimates for each individual to provide more useful information about how long the birds foraged in, or otherwise used, particular areas.

Lastly, the observers recorded the weather conditions at the beginning of each survey using a handled Kestrel 4500 Pocket Weather Tracker (Nielsen-Kellerman Company, Boothwyn, Pennsylvania). Recorded data included cloud cover estimates and types, presence/absence and type of precipitation, estimates of horizontal and vertical visibility when restricted, barometric pressure, ambient temperature, and wind speed and direction. For synoptic summary purposes, we augmented the data collected on site with data available through the weather station located approximately 8 kilometers (5 miles) northwest of the BSA, in Parkfield (MesoWest Database 2013).

2.3 Data Analysis

To describe patterns of variation in bird activity levels, we calculated frequency of occurrence by species or species groups as the number of surveys during which at least one individual was recorded, and we translated the raw survey counts into estimates of sightings per hour. For summary purposes, we examined patterns of variation for five distinct species groups: raptors (hawks, eagles, falcons, owls, and vultures), shorebirds (sandpipers, plovers, and allies), corvids (Corvidae: ravens, crows, magpies, and jays), icterids (Icteridae: blackbirds, orioles, and starlings), and other mostly smaller birds (passerines, hummingbirds, swallows/swifts, woodpeckers, quail, etc.).

For summary purposes, we assigned surveys to quarterly seasons as follows:

Spring: March through May
Summer: June through August
Fall: September through November
Winter: December through February

These quarterly divisions are useful for distinguishing approximate spring and fall migration periods from summer breeding and winter periods for most species. In California, however, and depending on the species, the nesting season may begin as early as January and continue well into September. Similarly, spring passerine migration often continues throughout May, or even June, and fall migration often continues through November and into early December for some raptor species.

We evaluated metrics of activity of the five groups of birds as a function of site and season. For each group of birds, we summarized the data by averaging sightings across surveys at each of the eight points within a season. Averaging detections in this way is a recommended and commonly used way of summarizing point count data (Nur et al. 1999), and helps avoid invalid inference that may result from temporally pseudoreplicated data. We then fit a linear model (ANOVA) to the data for each species group. We evaluated normality of residuals by visually inspecting q-q plots and applying Shapiro-Wilk tests. Two groups, icterids and shorebirds, did not meet these criteria for normality; for these groups, we used the Kruskal-Wallis rank sum test, and pairwise Mann-Whitney U tests, both nonparametric tests that do not assume normality of the data, to evaluate the separate effect of the two predictor variables, site and season, on the sightings rates. We evaluated significance at $\alpha = 0.05$, but also considered marginally significant results at $\alpha = 0.10$. We did not evaluate interactions between the predictor variables quantitatively because there were limited degrees of freedom following data summarization; however, we qualitatively evaluated possible interactions through graphical comparisons of average sighting rates by season and site.

Section 3.0 Results

3.1 Observation Effort

From late March 2013 through early March 2014, we conducted 200 twenty-minute surveys, with each count site surveyed at least six times during each quarterly season (spring, summer, fall, and winter) across the year-long survey period. Most counts occurred as planned on one day each during the first and third weeks of each month, but some exceptions occurred (Appendix A). Most notably, all of the March 2013 surveys occurred on two days during the last week of the month, because of contract-related constraints, and four of the April counts did not occur according to the expected randomized schedule, owing to constraints imposed by the landowner. In addition, a scheduling error resulted in the May counts consisting of only two AM counts at four sites and two PM counts at the other four sites. In the end, we covered all sites an equal number of times during both seasonal periods and at least once during AM and PM hours, but with an AM/PM sampling imbalance during the 2013 spring quarter (Table 3). In addition, we conducted only one round of surveys in early March 2014, as originally scheduled to provide a full year of coverage.

Table 3. Number of Monthly Surveys Conducted by Count Site and Season during Morning (AM) and Afternoon (PM) Hours at the Proposed California Flats Solar Project Site

Site	Spring		Summer		Fall		Winter		Total
	AM	PM	AM	PM	AM	PM	AM	PM	
1	2	5	3	3	3	3	3	3	25
2	4	3	3	3	3	3	3	3	25
3	2	5	3	3	3	3	3	3	25
4	4	3	3	3	3	3	3	3	25
5	3	4	3	3	3	3	3	3	25
6	5	2	3	3	3	3	3	3	25
7	3	4	3	3	3	3	3	3	25
8	5	2	3	3	3	3	3	3	25
All sites	28	28	24	24	24	24	24	24	200

3.2 Habitat and Climatic Conditions

At the onset of the survey period, the Project area and surrounding region was experiencing moderate drought conditions, which developed into severe drought conditions that prevailed across the entire region and Project site throughout the remainder of the survey period. The 30-year average annual precipitation (1970–2000) for the area ranges from 34.5–45.5 centimeters (13.6–17.9 inches) across the site (PRISM

Climate Group 2013). Precipitation during the 2012–2013 water year (1 October 2012 through 30 September 2013) amounted to only 41% of the long-term average, with the majority falling during several big storm events in late November and December 2012. By the end of the survey period, the precipitation total was only 36% the long-term average for the relevant portion of the water year (1 October 2013 to 31 March 2014).

The low precipitation resulted in minimal to no growth of grassland vegetation and limited seasonal development of wetlands and intermittent streams preceding and during the survey period. This lack of habitat development probably precluded some bird species or individuals from nesting or occupying the Project site during the survey period. For example, the lack of moisture likely reduced prey availability and contributed to depressed nesting activity and productivity of golden eagles in the region (HTH 2013b, 2013c).

3.3 Species Occurrences and General Patterns of Distribution and Abundance

We recorded 4061 individual bird sightings of 45 species during the BUC surveys (Table 4; also see Appendix B for a complete list of species recorded on or adjacent to the Project site during the standardized surveys, earlier reconnaissance surveys, and incidentally during travel around the Project site). The tally included five special-status species: Swainson's hawk (State-listed as threatened), golden eagle (State fully protected), northern harrier (California Species of Special Concern [CSSC]), burrowing owl (CSSC), and loggerhead shrike (CSSC).

We recorded nine species of raptors, two species of shorebirds, four species of corvids, greater roadrunner, and 30 species of passerines and other mostly smaller birds (Table 4). The 11 most abundant species were horned lark, western meadowlark, common raven, Brewer's blackbird, house finch, red-tailed hawk, mourning dove, Savannah sparrow, western kingbird, white-crowned sparrow, and American kestrel (*Falco sparverius*) (the latter two were equally abundant). The most commonly detected and widely distributed species was horned lark, which was the only species that we recorded in all survey areas and in all seasons (Table 4; Appendix C). We detected common raven, mourning dove, western meadowlark, Savannah sparrow, and American kestrel in all survey areas, but not in all seasons (e.g., Savannah sparrow was absent in summer). We recorded no other species in all survey areas; however, American kestrel, Brewer's blackbird, house finch, red-tailed hawk, Say's phoebe, golden eagle, and western kingbird were nearly ubiquitous across the sites. Most of these species are year-round residents in the area, but western kingbirds were absent in winter (Table 4; Appendix C).

We detected 14 species in all seasons, 9 species in three seasons, 10 species in only two seasons, and 12 species in only one season (Table 4). We detected five species only in spring: Swainson's hawk, Bullock's oriole, northern mockingbird, cliff swallow, oak titmouse, and white-breasted nuthatch. We detected two species each only in summer (California towhee and barn swallow), fall (ruby-crowned kinglet and Nuttall's woodpecker), and winter (burrowing owl and rock pigeon); however, several of these species are year-round residents in the area.

At the species-group level, raptors, shorebirds, corvids, and icterids showed higher activity rates in spring, lower activity rates in summer, and then higher activity rates again from late fall through winter (Figure 3; Appendix C). The overall raptor pattern was driven primarily by the activity of red-tailed hawks, the most abundant and ubiquitous raptor in the Project area, whose activity rate was more than twice as high in spring and winter than in summer and especially fall. The activity rates of kestrels, golden eagles, and ferruginous hawks also were relatively high in winter, but the eagle activity rate was higher in summer than in spring, and kestrels and turkey vultures were most active in the summer. Among the icterids, Brewer's blackbirds were much more active in spring and summer than in fall or winter, whereas western meadowlarks were most active and apparent in spring and especially winter. In contrast to the pattern shown by the other species groups, the other smaller birds as a group showed relatively low activity from March through October, but then high activity from late fall through winter. This pattern was driven by winter influxes of horned larks, house finches, Savannah sparrows, and white-crowned sparrows. Species included in the other smaller birds group that were most active in summer included ash-throated flycatcher, California quail, greater roadrunner, loggerhead shrike, and mourning dove.

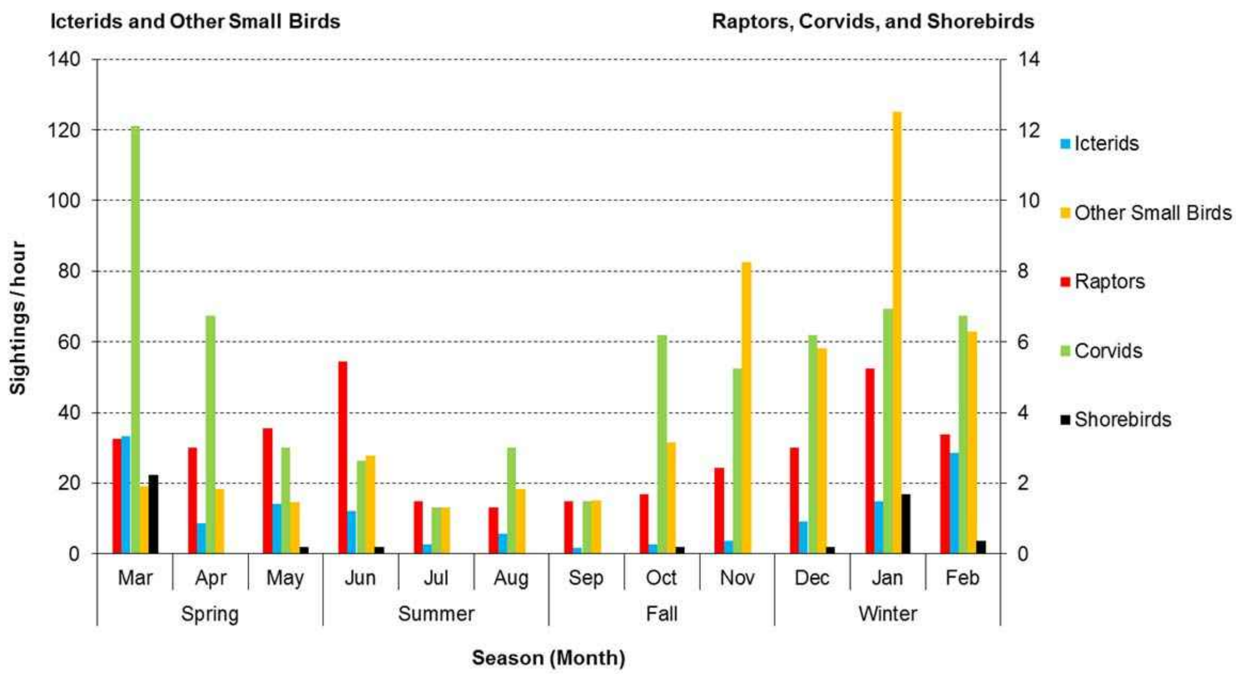

Figure 3. Seasonal Activity Patterns of Primary Species Groups

With data for all species combined and summarized across all seasons, the highest average activity rates occurred at BUC Site 4 (117 sightings/hour) and BUC Site 8 (82 sightings/hour), with slightly lower rates at BUC Sites 2, 3, and 7 (51–64 sightings/hour), and the lowest rates at BUC Sites 1, 5, and 6 (38–41 sightings/hour) (Appendix C). The high overall activity rates at BUC Sites 4 and 8 mostly reflect relatively large wintering flocks of horned larks and house finches (Figure 4). Examination of site-specific activity rates across seasons revealed that most sites supported at least moderate activity during at least one season (Figure 4).

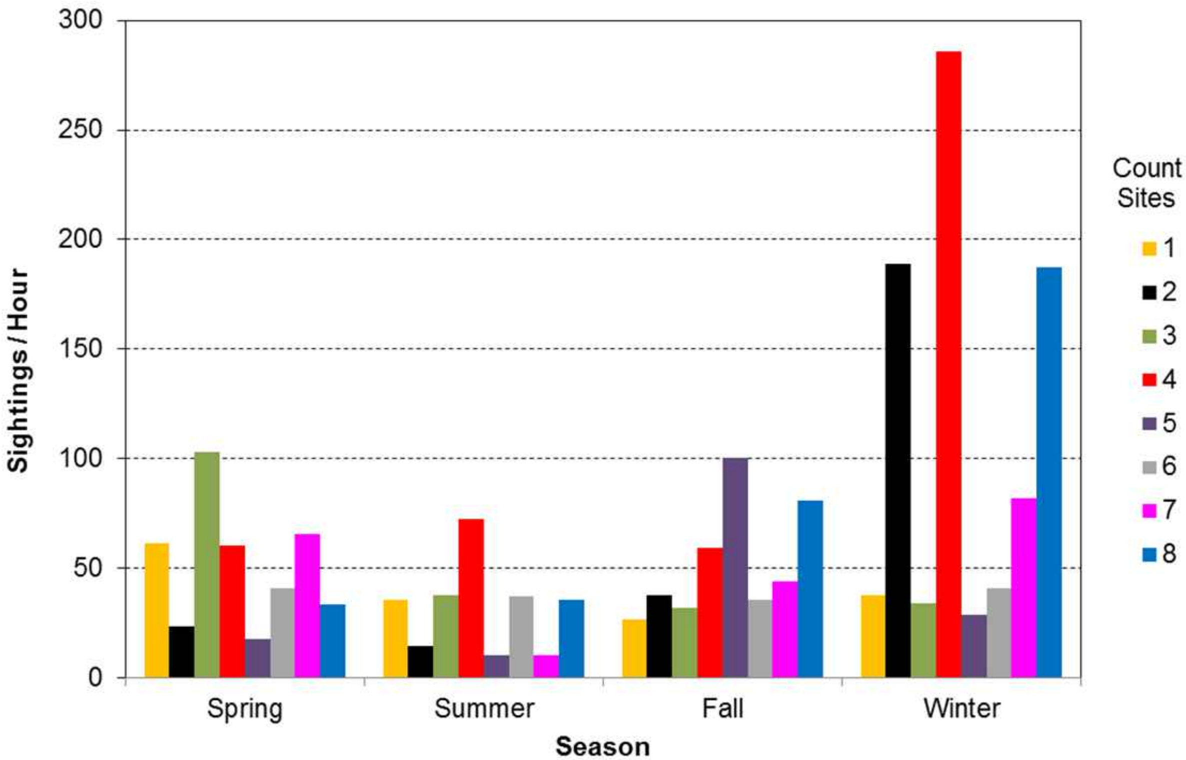

Figure 4. All-Bird Average Activity Rates by Count Site and Season

Table 4. Frequency of Occurrence and Total Sightings by Species and Season

Species	Spring		Summer		Fall		Winter		Total Sightings
	Frequency[1]	Sightings	Frequency	Sightings	Frequency	Sightings	Frequency	Sightings	
American Crow	1[1]	3	0	0	0	0	1	9	12
American Goldfinch	0	0	0	0	2	3	2	7	10
American Kestrel	6	6	9	15	6	6	9	12	39
Ash-throated Flycatcher	1	1	5	9	0	0	0	0	10
Barn Swallow	0	0	1	1	0	0	0	0	1
Brewer's Blackbird	8	213	10	93	3	3	7	22	331
Bullock's Oriole	5	5	0	0	0	0	0	0	5
Burrowing Owl	0	0	0	0	0	0	1	1	1
California Towhee	0	0	1	1	0	0	0	0	1
California Quail	1	1	1	4	1	1	0	0	6
Cliff Swallow	2	7	0	0	0	0	0	0	7
Common Raven	39	144	12	36	22	66	29	91	337
European Starling	5	19	1	4	1	1	2	6	30
Ferruginous Hawk	0	0	0	0	5	6	5	5	11
Golden Eagle	3	4	4	4	2	2	6	6	16
Greater Roadrunner	0	0	2	2	0	0	1	1	3
House Finch	6	46	12	21	9	38	9	137	242
Horned Lark	47	155	35	191	44	550	43	1067	1963
Killdeer	2	2	1	1	1	1	3	3	7
Lark Sparrow	7	10	2	2	1	3	0	0	15
Long-billed Curlew	2	17	0	0	0	0	3	9	26
Lewis's Woodpecker	5	9	1	2	5	10	2	4	25
Loggerhead Shrike	2	3	4	5	3	3	3	4	15
Mourning Dove	15	27	16	51	2	12	3	4	94
Northern Flicker	0	0	0	0	3	3	1	1	4
Northern Harrier	1	1	0	0	1	1	0	0	2

Species	Spring		Summer		Fall		Winter		Total Sightings
	Frequency[1]	Sightings	Frequency	Sightings	Frequency	Sightings	Frequency	Sightings	
Northern Mockingbird	3	5	0	0	0	0	0	0	5
Nuttall's Woodpecker	0	0	0	0	1	1	0	0	1
Oak Titmouse	1	1	0	0	0	0	0	0	1
Prairie Falcon	3	3	0	0	1	1	1	1	5
Ruby-crowned Kinglet	0	0	0	0	1	1	0	0	1
Rock Pigeon	0	0	0	0	0	0	1	2	2
Rock Wren	7	15	3	5	7	8	6	8	36
Red-tailed Hawk	28	46	12	18	11	13	20	36	113
Red-winged Blackbird	10	33	0	0	0	0	1	2	35
Say's Phoebe	1	1	0	0	10	11	9	9	21
Savannah Sparrow	7	13	0	0	17	29	16	47	89
Swainson's Hawk	1	1	0	0	0	0	0	0	1
Turkey Vulture	0	0	6	7	1	1	1	1	9
White-breasted Nuthatch	1	1	0	0	0	0	0	0	1
White-crowned Sparrow	1	1	0	0	3	16	5	22	39
Western Kingbird	13	33	10	22	0	0	0	0	55
Western Meadowlark	47	120	11	12	15	40	22	250	422
Western Scrub-Jay	2	2	0	0	2	2	1	1	5
Yellow-billed Magpie	0	0	1	1	1	1	3	5	7
All Species		**948**		**507**		**833**		**1773**	**4061**

[1] Values reflect the number of individual site-specific AM and PM surveys in each season (56 in spring, 48 in other seasons) during which at least one individual of the species was recorded.

3.3.1 Raptors

We recorded nine species of raptors during the surveys (Table 4). American kestrels and red-tailed hawks were relatively abundant and recorded during all seasons, with kestrels seen at all sites and red-tailed hawks at all sites except BUC Site 5. We recorded golden eagles during all seasons and at all sites except BUC Site 2 (incidental observations of eagles were recorded in this area outside of the standardized survey period). We recorded turkey vultures in all but the spring counts, but know from other observations that they were present in the general area in May. Ferruginous hawks were observed relatively frequently during fall and winter at five sites. Five prairie falcon observations occurred at BUC Sites 1, 2, 3, 4, and 8 between October and May during the scheduled surveys, but we observed this species on several other occasions in the general area through June. Northern harriers, burrowing owls, and Swainson's hawks were scarcer, sighted only once or twice each during the fall, winter, or spring scheduled counts. The harrier observations at BUC Site 2 and 8 involved an adult coursing low over annual grassland. The Swainson's hawk observation at BUC Site 4 involved a migrant of unknown age flying north at an altitude >150 meters (492 feet) during late March. The single burrowing owl observation during a scheduled count occurred at BUC Site 2 in January 2014. Our aerial survey work revealed several active prairie falcon nests in the foothills east of the Project site, whereas harriers and Swainson's hawks did not appear to be present in the area during the summer (HTH 2013b).

We detected golden eagles 16 times during the scheduled counts in all seasons and at all sites except BUC Site 2 (Table 4). We recorded sightings during 7.5% of the surveys: seven during morning surveys and nine during afternoon surveys. Slightly more sightings occurred in winter than in other seasons: six in winter (one in December, two in January, and three in February), four in spring (one in March, two in April, and one in May), four in summer (three in June and one in August), and two in the fall (November) (Appendix C). Six sightings occurred at BUC Site 5, three at BUC Site 3, two each at BUC Sites 1 and 4, and one each at BUC Sites 6, 7, and 8. We observed eight adults, six subadults, and two eagles of unknown age. All observations recorded during the scheduled counts were of eagles in flight, either foraging or in transit, and all occurred over annual grassland habitat. Seven of the 16 eagles were flying at altitudes >150 meters (492 feet), five were flying at altitudes of 50–150 meters (164–492 feet), and four were flying at altitudes of 10–50 meters (33–164 feet). Six of the observations occurred at BUC Site 5 in the vicinity of the proposed transmission line (discussed below). Other observations recorded during aerial and ground surveys for nesting raptors conducted during the BUC survey period documented additional eagle occurrences on or over proposed development areas in all of the BUC survey areas, as well as outside the PIA (HTH 2013b).

BUC Site 5, where we recorded the most eagle observations, was the site chosen to represent the central portion of the proposed transmission line corridor, and was the only survey area that encompassed a known golden eagle nest. Although the nest was inactive in 2013, we recorded adult eagles near the nest and in the surrounding area on several occasions, during both ground and aerial surveys for nesting raptors (HTH 2013b). Five of the six observations recorded at BUC Site 5 during the scheduled surveys involved eagles flying at altitudes above the projected collision risk zone for the proposed transmission line: four above 150 meters (492 feet) and one at an altitude of 50–150 meters (164–492 feet). The sixth observation was of an eagle flying within the projected risk zone of 10–50 meters (33–164 feet). During the BUC Site 5 surveys, we recorded four adult eagles traveling southward and two eagles (one adult, one of unknown age) soaring above the count site for periods of up to 5 minutes, while gradually floating southwestward. Overall, the observations we recorded in the vicinity of BUC Site 5, during both ground and aerial surveys, indicated both localized activity involving golden eagles that did not breed in 2013 (adults and subadults) and movements from the vicinity of the survey area toward active eagle nests located 3.5–3.6 kilometers (2.2 miles) southwest and south of the count site.

We detected red-tailed hawks during all seasons and at all sites except BUC Site 5 (Table 4), with the highest activity rates recorded at BUC Sites 1, 3, 4, and 6 (Appendix C). All these locations are situated near woodland areas, which in several areas supported active red-tailed hawk nests in 2013 (HTH 2013b). The lack of red-tailed hawk sightings during the official surveys of BUC Site 5 in the 2013 nesting season was surprising, given the presence of an active nest just northeast of the survey area. We recorded red-tailed hawks during 50% of the spring surveys, 25% of the summer surveys, 23% of the fall surveys, and 42% of the winter surveys (Table 4). We typically observed red-tailed hawks in or over annual grassland and woodland habitats on the Project site. Two active red-tailed hawk nests were visible from the count sites, one (which successfully fledged three young) on a windmill platform in the BUC Site 3 survey area, and the other (which produced two chicks that reached an age of at least 5–6 weeks) on a transmission tower in the BUC Site 6 survey area (HTH 2013b). Other active red-tailed hawk nests were located in the BUC Site 1 and 4 survey areas, and between the BUC Site 4 and 5 survey areas, but these nests were not readily observable from the count sites, and we did not confirm chick production in them.

During the scheduled counts, we detected American kestrels at all BUC sites (Appendix C). Kestrels were ubiquitous in the BSA during all seasons, with 12 observations each in the summer and winter surveys, and six observations each during the fall and spring surveys. These observations were particularly common wherever perch substrates (e.g., trees, power poles, and fences) were available for use during foraging. Sighting rates averaged highest at BUC Sites 1 and 7 (Appendix C), which were situated near woodland (Figure 2) and rocky outcrop habitats where we suspect several pairs of kestrels nested. Other sightings, recorded outside of the BUC surveys, revealed concentrated kestrel foraging activity in the northwestern and north-central sections of the Project site, where the birds routinely perched on fencelines as they foraged and consumed prey (HTH 2013b).

The ANOVA confirmed marginally significant seasonal variation in overall raptor activity, as well as significant variation across sites (Table 5; Figure 5). Post-hoc comparisons indicated that the overall fall activity rate was at least marginally lower than the spring and winter activity rates, and that, across the entire survey year, the average raptor activity rates were significantly lower at BUC Sites 2, 5, and 8, and marginally lower at Site 7, compared to Sites 1 and 3, and to a slightly lesser degree Site 4 (Figure 5; Appendix C). Each of the latter survey areas encompassed an active red-tailed hawk nest, and Sites 1 and 3 were among the survey areas closest to an active golden eagle nest (HTH 2013b).

Table 5. ANOVA Results for Raptors Evaluating the Influence of Site and Season on Average Bird Use Count (BUC) Sightings per Hour

Variable	Degrees of Freedom	Sum of Squares	Mean Square	*F*	*P*
Season	3	7.652	2.551	3.05	0.051
Site	7	25.087	3.582	4.28	0.004
Residuals	21	17.564	0.836	–	–
		Estimate	**Standard Error**	***t***	***P***
(Intercept)		2.991	0.536	5.58	0.000
Season:Summer [1]		-0.345	0.457	-0.76	0.459
Season:Fall		-0.929	0.457	-2.03	0.055
Season:Winter		0.405	0.457	0.89	0.386
Site 2		-1.345	0.647	-2.08	0.050
Site 3		0.452	0.647	0.70	0.492
Site 4		-0.131	0.647	-0.20	0.841
Site 5		-2.000	0.647	-3.09	0.006
Site 6		-0.310	0.647	-0.48	0.637
Site 7		-1.131	0.647	-1.75	0.095
Site 8		-2.036	0.647	-3.15	0.005

[1] Reference categories: Site1 and Spring.

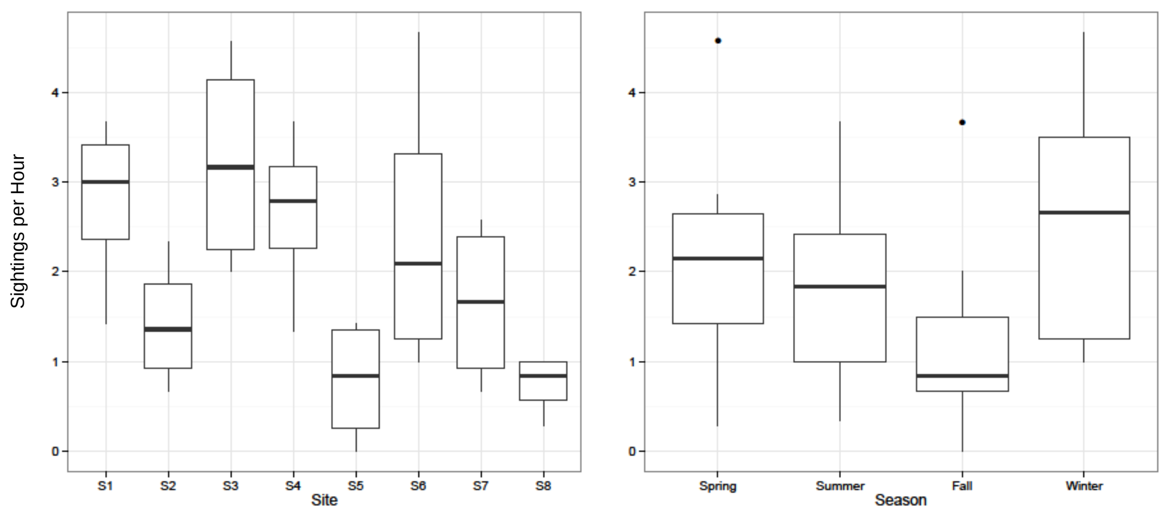

Figure 5. Box Plots Illustrating Variation in Average Sighting Rates for Raptors across Sites and Seasons

3.3.2 Shorebirds and Other Waterbirds

During the BUC surveys, we observed no waterfowl, but we did observe killdeer on several occasions, during all seasons, and long-billed curlews on multiple occasions during winter and spring (Table 4), all within grassland or grassland riparian habitats. We recorded a group of 15 curlews at BUC Site 7 and two curlews at BUC Site 2 in late March 2013, a group of seven curlews at BUC Site 3 in January 2014, and one curlew each at BUC Sites 1 and 2 in December and February (Appendix C). Two of the curlews were flying when observed, at an altitude that would have put them at risk of collision with the proposed transmission line. At other times outside of the BUC surveys, we observed a flock of whimbrels over the BSA in April, mallards along Cottonwood Creek in the BSA on several occasions, and a variety of other waterbirds at a stock pond not far from the BSA and utility corridor (Appendix B).

The observation sample size was low; nevertheless, the Kruskall-Wallis analysis of shorebird (curlew and killdeer) activity rates indicated no overall seasonal variation, but marginally significant variation among the BUC survey areas, with the average sighting rate at BUC Site 3 higher than at Sites 5, 6, and 8, where we documented no relevant activity (Table 6; Figure 6).

Table 6. Kruskall-Wallis Results for Shorebirds Evaluating the Influence of Site and Season on Average Bird Use Count (BUC) Sightings per Hour

	X^2	Degrees of Freedom	*P*
Season	4.67	3	0.198
Site	12.92	7	0.074

Mann-Whitney Pairwise U tests

	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6	Site 7
Site 2	0.620						
Site 3	0.180	0.457					
Site 4	1.000	0.620	0.180				
Site 5	0.453	0.186	0.020	0.453			
Site 6	0.453	0.186	0.020	0.453	–		
Site 7	1.000	0.869	0.298	1.000	0.453	0.453	
Site 8	0.453	0.186	0.020	0.453	–	–	0.453

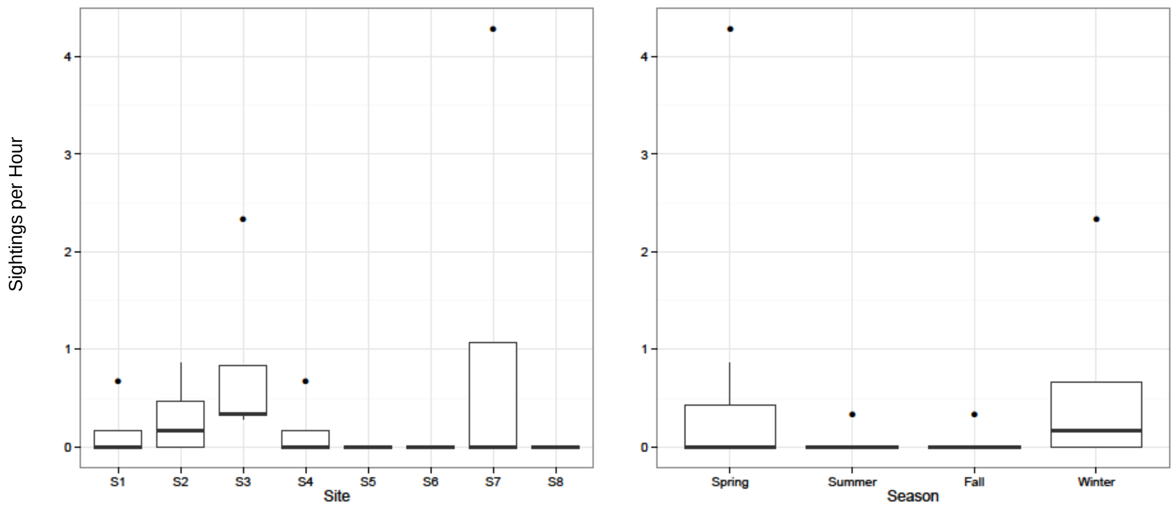

Figure 6. Box Plots Illustrating Variation in Average Sighting Rates for Shorebirds across Sites and Seasons

3.3.3 Corvids

We recorded four corvid species during the BUC surveys: common raven, American crow, western scrub-jay, and yellow-billed magpie. Common ravens were by far the most numerous representative of this group, with relatively few additional observations of American crows, yellow-billed magpies, and western scrub-jays (Table 4). The five western scrub-jay sightings occurred in February, March, and November, all in the BUC Site 7 survey area, which contained a high proportion of woodland habitat. Five of the seven magpie sightings occurred at BUC Site 1, between November and February. In contrast, ravens generally occurred in all survey areas throughout the year (Appendix C).

The ANOVA results indicated significant seasonal and site-to-site variation (Table 7; Figure 7). The overall spring activity rate was higher than in summer and fall, and activity was at least marginally higher at BUC Sites 6 and 7 than at Site 2, and to a lesser degree Sites 4 and 5. Overall, corvid activity was most concentrated in the northern section of the BSA; however, we observed active raven nests in the BUC Site 1 and 4 areas in 2013.

Table 7. ANOVA Results for Corvids Evaluating the Influence of Site and Season on Average Bird Use Count (BUC) Sightings per Hour

Variable	Degrees of Freedom	Sum of Squares	Mean Square	*F*	*P*
Season	3	67.021	22.340	5.76	0.005
Site	7	79.220	11.317	2.92	0.027
Residuals	21	81.512	3.882	–	–
		Estimate	**Standard Error**	***t***	***P***
(Intercept)		5.128	1.155	4.44	0.000
Season:Summer [1]		-3.780	0.985	-3.84	0.001
Season:Fall		-2.446	0.985	-2.48	0.022
Season:Winter		-0.905	0.985	-0.92	0.369
Site 2		-2.476	1.393	-1.78	0.090
Site 3		0.583	1.393	0.42	0.680
Site 4		-0.738	1.393	-0.53	0.602
Site 5		-1.083	1.393	-0.78	0.445
Site 6		2.631	1.393	1.89	0.073
Site 7		2.190	1.393	1.57	0.131
Site 8		0.440	1.393	0.32	0.755

[1] Reference categories: Site1 and Spring.

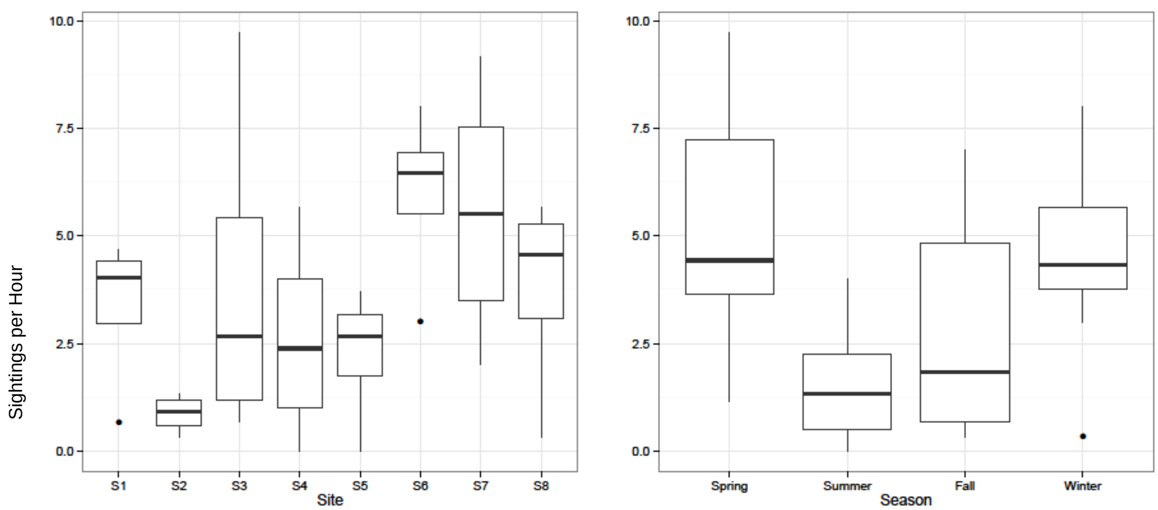

Figure 7. Box Plots Illustrating Variation in Average Sighting Rates for Corvids across Sites and Seasons

3.3.4 Icterids

We recorded five species of icterids and starlings during the BUC surveys: Brewer's blackbird, red-winged blackbird, Bullock's oriole, western meadowlark, and European starling (Table 4). Brewer's blackbirds and western meadowlarks were by far the most abundant of these species in the Project area, and were present in all seasons. All five species showed relatively high abundance in spring, but western meadowlarks were most frequently detected in winter (Table 4; Appendix C). The Kruskall-Wallis analysis indicated significant seasonal variation in the overall icterid and starling activity rates, but no significant overall variation across sites (Table 8). The overall spring activity rate was higher than in summer and fall, and the plots of average activity by site also suggested that the activity rate at BUC Site 4 tended to be higher, and the activity rate at BUC Sites 5, 6, and 8 tended to be lower, than at other sites (Figure 8). Overall icterid and starling activity tended to most concentrated in the southern half of the BSA; however, western meadowlarks, in particular, were nearly ubiquitous throughout the Project site wherever grassland habitat was found.

Table 8. Kruskall-Wallis Results for Icterids Evaluating the Influence of Site and Season on Average Bird Use Count (BUC) Sightings per Hour

	X^2	Degrees of Freedom	*P*
Season	10.01	3	0.018
Site	10.70	7	0.152
Mann-Whitney Pairwise U tests			
	Spring	**Summer**	**Fall**
Summer	0.018		
Fall	0.002	0.916	
Winter	0.195	0.268	0.207

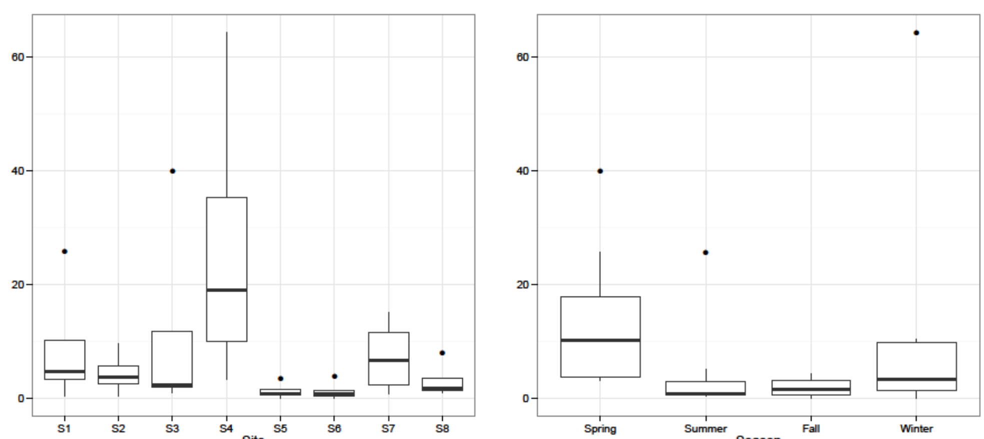

Figure 8. Box Plots Illustrating Variation in Average Sighting Rates for Icterids across Sites and Seasons

3.3.5 Other Small Birds

We recorded 25 other species of mostly smaller birds during the BUC surveys (Table 4). By far the most abundant and ubiquitous species in this group was the horned lark, which we recorded in all survey areas throughout all seasons (Appendix C). The only other species in this group that we recorded throughout the survey year and in many of the survey areas were house finch and mourning dove; however, Savannah sparrows were routinely encountered in small numbers in most survey areas in all seasons except summer; Say's phoebe occurred in small numbers in most survey areas during fall and winter; and western kingbird occurred in small numbers in most survey areas in spring and summer. All other species were encountered only in scattered small numbers at various times of year or in a few cases in moderate numbers at one or two sites during certain times of year. For example, Lewis's woodpeckers were sighted fairly frequently at BUC Site 7 in spring and fall; white-crowned sparrows were relatively abundant in fall and winter at BUC Site 7; and rock wrens were relatively abundant in summer at BUC Site 6 (Appendix C). Excluding the three most common species in this group (horned lark, house finch, and mourning dove), BUC Sites 1, 4, 6, and 7 supported the most overall small bird activity, across the seasons. Each of these survey areas included relatively diverse mixes of riparian, woodland, wildflower field, and shrub/scrub habitats (Table 2; Figure 2).

The ANOVA analysis indicated significant seasonal variation in the overall activity rates of the other small birds group, but no significant variation across sites (Table 9). The overall activity rates increased from spring through winter, and the average winter rate was significantly higher than the average spring rate (Figure 9). The high winter activity rate reflected primarily a large influx of horned larks. Although no significant overall site effect was apparent based on the combined-species analysis, the post-hoc assessment suggested that the average activity rates at BUC Sites 4 and 8 were at least marginally higher than at other sites, reflecting relatively high activity by several species at BUC Site 4, and primarily high horned lark activity at BUC Site 8, especially in fall and winter (Appendix C).

The only special-status species represented in this group and observed during the scheduled counts was loggerhead shrike (CSSC). During the scheduled counts, we recorded this species only at BUC Site 1, during all seasons (Table 4; Appendix C). This survey area encompassed ornamental, non-native woodland that supported at least one breeding pair of shrikes, with several fledglings present by mid-April 2013. Although we did not observe shrikes anywhere else during the BUC surveys, we opportunistically recorded other individuals in the BSA near BUC Site 7, in the BUC Site 3 survey area, and in other woodland areas.

Table 9. ANOVA Results for Other Small Birds Evaluating the Influence of Site and Season on Average Sightings per Hour from the BUC Surveys

Variable	Degrees of Freedom	Sum of Squares	Mean Square	*F*	*P*
Season	3	9556.528	3185.509	4.37	0.015
Site	7	6422.372	917.482	1.26	0.317
Residuals	21	15300.239	728.583	–	–
		Estimate	**Standard Error**	***t***	***P***
(Intercept)		-3.512	15.826	-0.22	0.827
Season:Summer [1]		1.417	13.496	0.10	0.917
Season:Fall		16.958	13.496	1.26	0.223
Season:Winter		42.958	13.496	3.18	0.004
Site 2		25.310	19.086	1.33	0.199
Site 3		3.250	19.086	0.17	0.866
Site 4		36.095	19.086	1.89	0.072
Site 5		10.131	19.086	0.53	0.601
Site 6		4.179	19.086	0.22	0.829
Site 7		6.321	19.086	0.33	0.744
Site 8		36.810	19.086	1.93	0.067

[1] Reference categories: Site1 and Spring.

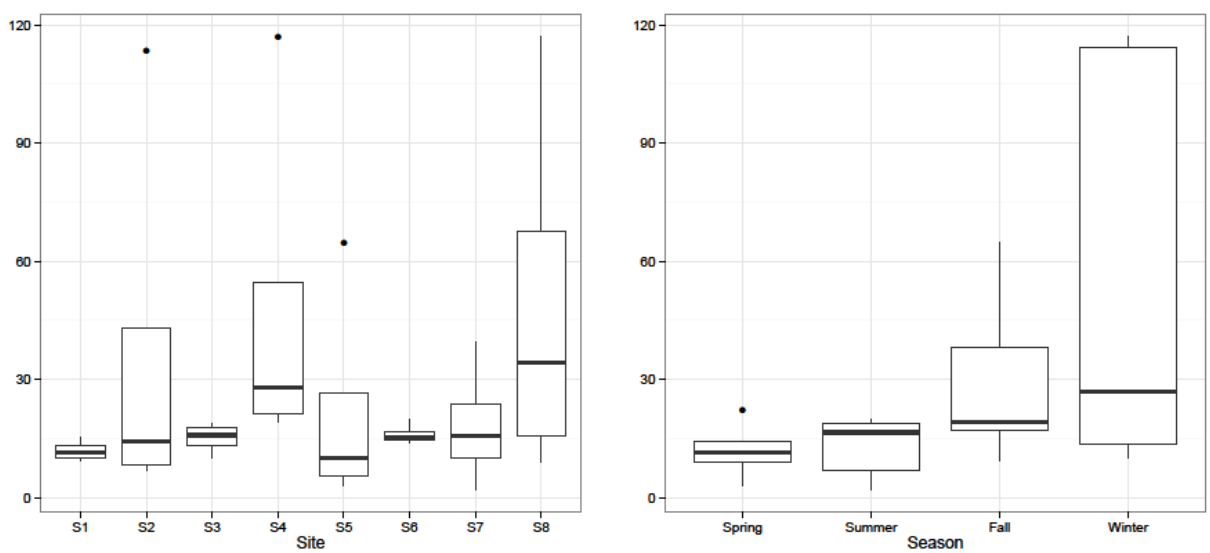

Figure 9. Box Plots Illustrating Variation in Average Sighting Rates for Other Small Birds across Sites and Seasons

3.4 Habitat Use

Of 4061 bird sightings recorded during the year-long survey period, 91% occurred in or over grassland habitats, 4% in natural, upland woodlands, 3% in riparian woodlands, 2% in ornamental, non-native woodlands, and <1% each in marsh/wetland habitats, interior Coast Range goldenbush scrub, and developed habitats (Table 10). Restricting the evaluation to 1384 confirmed or probable (aural detections only) observations involving nonflying birds further emphasized use of woodland habitats, but otherwise did not alter the overall picture appreciably; the relevant figures were approximately 79% in grassland, 11% in natural upland woodlands, 6% in riparian woodlands, 5% in ornamental woodlands, and <1% each in marsh/wetland habitats, interior coast range goldenbush scrub, and developed habitats. Examined at the group level, shorebirds were found exclusively in grassland habitats; icterids and starlings ranked second highest in proportional use of grassland habitats (82% of nonflying observations) and lowest in use of woodland habitats (17%); raptors (red-tailed hawks, in particular) were sighted more frequently than other groups in woodland habitats (35%); and corvids showed the highest proportion of sightings in juniper woodland habitats (18%; although at the species level, lark sparrows, white-crowned sparrows, and ash-throated flycatchers were more abundant in this habitat).

The diversity of habitats in which we documented birds was the lowest in summer (Table 10). For all species groups, most sightings occurred in association with grassland habitats, in proportions that corresponded fairly closely to the proportional availability of this habitat in the BSA (Figure 10). Habitats that were used by all species groups, except shorebirds, more than expected based on their proportional availability in the BSA included all three types of natural and ornamental woodlands (Figure 10). Based on this coarse-scale comparison, other habitat types appeared to be used less often than expected based on their availability. However, note that the utility of such comparisons is limited, because private property considerations precluded mapping the distribution of habitats outside the BSA. This limitation precluded developing a robust evaluation of habitat selection in the BUC survey areas, because large portions of most of the areas extended beyond the boundaries of the delineated BSA. In addition, delineated marsh, wetland, and aquatic habitats were poorly represented during the surveys, owing to a combination of drought conditions and the distance of these habitats from the survey points.

We recorded 285 observations of perched birds during the surveys (Table 11). Across all species, 69% of these observations involved trees as the perch substrate, with an additional 4% of the observations involving other vegetation or rock substrates. We recorded 13 species perching on trees, comprising two species of raptors, ravens, three species of icterids and starlings, and seven species of other smaller birds. American kestrels, common ravens, and Say's phoebes used the broadest ranges of both natural and artificial perch substrates. In contrast, rock wrens and horned larks perched exclusively on rock substrates (along with one kestrel, which we suspected was nesting in a rocky outcrop in the BSA), and European starlings, lark sparrows, Lewis's woodpeckers, and white-crowned sparrows were recorded perching only in trees. Six percent of the observations involved birds perching on the existing transmission towers or lines, primarily

Table 10. Total Counts for Species Groups by Season and Habitat

Season	Habitat	Raptors	Shorebirds	Corvids	Icterids	Other Birds	All Species
Spring	Grassland	53	18	133	351	258	813
	Serpentine bunchgrass grassland					14	14
	Grassland riparian		1				1
	Perennial marsh				1		1
	Willow-cottonwood riparian woodland	3		2	23	1	29
	Riparian oak woodland	2		6	12	16	36
	Oak woodland	2		6	1	8	17
	Gray pine woodland					5	5
	Juniper woodland			1		8	9
	Ornamental woodland	1			2	19	22
	Farm/ranch facility			1			1
	Spring total	**61**	**19**	**149**	**390**	**329**	**948**
Summer	Grassland	37	1	35	91	271	435
	Serpentine bunchgrass grassland					5	5
	Willow-cottonwood riparian woodland	2			5	1	8
	Oak woodland	3		1	13	11	28
	Gray pine woodland					2	2
	Juniper woodland			1		16	17
	Ornamental woodland	2				10	12
	Summer total	**44**	**1**	**37**	**109**	**316**	**507**
Fall	Grassland	20	1	63	19	591	694
	Serpentine bunchgrass grassland					9	9
	Grassland riparian	2			23	52	77
	Willow-cottonwood riparian woodland	2					2
	Riparian oak woodland	1		1	1	12	15
	Oak woodland			2		14	16
	Juniper woodland					7	7
	Ornamental woodland	5		3		4	12
	Interior Coast Range goldenbush scrub				1		1
	Fall total	**30**	**1**	**69**	**44**	**689**	**833**
Winter	Grassland	53	12	98	152	1085	1400
	Serpentine bunchgrass grassland					8	8
	Grassland riparian				109	142	251
	Willow-cottonwood riparian woodland	1				1	2
	Riparian oak woodland	1			11	4	16
	Oak woodland	3		2	1	40	46
	Gray pine woodland			3			3
	Juniper woodland			2		18	20
	Ornamental woodland	4		1	7	15	27
	Winter total	**62**	**12**	**106**	**280**	**1313**	**1773**
Total		**197**	**33**	**361**	**823**	**2647**	**4061**

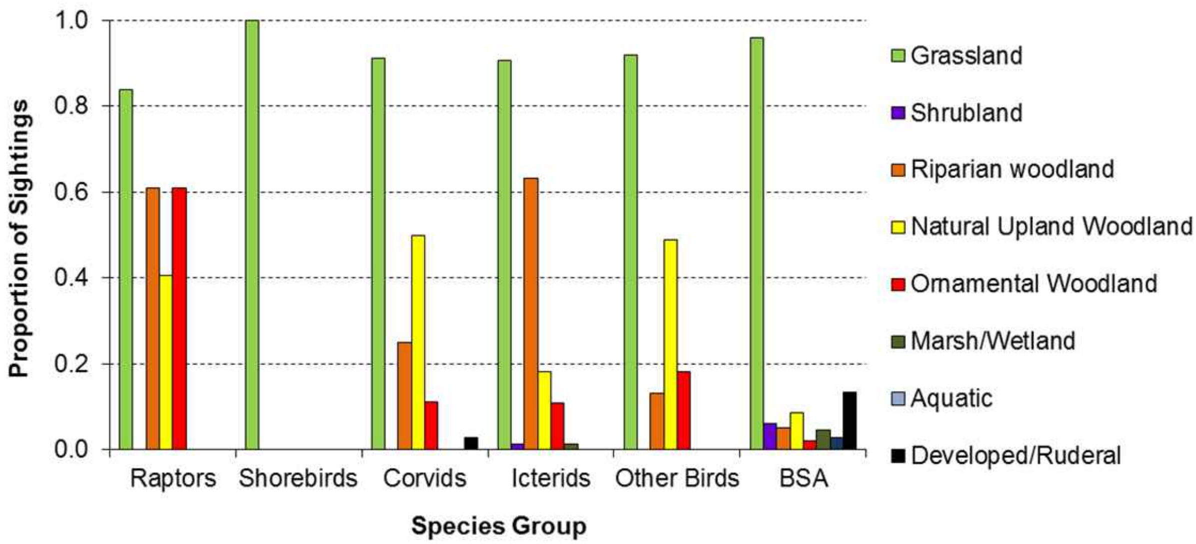

Figure 10. Proportions of Sightings for Species Groups by Habitat Type, in Relation to the Proportional Representation of Habitats in the Biological Study Area (BSA)

red-tailed hawks (26% of the species-specific observations), plus two ravens and a kestrel. Both red-tailed hawks and common ravens nested on the existing transmission line during the survey period.

Perching on other artificial substrates composed the remaining 21% of the relevant observations: fences (9.5%), windmills (6%), water trough (2.5%), other structure (2.5%), and one observation (<1%) of a raven perched on a ranch building. In terms of diversity of species use, fences were the second most popular perch substrate after trees, used by American kestrels, ferruginous hawks, ravens, western meadowlarks, loggerhead shrikes, and especially Brewer's blackbirds and western kingbirds. Windmills (mostly nonfunctional) were used primarily by red-tailed hawks, which nested successfully on one such structure in the BUC Site 3 survey area in 2013.

3.5 Observations of Predator–prey Interactions

Although we recorded many observations of raptors that appeared to be foraging, throughout the surveys we recorded no definitive prey captures, other than kestrels taking insects, and only one observation of a raptor with prey (a red-tailed hawk defending its prey, most likely a ground squirrel or rodent, from a raven).

3.6 Flight Altitudes and Risk of Exposure to Powerline Collisions

We recorded flight heights for 2722 individual bird sightings, including 127 raptor observations. Thirty-six percent of all flying birds were recorded in the altitude range of ±10 meters (33 feet) of the observer's position, and for all species groups except corvids and raptors, the highest proportion of flight observations occurred in this altitude range (Figure 11). Thirty-five percent of all flight observations occurred in the range of 10–50 meters (33–164 feet) range—the projected powerline-collision risk zone—and, for all species groups, between 20% and 40% of the observations occurred in this altitude range. Raptors (36%), icterids (37%), and other small birds (37%) were the most likely to be recorded in the collision-risk zone. Raptors and corvids were the only groups to show high proportions of activity at higher flight altitudes (49% and 66%, respectively).

Table 11. Observations of Perched Birds in Relation to Different Substrate Types

		Perch Substrate										
Group	**Species**	**Tree**	**Other Vegetation**	**Rock**	**Transmission Tower**	**Powerline**	**Building**	**Fence**	**Other Structure**	**Water Trough**	**Windmill**	**Total**
Raptors	American kestrel	3		1		1		2			1	8
	Ferruginous hawk							1			1	2
	Red-tailed hawk	32			16				1		13	62
	All raptors	**35**		**1**	**16**	**1**		**3**	**1**		**15**	**72**
Corvids	Common raven	13			2		1	1	5		1	23
	Yellow-billed magpie								1			1
	All corvids	**13**			**2**		**1**	**1**	**6**		**1**	**24**
Icterids	Brewer's blackbird	26						11		6		43
	European starling	8										8
	Western meadowlark	35						1				36
	All icterids	**69**						**12**		**6**		**87**
Other small birds	House finch	40										40
	Horned lark			3								3
	Lark sparrow	3										3
	Lewis's woodpecker	6										6
	Loggerhead shrike	6						1				7
	Rock wren			4								4
	Say's phoebe	1	2					2		1	1	7
	White-crowned sparrow	12										12
	Western kingbird	12						8				20
	All other small birds	**80**	**2**	**7**				**11**		**1**	**1**	**102**
All species		**197**	**2**	**8**	**18**	**1**	**1**	**27**	**7**	**7**	**17**	**285**

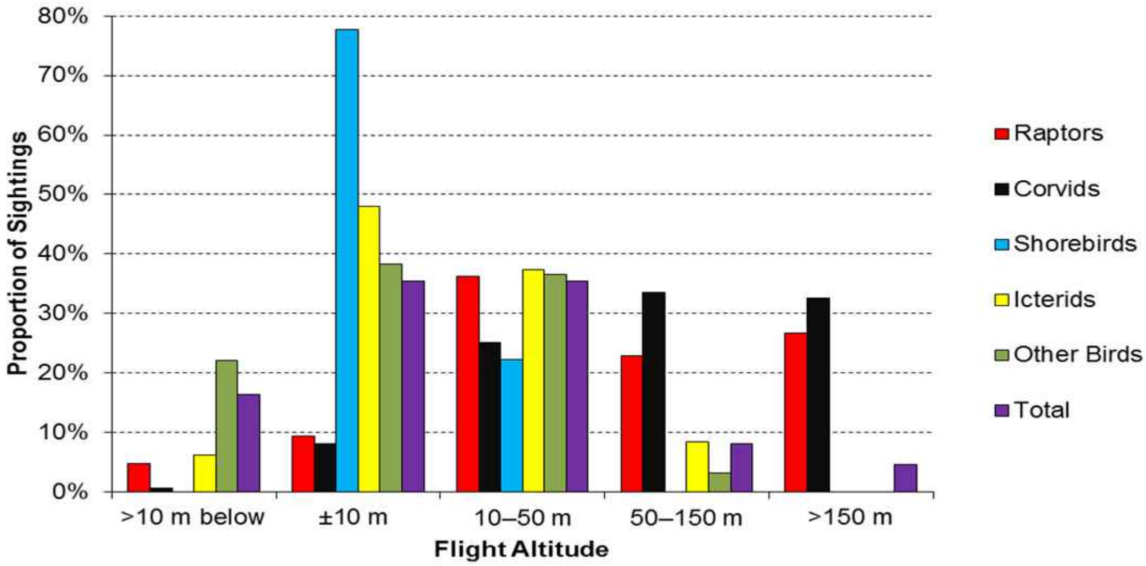

Figure 11. Flight Heights of Different Species Groups Relative to the Observer's Position

Section 4.0 Discussion

4.1 Species Composition

Although populations were probably somewhat depauperate because of the drought, the observed species constituted a diurnal assemblage typical of the open grassland, oak savanna woodland, and riparian habitats of the inner Coast Ranges of central California, with species representation varying by season. Most species, including all of the special-status species, had been observed previously in the Project area during the preliminary surveys and reconnaissance work conducted since November 2011 (HTH 2013a). Species notably absent from the survey counts included waterfowl and most other aquatic-oriented species. These species generally are not expected in upland grassland habitats, but are expected to be more prevalent in the area during years when drought conditions do not prevail, including in the seasonal wetland habitats identified on the Project site and along the riparian corridors that transect the area.

The overall seasonal patterns, much of the species composition, and the activity rates were similar to those documented over a two-year period (fall 2011 to fall 2013, and ongoing) at the California Valley Solar Ranch (CVSR) on the open grassland habitats of the Carrizo Plain, approximately 64 kilometers (40 miles) to the south (HTH 2014a). However, the Project site features a considerably greater abundance of woodland habitat than is found at CVSR, and the observed species composition therefore includes several additional species more characteristic of such habitats; e.g., Bullock's oriole, ash-throated flycatcher, Lewis's woodpecker, Nuttall's woodpecker, and yellow-billed magpie. In addition, the density and relative proximity of tree-nesting raptors such as golden eagles and red-tailed hawks is greater in this Project area. For most of these additional species, however, development of this Project is not expected to pose a substantial threat, because woodland habitat will not be directly affected.

The occurrence of special-status species in the Project vicinity has been limited, with the exception of breeding golden eagles (State fully protected), which are relatively abundant in the Project area (HTH 2013b). Besides those species recorded during the BUC surveys and discussed above, since HTH began survey and assessment work in the Project area in November 2011, our biologists have confirmed only two other special-status bird species in the BSA (Appendix B). During March 2013, as we were scouting for BUC survey points, we documented small numbers of tricolored blackbirds (CSSC) in two areas on the Project site. We opportunistically sighted this species again in March 2014, foraging in a mixed-species flock of blackbirds in grassland habitat. Tricolored blackbirds are an expected winter resident and transient, and are known to breed in some areas of Cholame Valley; however, the availability of potentially suitable breeding habitat is limited in the immediate Project vicinity (HTH 2013a). In November 2012 and April 2013, HTH biologists opportunistically recorded sightings of individual short-eared owls (CSSC) in the BUC Site 1 and 6 survey areas. Since then, no short- eared owls have been observed incidentally or during the BUC surveys.

Previous surveys for burrowing mammals revealed evidence and sightings of burrowing owls (CSSC) during winter (HTH 2013a). This species appeared to be much scarcer throughout the remainder of the survey period. One owl was detected during a winter BUC survey (BUC Site 2). The presence of a few owls was confirmed into at least early summer in two locations in the BSA in 2013, and in winter 2014. Sightings occurred near the Turkey Flats Road entrance to the Project site and along the southwest margin of the BUC Site 2 survey area. Whether or not these owls nested in 2013 is unknown. The severe drought conditions may have affected the wintering and nesting patterns of burrowing owls in the Project area during the survey year.

Although we observed no bald eagles (State-listed as endangered) during the BUC surveys, a pair nested 6 kilometers (9 miles) west of the BSA (HTH 2013b). Most likely, one of these adults was sighted in February, perched near the margin of the BSA in the riparian corridor that runs along the southeastern edge of BUC Site 7. In addition, while conducting ground surveys for nesting raptors, we recorded a subadult bald eagle apparently foraging over the foothills just east of the BSA. Otherwise, observed bald eagle activity (two pairs of adults and several subadults) has been confined to elsewhere in central and northern Cholame Valley, away from the Project site.

Other special-status species with the potential to occur on the Project site, but which HTH biologists have not recorded there, include California condor (*Gymnogyps californianus*; federally and State-listed as endangered), white-tailed kite (*Elanus leucurus*; State fully protected), American peregrine falcon (*Falco peregrinus anatum*; State fully protected; recorded during aerial surveys in the mountains east of the Project site; HTH 2013b), long-eared owl (*Asio otus*; CSSC), mountain plover (*Charadrius montanus*; CSSC), lesser sandhill crane (*Grus canadensis canadensis*; CSSC), and grasshopper sparrow (*Ammodramus savannarum*; CSSC).

- USFWS tracking revealed the occurrence of a condor in the Project area in 2003, but more recent tracking has shown only limited activity in the southern Diablo Range (HTH 2013a), and HTH aerial survey work revealed no suitable roosting/nesting habitat for this species, except along the eastern flanks of the Diablo Range (HTH 2013b).

- Drought conditions and a lack of necessary grassland cover may have precluded grasshopper sparrows from nesting in the area in 2013.

- Mountain plovers would occur only in winter; we did not observe them opportunistically or during the standard surveys.

- Sandhill cranes are generally rare in Monterey County and are likely to be seen only as occasional transients, and they are most likely to occur in either harvested grain fields in the Cholame Valley or in wetland areas during more mesic periods.

- Ground-based raptor nest surveys around the Project site revealed no nesting long-eared owls in 2013 (HTH 2013b), but there is potentially suitable nesting habitat in the Project vicinity, and the species may occur in the area during more mesic periods.

- Like long-eared owls, white-tailed kites could nest in the area; however, the complete lack of sightings to date suggests that this species most likely is not a common breeder in the Project vicinity.

- During aerial surveys (HTH 2013b), we spotted a probable peregrine falcon on the ridgeline east of the Project site, but the closest suitable nesting habitat for this species is on the east side of the Diablo Range; therefore, it is unlikely that this species will occur on the Project site except as an occasional transient and possible winter visitor.

4.2 Habitat Use in Relation to Proposed Development Areas and Project Infrastructure

The surveys conducted to date confirmed broad use, by a variety of species, of the grassland habitats proposed for array installation, but also emphasized the importance of woodland habitats in the general area, especially for raptors, ravens, Brewer's blackbirds, woodpeckers, and other birds that nest and roost in such habitats. More specifically, the survey areas that supported the highest species diversity and general abundances of birds tended to be those that contained mixes of grassland, woodland, and riparian habitats. If drought conditions had not prevailed throughout the survey period, the use of seasonal wetland and riparian habitats likely would have been greater. Moreover, the drought and general lack of grassland growth may have precluded sightings of one special-status species that we expected to observe in the area, but did not: grasshopper sparrow (CSSC). Similarly, although HTH biologists opportunistically recorded two observations of short-eared owls (CSSC) during the survey period, fairly abundant sign and sightings of burrowing owls (CSSC) in winter and early spring, and a few observations of northern harriers (CSSC) during and outside of the BUC surveys, each of these species might have been more prevalent in the area given more mesic conditions and healthier grassland habitat. Otherwise, based on these surveys, the species most likely to have their habitat altered by installation of the solar arrays in grassland habitat are horned larks, western meadowlarks, Savannah sparrows, and long-billed curlews, but each of these species is relatively common and abundant and unlikely to be substantially influenced by the habitat modification resulting from the Project.

The survey data also confirmed golden eagle activity on and over several areas proposed for installation of solar arrays, but within the BUC survey plots we observed the greatest flight activity in the area proposed for the new transmission line. Other eagle flight activity data (recorded outside the BUC surveys during other ground-survey and nest-survey work) confirmed additional activity around the proposed Project site and in neighboring areas. The nature of eagle flight activity in the vicinity of the proposed transmission line indicates the potential for eagles to collide with the new powerlines; however, some of the eagles that use this area have an existing transmission line within their territories and may quickly adjust to the presence of a new line.

Because the new line will be designed to standards of the Avian Power Line Interaction Committee (APLIC) to reduce risk of electrocution (APLIC 2006) and collision (ALIC 2012), the towers associated with the new transmission line may be an asset for eagles by providing useful hunting perches. The data on perch use and the occurrence of active nests on the existing transmission line suggest that red-tailed hawks and ravens, as well as American kestrels, also will use the new transmission line. For example, installation of a new generation-tie line at the CVSR facility resulted in increased red-tailed hawk and kestrel activity at that site (HTH 2104c).

The new transmission lines, as well as the new utility corridor powerlines, may represent a collision risk for species other than golden eagles, red-tailed hawks, kestrels, and ravens. At risk may be relatively ungainly fliers such as the long-billed curlews and whimbrels that use the grassland habitats in the area; however, even smaller songbirds such as horned larks are susceptible to powerline collisions (e.g., see HTH 2014c). In addition, we did not specifically evaluate bird activity in the vicinity of the newly proposed utility corridor, because most of this study was already complete when this feature was added to the Project site plan. Much of the habitat in the utility corridor is similar to that found across many of the BUC survey areas, comprising mostly grassland and grassland riparian habitat. However, the corridor is adjacent to a relatively large stock pond, which is known to attract waterfowl, egrets, and other waterbirds that generally were not detected in the BUC surveys areas. Depending on site-specific conditions, species such as these can be susceptible to collisions with overhead powerlines placed adjacent to aquatic features. The southwestern portion of the proposed utility corridor also runs adjacent to an oak woodland and within approximately 600 meters (<0.5 miles) of a golden eagle nest that was active and productive in 2013 (HTH 2013b). Therefore, consideration of eagle activity in this area is also warranted.

Section 5.0 Literature Cited

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Appendix A. Surveys Conducted by Date, Period, and Site

Date	Period	Site 1	2	3	4	5	6	7	8	Total
26-Mar-13	AM					1	1	1	1	4
	PM	1	1	1	1					4
27-Mar-13	AM	1	1	1	1					4
	PM					1	1	1	1	4
12-Apr-13	AM		1		1		1		1	4
	PM	1		1		1		1		4
23-Apr-13	AM					1	1	1	1	4
	PM	1	1	1	1					4
7-May-13	AM		1		1		1		1	4
	PM	1		1		1		1		4
23-May-13	AM		1		1		1		1	4
	PM	1		1		1		1		4
6-Jun-13	AM	1		1		1		1		4
	PM		1		1		1		1	4
19-Jun-13	AM		1		1		1		1	4
	PM	1		1		1		1		4
8-Jul-13	AM	1		1		1		1		4
	PM		1		1		1		1	4
18-Jul-13	AM		1		1		1		1	4
	PM	1		1		1		1		4
7-Aug-13	AM	1		1		1		1		4
	PM		1		1		1		1	4
22-Aug-13	AM		1		1		1		1	4
	PM	1		1		1		1		4
5-Sep-13	AM	1		1		1		1		4
	PM		1		1		1		1	4
19-Sep-13	AM		1		1		1		1	4
	PM	1		1		1		1		4
3-Oct-13	AM		1		1		1		1	4
	PM	1		1		1		1		4
17-Oct-13	AM	1		1		1		1		4
	PM		1		1		1		1	4
7-Nov-13	AM	1		1		1		1		4
	PM		1		1		1		1	4
19-Nov-13	AM		1		1		1		1	4
	PM	1		1		1		1		4
5-Dec-13	AM	1		1		1		1		4

Date	Period	Site 1	2	3	4	5	6	7	8	Total
	PM		1		1		1		1	4
18-Dec-13	AM		1		1		1		1	4
	PM	1		1		1		1		4
9-Jan-14	AM		1		1		1		1	4
	PM	1		1		1		1		4
23-Jan-14	AM	1		1		1		1		4
	PM		1		1		1		1	4
5-Feb-14	AM	1		1		1		1		4
	PM		1		1		1		1	4
25-Feb-14	AM		1		1		1		1	4
	PM	1		1		1		1		4
7-Mar-14	AM	1		1		1		1		4
	PM		1		1		1		1	4
Total		**25**	**25**	**25**	**25**	**25**	**25**	**25**	**25**	**200**

[1] See Figure 2 for site locations.

Appendix B. Bird Species Observed on or in the Immediate Vicinity of the Project Site by HTH Biologists since November 2011

Common Name	Scientific Name	Status[1]
American avocet	*Recurvirostra americana*	
American coot	*Fulica americana*	-
American crow	*Corvus brachyrhynchos*	-
American goldfinch	*Spinus tristis*	-
American kestrel	*Falco sparverius*	-
American pipit	*Anthus rubescens*	-
Ash-throated flycatcher	*Myiarchus cinerascens*	-
Bald eagle	*Haliaeetus leucocephalus*	SE, SFP
Barn owl	*Tyto alba*	
Bewick's wren	*Thryomanes bewickii*	-
Black phoebe	*Sayornis nigricans*	-
Brewer's blackbird	*Euphagus cyanocephalus*	-
Bufflehead	*Bucephala albeola*	-
Bullock's oriole	*Icterus bullockii*	-
Burrowing owl	*Athene cunicularia*	CSSC
California quail	*Callipepla californica*	-
California towhee	*Melozone crissalis*	-
Canvasback	*Aythya valisineria*	
Cliff swallow	*Petrochelidon pyrrhonota*	-
Common raven	*Corvus corax*	-
Common merganser	*Mergus merganser*	
Common yellowthroat	*Geothlypis trichas*	-
Cooper's hawk	*Accipiter cooperi*	-
Dark-eyed junco	*Junco hyemalis*	-
European starling	*Sturnus vulgaris*	-
Ferruginous hawk	*Buteo regalis*	-
Golden eagle	*Aquila chrysaetos*	SFP
Great egret	*Ardea alba*	-
Great horned owl	*Bubo virginianus*	-
Greater roadrunner	*Geococcyx californianus*	-
Greater yellowlegs	*Tringa melanoleuca*	
Green-winged teal	*Anas crecca*	-
Horned lark	*Eremophila alpestris*	-
House finch	*Carpodacus mexicanus*	-

Common Name	Scientific Name	Status[1]
Killdeer	*Charadrius vociferus*	-
Lark sparrow	*Chondestes grammacus*	-
Lawrence's goldfinch	*Spinus lawrencei*	-
Lewis's woodpecker	*Melanerpes lewis*	-
Loggerhead shrike	*Lanius ludovicianus*	CSSC
Long-billed curlew	*Numenius americanus*	-
Mallard	*Anas platyrhynchos*	-
Mountain bluebird	*Sialia currucoides*	-
Mourning dove	*Zenaida macroura*	-
Northern flicker	*Colaptes auratus*	-
Northern harrier	*Circus cyaneus*	CSSC
Northern mockingbird	*Mimus polyglottos*	-
Nuttall's woodpecker	*Picoides nuttallii*	-
Oak titmouse	*Baeolophus inornatus*	-
Pacific-slope flycatcher	*Empidonax difficilis*	-
Prairie falcon	*Falco mexicanus*	-
Red-breasted sapsucker	*Sphyrapicus ruber*	
Red-tailed hawk	*Buteo jamaicensis*	-
Red-winged blackbird	*Agelaius phoeniceus*	-
Ring-necked duck	*Aythya collaris*	-
Rock dove	*Columba livia*	-
Rock wren	*Salpinctes obsoletus*	-
Rough-legged hawk	*Buteo lagopus*	
Ruby-crowned kinglet	*Regulus calendula*	-
Ruddy duck	*Oxyura jamaicensis*	-
Sage thrasher	*Oreoscoptes montanus*	
Savannah sparrow	*Passerculus sandwichensis*	-
Say's phoebe	*Sayornis saya*	-
Short-eared owl	*Asio flammeus*	CSSC
Song sparrow	*Melospiza melodia*	-
Swainson's hawk	*Buteo swainsoni*	ST
Tree swallow	*Tachycineta bicolor*	-
Tricolored blackbird	*Agelaius tricolor*	CSSC
Western bluebird	*Sialia mexicana*	-
Western kingbird	*Tyrannus verticalis*	-
Western meadowlark	*Sturnella neglecta*	-
Western scrub-jay	*Aphelocoma californica*	-
Western tanager	*Piranga ludoviciana*	-
Whimbrel	*Numenius phaeopus*	
White-breasted nuthatch	*Sitta carolinensis*	-
White-crowned sparrow	*Zonotrichia leucophrys*	-

Common Name	Scientific Name	Status[1]
Wilson's snipe	*Gallinago gallinago*	-
Wilson's warbler	*Cardellina pusilla*	-
Yellow-billed magpie	*Pica nuttalli*	-
Yellow-rumped warbler	*Setophaga coronata*	-

[1] CSSC = California Species of Special Concern; SE = State-listed as endangered; SFP = State fully protected; ST = State-listed as threatened.

Appendix C Average Sightings per Hour by Species and Count Site for Each Season

Table C-1. Average Sightings per Hour by Species and Count Site in Spring and Summer

		Spring									Summer								
Group	Species	1	2	3	4	5	6	7	8	All sites	1	2	3	4	5	6	7	8	All Sites
Raptor	American kestrel	0.0[1]	0.0	0.4	0.0	0.4	0.4	1.3	0.0	0.3	2.0	0.0	0.5	2.5	0.0	0.0	1.5	1.0	0.9
	Burrowing owl	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Ferruginous hawk	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Golden eagle	0.0	0.0	0.0	0.0	1.7	0.0	0.0	0.0	0.2	0.5	0.0	0.5	0.0	0.5	0.0	0.5	0.0	0.3
	Northern harrier	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Prairie falcon	0.4	0.4	0.0	0.4	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Red-tailed hawk	1.7	2.1	6.4	3.0	0.0	3.9	2.6	0.0	2.5	1.5	0.5	2.0	2.5	0.0	2.0	0.5	0.0	1.1
	Swainson's hawk	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Turkey vulture	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.5	0.5	0.0	0.0	1.0	0.5	0.4
	All raptors	**2.1[2]**	**2.6**	**6.9**	**3.9**	**2.1**	**4.3**	**3.9**	**0.4**	**3.3**	**4.0**	**1.5**	**3.5**	**5.5**	**0.5**	**2.0**	**3.5**	**1.5**	**2.8**
Corvid	American crow	0.0	0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Common raven	5.6	1.7	14.6	5.1	5.6	9.9	11.6	7.7	7.7	1.0	2.0	2.0	0.0	0.0	4.0	3.0	6.0	2.3
	Western scrub-jay	0.0	0.0	0.0	0.0	0.0	0.0	0.9	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Yellow-billed magpie	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.1
	All corvids	**5.6**	**1.7**	**14.6**	**5.1**	**5.6**	**9.9**	**13.7**	**7.7**	**8.0**	**1.0**	**2.0**	**2.0**	**0.0**	**0.0**	**4.5**	**3.0**	**6.0**	**2.3**
Shorebird	Killdeer	0.0	0.4	0.4	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.1
	Long-billed curlew	0.0	0.9	0.0	0.0	0.0	0.0	6.4	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	All shorebirds	**0.0**	**1.3**	**0.4**	**0.0**	**0.0**	**0.0**	**6.4**	**0.0**	**1.0**	**0.0**	**0.0**	**0.5**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.1**
Icterid	Brewer's blackbird	28.7	0.0	43.3	9.9	0.0	0.0	9.4	0.0	11.4	4.5	0.0	3.0	38.5	0.0	0.5	0.0	0.0	5.8
	Bullock's oriole	0.9	0.0	0.4	0.0	0.0	0.0	0.9	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	European starling	1.3	0.0	0.0	1.3	0.0	0.0	5.6	0.0	1.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
	Red-winged blackbird	2.1	0.4	9.9	0.9	0.0	0.4	0.4	0.0	1.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Western meadowlark	5.6	4.3	6.4	6.4	5.1	5.1	6.4	12.0	6.4	1.0	0.5	0.5	0.0	1.0	0.5	1.0	1.5	0.8
	All icterids	**38.6**	**4.7**	**60.0**	**18.4**	**5.1**	**5.6**	**22.7**	**12.0**	**20.9**	**7.5**	**0.5**	**3.5**	**38.5**	**1.0**	**1.0**	**1.0**	**1.5**	**6.8**
Other birds	American goldfinch	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Ash-throated flycatcher	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.1	0.5	0.0	0.0	1.5	0.0	2.5	0.0	0.0	0.6
	Barn swallow	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1
	California towhee	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.1

Group	Species	Spring 1	Spring 2	Spring 3	Spring 4	Spring 5	Spring 6	Spring 7	Spring 8	Spring All sites	Summer 1	Summer 2	Summer 3	Summer 4	Summer 5	Summer 6	Summer 7	Summer 8	Summer All Sites
	California quail	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.1	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.0	0.3
	Cliff swallow	3.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Greater roadrunner	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.5	0.0	0.0	0.1
	House finch	0.9	0.0	0.0	18.4	0.0	0.0	0.4	0.0	2.5	1.0	1.0	3.0	4.0	0.0	0.0	0.5	1.0	1.3
	Horned lark	2.6	12.4	20.1	3.4	3.9	8.6	4.7	10.7	8.3	4.0	9.0	18.0	15.0	8.0	16.0	2.0	23.5	11.9
	Lawrence's goldfinch	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Lark sparrow	0.0	0.4	0.0	0.4	0.0	3.4	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.0	0.1
	Lewis's woodpecker	0.0	0.0	0.0	0.0	0.0	0.0	3.9	0.0	0.5	0.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.1
	Loggerhead shrike	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3
	Mourning dove	2.6	0.0	0.0	0.9	0.0	0.9	5.1	2.1	1.4	12.0	0.5	6.5	2.0	0.5	2.5	0.5	1.0	3.2
	Northern flicker	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Northern mockingbird	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Nuttall's woodpecker	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Oak titmouse	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Ruby-crowned kinglet	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Rock pigeon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Rock wren	0.0	0.0	0.0	0.0	0.0	6.4	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	2.5	0.0	0.0	0.3
	Say's phoebe	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Savannah sparrow	0.9	0.4	0.9	2.6	0.4	0.4	0.0	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	White-breasted nuthatch	0.0	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	White-crowned sparrow	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Western kingbird	1.7	0.0	0.4	7.3	0.4	0.4	3.9	0.0	1.8	2.5	0.0	0.5	4.5	0.5	2.0	0.0	1.0	1.4
	All other birds	**15.4**	**13.3**	**21.4**	**33.0**	**4.7**	**21.0**	**18.9**	**13.3**	**17.6**	**23.0**	**10.5**	**28.0**	**28.5**	**9.0**	**29.5**	**3.0**	**26.5**	**19.8**
All species		**61.7**[3]	**23.6**	**103.3**	**60.4**	**17.6**	**40.7**	**65.6**	**33.4**	**50.8**	**35.5**	**14.5**	**37.5**	**72.5**	**10.5**	**37.0**	**10.5**	**35.5**	**31.7**

[1] Values are averages of species-specific sighting rates (count per hour) for all individual, site-specific, AM and PM surveys.

[2] Values are averages of group-specific sighting rates (count per hour) for all individual, site-specific, AM and PM surveys.

[3] Values are averages of combined-species sighting rates (count per hour) for all individual, site-specific, AM and PM surveys.

Table C-2. Average Sightings per Hour by Species and Count Site in Fall and Winter

		Fall									Winter									
Group	Species	1	2	3	4	5	6	7	8	All sites	1	2	3	4	5	6	7	8	All Sites	All Combined
Raptor	American kestrel	1.5[1]	0.0	0.0	0.0	0.0	0.0	0.5	1.0	0.38	0.5	1.0	0.5	0.0	1.5	2.0	0.5	0.0	0.75	0.59
	Burrowing owl	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.06	0.02
	Ferruginous hawk	1.5	0.5	0.0	1.0	0.0	0.0	0.0	0.0	0.38	0.0	0.0	1.5	0.5	0.0	0.5	0.0	0.0	0.31	0.17
	Golden eagle	0.5	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.13	0.0	0.0	1.0	0.5	0.5	0.5	0.0	0.5	0.38	0.24
	Northern harrier	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.03
	Prairie falcon	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.06	0.08
	Red-tailed hawk	2.0	0.0	2.0	0.5	0.0	1.5	0.5	0.0	0.81	4.5	2.0	3.0	3.5	0.0	4.0	0.5	0.5	2.25	1.70
	Swainson's hawk	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.02
	Turkey vulture	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.06	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.06	0.14
	All raptors	**5.5[2]**	**1.0**	**3.0**	**2.0**	**0.0**	**1.5**	**1.0**	**1.0**	**1.9**	**5.0**	**3.5**	**6.0**	**4.5**	**2.0**	**7.0**	**1.5**	**1.5**	**3.9**	**3.0**
Corvid	American crow	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.0	0.0	0.0	4.5	0.0	0.0	0.0	0.0	0.56	0.18
	Common raven	6.0	1.0	1.0	2.0	3.5	9.5	9.5	0.5	4.13	5.0	0.5	6.0	4.0	4.5	12.0	5.0	8.5	5.69	5.06
	Western scrub-jay	0.0	0.0	0.0	0.0	0.0	0.0	1.0	0.0	0.13	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.06	0.08
	Yellow-billed magpie	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.06	2.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.31	0.11
	All corvids	**6.5**	**1.0**	**1.0**	**2.0**	**3.5**	**9.5**	**10.5**	**0.5**	**4.3**	**7.0**	**0.5**	**6.0**	**8.5**	**4.5**	**12.0**	**6.0**	**8.5**	**6.6**	**5.4**
Shorebird	Killdeer	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.0	0.06	0.5	0.0	0.0	1.0	0.0	0.0	0.0	0.0	0.19	0.11
	Long-billed curlew	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.5	0.5	3.5	0.0	0.0	0.0	0.0	0.0	0.56	0.39
	All shorebirds	**0.0**	**0.0**	**0.5**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.1**	**1.0**	**0.5**	**3.5**	**1.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.8**	**0.5**
Icterid	Brewer's blackbird	0.0	0.0	0.0	1.5	0.0	0.0	0.0	0.0	0.19	1.5	0.0	0.0	5.0	0.0	0.0	4.5	0.0	1.38	4.97
	Bullock's oriole	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.08
	European starling	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.06	1.5	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.38	0.45
	Red-winged blackbird	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.13	0.53
	Western meadowlark	0.5	6.5	1.5	3.5	0.0	1.0	4.0	3.0	2.50	2.5	14.5	3.5	91.5	1.5	0.0	9.5	2.0	15.63	6.33
	All icterids	**0.5**	**6.5**	**1.5**	**5.0**	**0.0**	**1.0**	**4.5**	**3.0**	**2.8**	**6.5**	**14.5**	**3.5**	**96.5**	**1.5**	**0.0**	**15.5**	**2.0**	**17.5**	**12.3**
Other birds	American goldfinch	0.0	1.0	0.5	0.0	0.0	0.0	0.0	0.0	0.19	0.0	0.0	0.5	0.0	0.0	3.0	0.0	0.0	0.44	0.15
	Ash-throated flycatcher	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.15
	Barn swallow	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.02
	California towhee	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.02
	California quail	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.09
	Cliff swallow	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.11

		Fall									Winter									
Group	**Species**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**All sites**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**All Sites**	**All Combined**
	Greater roadrunner	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.06	0.05
	House finch	0.0	5.0	4.5	0.5	0.0	9.0	0.0	0.0	2.38	6.5	25.0	1.5	34.5	0.0	0.0	1.0	0.0	8.56	3.63
	Horned lark	10.0	16.5	12.5	45.0	97.0	5.0	13.5	75.5	34.38	7.0	143.0	9.0	136.5	20.0	4.0	41.0	173.0	66.69	29.45
	Lawrence's goldfinch	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.00
	Lark sparrow	0.0	0.0	0.0	0.0	0.0	1.5	0.0	0.0	0.19	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.23
	Lewis's woodpecker	0.0	0.0	0.0	0.0	0.0	0.0	5.0	0.0	0.63	0.0	0.0	0.0	0.0	0.0	0.0	2.0	0.0	0.25	0.38
	Loggerhead shrike	1.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.19	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.25	0.23
	Mourning dove	0.0	2.0	4.0	0.0	0.0	0.0	0.0	0.0	0.75	0.0	1.0	0.5	0.0	0.0	0.5	0.0	0.0	0.25	1.41
	Northern flicker	0.5	0.0	0.0	0.0	0.0	0.5	0.5	0.0	0.19	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.06	0.06
	Northern mockingbird	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.08
	Nuttall's woodpecker	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.0	0.06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.02
	Oak titmouse	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.02
	Ruby-crowned kinglet	0.0	0.0	0.0	0.0	0.0	0.0	0.5	0.0	0.06	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.02
	Rock pigeon	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.13	0.03
	Rock wren	0.0	0.0	0.0	0.5	0.0	3.0	0.0	0.5	0.50	0.0	0.0	0.0	0.5	0.0	2.0	0.0	1.5	0.50	0.54
	Say's phoebe	0.5	0.0	2.5	1.0	0.0	0.5	1.0	0.0	0.69	1.0	0.0	0.5	1.0	1.0	0.5	0.0	0.5	0.56	0.32
	Savannah sparrow	1.5	4.5	2.0	3.5	0.0	1.0	1.5	0.5	1.81	0.5	1.0	3.0	2.5	0.0	3.0	13.0	0.5	2.94	1.34
	White-breasted nuthatch	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.02
	White-crowned sparrow	0.0	0.0	0.0	0.0	0.0	2.0	6.0	0.0	1.00	0.0	0.0	0.0	0.0	0.0	9.0	2.0	0.0	1.38	0.59
	Western kingbird	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	0.83
	All other birds	**14.0**	**29.0**	**26.0**	**50.5**	**97.0**	**23.5**	**28.0**	**76.5**	**43.1**	**18.5**	**170.0**	**15.0**	**175.5**	**21.0**	**22.0**	**59.0**	**175.5**	**82.1**	**39.7**
All species		**26.5**[3]	**37.5**	**32.0**	**59.5**	**100.5**	**35.5**	**44.0**	**81.0**	**52.1**	**38.0**	**189.0**	**34.0**	**286.0**	**29.0**	**41.0**	**82.0**	**187.5**	**110.8**	**60.9**

[1] Values are averages of species-specific sighting rates (count per hour) for all individual, site-specific, AM and PM surveys.

[2] Values are averages of group-specific sighting rates (count per hour) for all individual, site-specific, AM and PM surveys.

[3] Values are averages of combined-species sighting rates (count per hour) for all individual, site-specific, AM and PM surveys.

Appendix D

2014 Eagle Use Survey Report

2014 Golden Eagle Studies at the California Flats Solar Project, Monterey County, California

Final Report

Prepared for:

California Flats Solar, LLC

135 Main Street, 6th Floor
San Francisco, California 94105

Prepared by:

Todd Mattson, Joyce Pickle, and Andrea Chatfield

Western EcoSystems Technology, Inc.
415 West 17th Street, Suite 200
Cheyenne, Wyoming 82001

March 5, 2015

WEST Inc.

EXECUTIVE SUMMARY

California Flats Solar, LLC (California Flats) has proposed to construct and operate a 280-megawatt (MW) photovoltaic solar generating facility referred to as the California Flats Solar Project (Project). California Flats contracted Western EcoSystems Technology, Inc. (WEST) to help estimate the impacts of the solar energy facility's construction and operation on golden eagles, and to help supplement the information contained in the Bird and Bat Conservation Strategy developed for the Project. The following document contains results for golden eagle use/activity surveys conducted at the Project from March 10 through December 22, 2014. During the spring and summer of 2014, WEST also conducted aerial eagle nest surveys and an eagle prey assessment, the results of which are presented in separate reports (see WEST 2014a and 2014b).

The principal objectives of the 2014 eagle use/activity surveys were to: 1) provide site-specific information on the seasonal and spatial use of the Project and surrounding landscape by golden eagles that would be useful in evaluating potential impacts from the proposed solar energy facility; and 2) provide information that could be used in project planning and design of the facility to minimize impacts to eagles, if warranted.

Golden eagle use/activity surveys were conducted to characterize use of the Project site and surrounding landscape by golden eagles, particularly the foraging habits of locally breeding, migrant, and wintering eagles. Three-hour surveys were conducted every other week at each of 10 observation stations, including six stations located within or adjacent to the Project site, and four stations located in areas to the west and south of the Project site, for a total of approximately 597 survey hours. During the course of the study, a total of 216 separate golden eagle observations were recorded and a total of 1,215 golden eagle flight minutes were recorded from the viewsheds surrounding each survey station.

For calculations of eagle use/activity, survey data were truncated to include only those eagles recorded within 800-m of the observer, for purposes of comparison to other projects with publicly available golden eagle use data. Within the 800-m radius survey plots, a total of 71 golden eagle observations were recorded during the study period for an average golden eagle use of 0.12 eagles observed per hour (obs/hr). Among the ten points surveyed, golden eagle use ranged from zero obs/hr at Station CF1 to 0.33 obs/hr at Station CF10.

Over the 597 hours of survey, 268 minutes of golden eagle flight were observed within the 800-m radius plots, for an average activity of 0.45 eagle flight minutes per hour (flight min/hr); these numbers exclude the time that eagles were observed perching. Among the 10 points surveyed, flight activity levels ranged from zero flight min/hr at CF1 to 1.11 flight min/hr at CF10. In general, eagle use/activity was greatest during the spring, with peak golden eagle observations and flight minutes recorded in May. Use/activity was lowest during the late summer.

Although the focus of the surveys was golden eagles, all raptors and other sensitive avian species seen or heard during each survey were recorded, as well as observations of these species made while in-transit between points. A total of 12 additional raptor species were observed during the study, the most common of which were red-tailed hawks (177 observations), bald eagles (42 observations), American kestrels (27 observations), ferruginous hawks (12 observations), and prairie falcons (10 observations). The remaining raptor species were recorded only infrequently, with fewer than 10 individuals observed during the ten-month study.

All raptor species identified during the study are protected under the Migratory Bird Treaty Act. Additionally, six species considered sensitive at the state and/or federal level were recorded during the study, including one state endangered species (bald eagle), one state threatened species (Swainson's hawk), two state fully protected species (golden eagle and peregrine falcon), and two state species of special concern (burrowing owl and northern harrier). Bald eagles, burrowing owls, and peregrine falcons are further considered federal species of concern within Bird Conservation Region 32, and both bald and golden eagles are further protected under the federal Bald and Golden Eagle Protection Act.

Based on golden eagle use estimates and mapped flight pathways, it does not appear that golden eagles are relying more heavily on the Project site for foraging than on the surrounding landscape; in fact two of the highest use points are located in the Cholame Valley, more than 3 miles from the proposed solar arrays, and eagles have not been observed using large portions of the Project site.

STUDY PARTICIPANTS

Western EcoSystems Technology

Todd Mattson	Project Manager, Senior Ecologist
Joyce Pickle	Assistant Project Manager, Research Biologist
Andrea Chatfield	Field Coordinator, Research Biologist
Carmen Kennedy	Data and Report Manager
Daniel Riser-Espinoza	Statistician
Jeff Fruhwirth	GIS Technician
Andrea Palochak	Technical Editor
Will Lawton	Field Technician

REPORT REFERENCE

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INTRODUCTION

California Flats Solar, LLC (California Flats) has proposed to construct and operate a 280-megawatt (MW) alternating current (AC) photovoltaic (PV) solar generating facility in Monterey County, California referred to as the California Flats Solar Project (Project). When approved, the solar facility and related operational infrastructure (Project site) will be built on approximately 2,720 acres of private ranchland (Figure 1). The Project will include construction, installation, and operation of energy-related infrastructure (e.g., solar panels, inverters, substations, a switching station owned and operated by Pacific Gas and Electric Company, and new power poles and lines) and improvements needed to operate and maintain energy-related facilities (e.g., buildings, internal roadways, access roads, fencing, and lighting). The overall development will also include improvements to an existing access road and its connection to the California Department of Transportation (Caltrans) right-of-way at California State Route (Hwy) 41, approximately 5 miles south of the Project site, as well as a new utility corridor.

In the spring of 2014, California Flats contracted Western EcoSystems Technology, Inc. (WEST) to conduct golden eagle studies within the Project site and surrounding area to help document the spatial and temporal eagle use of the area. The following discussion contains results for golden eagle use/activity surveys conducted at the Project from March 10 through December 22, 2014. During the spring and summer of 2014, WEST also conducted aerial eagle nest surveys and an eagle prey assessment, the results of which are presented in separate reports (see WEST 2014a and 2014b).

STUDY AREA

The Biological Study Area (BSA) for the Project comprises approximately 4,872 acres in an unincorporated area of southeastern Monterey County and northeastern San Luis Obispo County, California, near the Kings County and Fresno County borders (Figure 1). The BSA is located along the eastern rim of the Cholame Valley. The San Andreas Rift Zone trends northwest-southeast south of the BSA. The BSA is bounded by mostly undeveloped private land in all directions. Sparse residential settlements and small farms are located south and east of the BSA. The BSA is vacant and is currently a working landscape that includes cattle ranching. Most level areas of the BSA (i.e., the area north of the access road spur to Hwy 41) have been historically disked and dryland farmed for hay and small grain production. Elevation ranges from 1,180 feet National Geodetic Vertical Datum (NGVD) at the intersection with Hwy 41 to approximately 1,860 feet NGVD along the northwest edge of the BSA. Topography within the BSA consists of steeply rolling hills along the edges of the Project site, with extensive alluvial terraces forming wide level plains, primarily within the Project site. These plains and hills are bisected by a number of drainages that typically flow from north to south, with drainage eventually to the Cholame Valley.

Based on vegetation mapping conducted in 2012 (H.T. Harvey and Associates [HTH] 2013), the predominant natural community on the Project site and BSA consists of California annual grassland dominated by non-native grasses typical of the region but also supporting a healthy complement of native forbs. Other habitats within the Project site include wildflower fields, serpentine bunchgrass grasslands, valley needlegrass grasslands, grassland riparian, interior coast range goldenbush scrub, willow–cottonwood riparian woodlands, ornamental non-native woodlands, blue oak (*Quercus douglasii*) woodlands, valley oak (*Quercus lobata*) riparian woodlands, ephemeral streams, intermittent streams, perennial streams, perennial marsh, seasonal wetlands, and developed/ruderal grasslands. Habitat composition of the larger BSA is generally similar to that of the Project site with the exception that the BSA contains areas of shrubland (interior coast range goldenbush scrub) that is absent from the Project site.

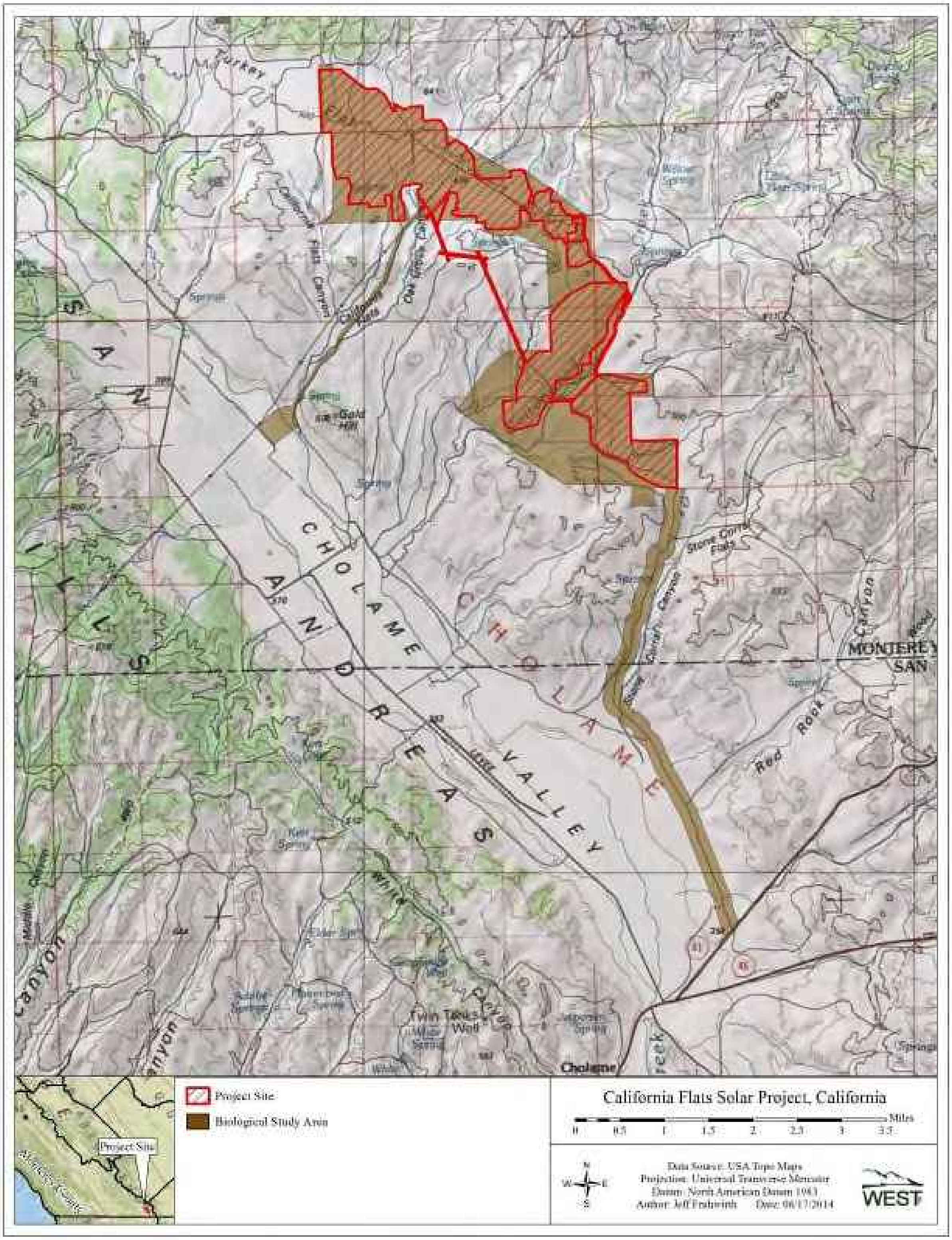

Figure 1. California Flats Solar Project Site and Biological Study Area.

METHODS

The objective of the golden eagle use/activity surveys was to characterize the spatial and temporal use of the Project site and surrounding area by golden eagles, particularly the foraging habits of locally breeding, migrant, and wintering golden eagles. Although the focus of the surveys was golden eagles, all raptors and other sensitive avian species seen or heard during each survey were recorded, as well as observations of these species made while in-transit between stations (i.e., incidental observations). Point counts using variable circular plots (similar to Reynolds et al. 1980, Bibby et al. 1992) were conducted within the Project and surrounding area according to methods used by the Hawk Migration Association of North America (HMANA), with observers continuously scanning the sky for raptors within the visible viewshed surrounding the survey station.

Survey Stations

Ten survey stations were established within the Project site and surrounding area, including six stations located within or adjacent to the Project site, and four stations located in areas to the west and south of the Project site (Figure 2). Stations CF1 through CF7 were established on March 10, 2014; Stations CF10, CF11 and CF 12 were added on April 10, in order to record eagle activity in the surrounding area (greater than 3 miles from the Project site) for comparison purposes. Observation stations were established in locations that afforded broad overviews of the Project site and surrounding landscape and allowed for effective documentation of the activity patterns and home-range dynamics of resident breeding eagles in the Project site and surrounding area, as well as use of the region by migrant and wintering eagles.

Survey Methods

Surveys at each station were conducted once every two weeks for three continuous hours. Every golden eagle and other raptor species observed during the survey period were recorded by a unique observation number. Observations of golden eagles beyond an 800-m radius were recorded, but were not included in the estimation of use/activity levels. Data recorded for each 3-hour survey period included the date, start and end time of survey period, observer, and weather information (i.e., temperature, wind speed, wind direction, and cloud cover). For each golden eagle or other raptor species detected during the survey, the following data were recorded: species or best possible identification, number of individuals, sex and age class, distance from plot center when first observed, direction of flight, height above ground, activity, and habitat. Behavior categories included: perched, soaring, flapping/gliding, hunting/kiting/hovering, stooping/diving at prey, stooping in antagonistic interaction with another bird, being mobbed, undulating/territorial flight, auditory, and other. Habitat categories included: grassland/pasture, oak woodland, riparian, cropland, rock outcrop, and other. Approximate flight heights and distances from plot center were recorded to the nearest 5-m (16-ft) interval. Additionally, for each golden or bald eagle observed, data were recorded every minute that the bird was within view. Flight or movement paths and perched locations for all eagles were mapped onto US Geological Survey (USGS) base maps, given corresponding observation numbers, and digitized using ArcGIS software. Topographic maps were used to aid in recording locations of eagles as accurately as possible. The long viewsheds available from the survey stations and the pronounced topographical features of the Project site and surround vicinity allowed for the experienced avian surveyors who conducted the surveys to relatively accurately transfer flightpaths onto the base maps. Any comments or unusual observations were noted in the comments section of the dataform.

Observation Schedule

Three-hour surveys were conducted at each of the 10 stations once every two weeks during the spring (March 10 – May 31, 2014), summer (June 1 – August 31, 2014), fall (September 1 – November 15, 2014), and early winter (November 16 – December 22, 2014) survey periods, with the exception of stations CF10 and CF12, which started surveys on April 10 rather than March 10. Surveys were carried out during the late morning through early afternoon hours (approximately 9:00 am to 5:00 pm), the period of greatest activity for eagles and other raptors. To the extent practical, each station was surveyed for roughly the same number of hours during the study period. Survey start times at stations varied from week to week such that different time periods were surveyed throughout the study at each station (i.e., early morning, late morning, afternoon). As described below, weather and road conditions sometimes prevented surveys from occurring at all stations during each visit.

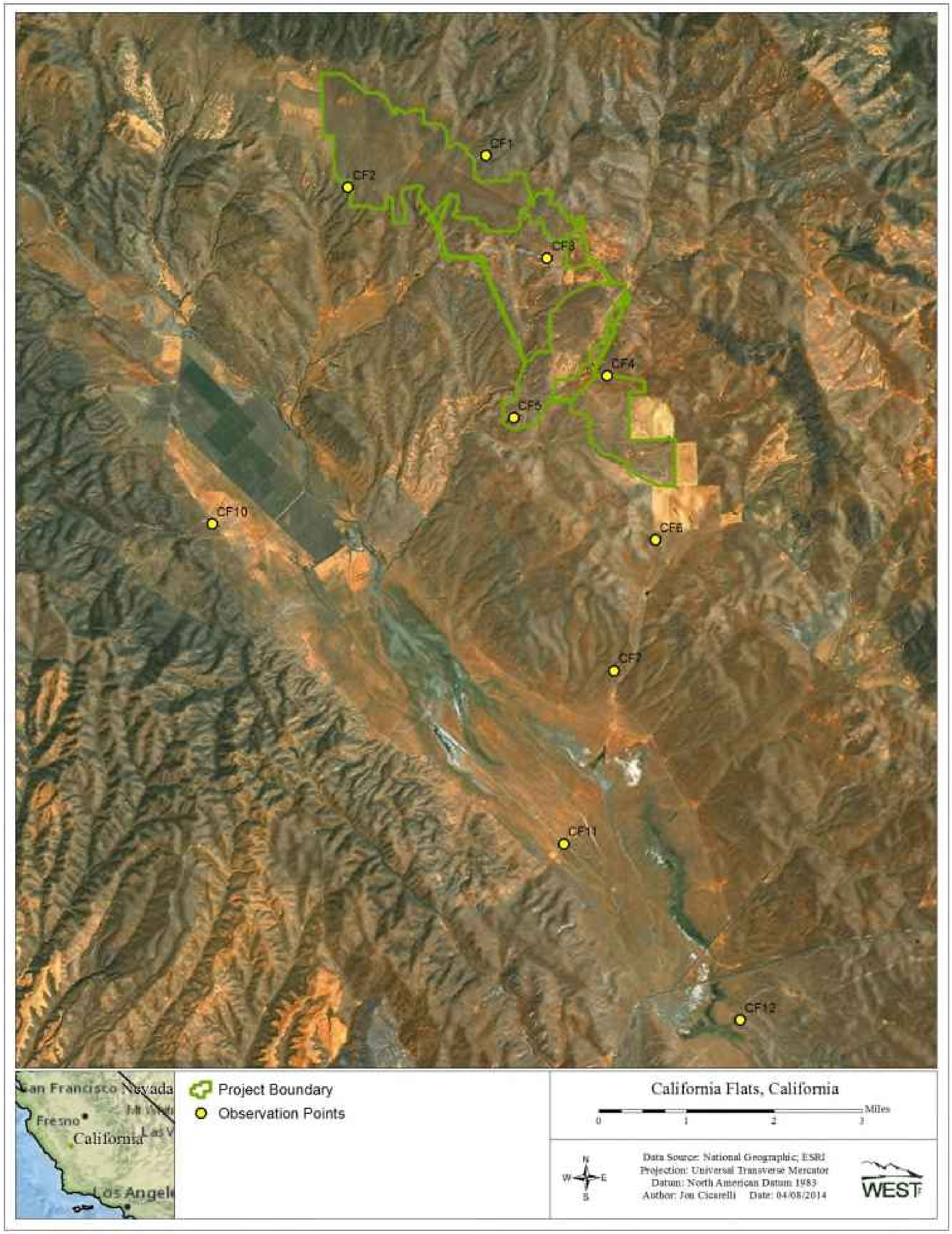

Figure 2. Location of 2014 eagle use/activity survey stations at the California Flats Solar Project.

Statistical Analysis

For the purpose of analysis, a visit was defined as the required length of time, in days, to survey all of the plots once within the study area. A visit could be spread across multiple dates, but a single date could not contain surveys from multiple visits. Under certain circumstances, such as extreme weather conditions, plots were not surveyed during some visits. In these cases, a visit might not have constituted a survey of all plots.

Quality Assurance and Quality Control

Quality assurance and quality control (QA/QC) measures were implemented at all stages of the study, including in the field, during data entry and analysis, and report writing. Following field surveys, observers were responsible for inspecting data forms for completeness, accuracy, and legibility. Potentially erroneous data was identified using a series of database queries. Irregular codes or data suspected as questionable were discussed with the observer and/or project manager. Errors, omissions, or problems identified in later stages of analysis were traced back to the raw data forms, and appropriate changes in all steps were made.

Data Compilation and Storage

A Microsoft® ACCESS database was developed to store, organize, and retrieve survey data. Data were keyed into the electronic database using a pre-defined protocol to facilitate subsequent QA/QC and data analysis. All data forms and electronic data files were retained for reference.

Golden Eagle Use/Activity

All eagles and other raptors observed within the visible viewshed were recorded during surveys in order to map out flight paths in the survey area as extensively as possible. In addition to examining the activity of all golden eagles observed in an unlimited viewshed from the survey stations, standardized use and activity estimates were calculated using only golden eagles detected within an 800-m radius plot (at any time during the survey). This was done to provide a similar basis for comparison with other study sites, because most publicly available eagle use information is limited to an 800-m radius survey plot. Two separate metrics were used to measure mean use/activity: 1) the number of golden eagles observed (flying and perched) per plot per hour of survey (“eagle use”), and 2) the number of golden eagle flight minutes (excluding perching) per plot per hour of survey (“eagle activity”). These standardized estimates of mean bird use/activity were used to compare differences between survey stations, seasons, and studies at other project sites where similar methods were used.

Spatial Use

Flight paths of all golden eagles recorded during surveys were qualitatively compared to study area characteristics (e.g., topographic features). The objective of mapping observed eagle flight paths was to identify potential high activity areas (for foraging, perching, or roosting) and/or consistent flight patterns within the Project site and surrounding region, including in relation to known golden eagle nests in the Project vicinity.

RESULTS

The golden eagle use/activity study was conducted at the Project from March 10 through December 22, 2014. Surveys were conducted at 10 observation stations once every two weeks over the course of the ten-month study, for a total of 199 surveys totaling 597 hours of survey (Table 1). Although not all stations were surveyed the exact same number of times (due to CF10 – CF 12 being added late, and weather/road conditions preventing other visits), each station was surveyed 19 to 21 times during 2014, for a range of 57 to 63 hours per station (Tables 2 and 3). During the course of the study, a total of 216 separate golden eagle observations (flying and perched) were recorded and 1,215 golden eagle flight minutes were recorded within an unlimited viewshed surrounding the survey stations.

Table 1. Summary of survey effort and total golden eagle observations and flight minutes* recorded during eagle use surveys at the California Flats Solar Project, March 10 – December 22, 2014.

Season	# Stations	# Visits	# Surveys Conducted	# Observer-Hours	# Golden Eagle Obs	# Golden Eagle Flight Min
Spring	10	6	53	159	104	584
Summer	10	6	59	177	44	218
Fall	10	6	60	180	53	200
Winter	10	3	27	81	15	113
Overall	**10**	**21**	**199**	**597**	**216**	**1,215**

*Within an unlimited viewshed surrounding survey station

Golden Eagle Use/Activity

For calculations of eagle use/activity, survey data were examined in two different ways: truncated to include only those eagles recorded within 800-m of the observer, (for purposes of comparison to other projects with publicly available golden eagle use data), and all inclusive, including all eagles observed with the visible viewshed (for purposes of intra-project spatial and temporal comparisons).

Within the 800-m radius survey plots, a total of 71 golden eagle observations were recorded during the study period for an average golden eagle use of 0.12 eagles observed per hour (obs/hr; Table 2); these numbers include both perching and flying eagles. Among the ten points surveyed, overall golden eagle use was highest at Stations CF10 (0.33 obs/hr), CF11 (0.19 obs/hr), and CF5 (0.14 obs/hr; Table 2, Figure 2). The lowest use was observed at Stations CF1 (zero obs/hr) and CF7 (0.07 obs/hr; Table 2, Figure 2).

Over the 597 hours of survey, 268 minutes of golden eagle flight were observed within the 800-m radius plots, for an average activity of 0.45 eagle flight minutes per hour (flight min/hr; Table 2); these numbers exclude the time that eagles were observed perching. Among the 10 points surveyed, the flight activity was highest at Stations CF10 (1.11 flight min/hr) and CF 11 (0.93 flight min/hr) and lowest at Stations CF 1 (zero flight min/hr) and CF7 (0.03 flight min/hr; Table 2; Figure 2).

Table 2. Golden eagle use/activity*, expressed as the number of golden eagles observed per hour of survey (Obs/hr) and the number of golden eagle flight minutes recorded per hour of survey (Flight min/hr), recorded during eagle use surveys at the California Flats Solar Project.

Survey Station	# Hours Surveyed	# Observations	Use (Obs/hr)	# Flight Minutes	Activity (Flight min/hr)
CF1	63	0	0.00	0	0.00
CF2	60	7	0.12	39	0.65
CF3	57	7	0.12	18	0.32
CF4	60	6	0.10	21	0.35
CF5	63	9	0.14	31	0.49
CF6	63	7	0.11	31	0.49
CF7	60	2	0.03	2	0.03
CF10	57	19	0.33	63	1.11
CF11	57	11	0.19	53	0.93
CF12	57	3	0.05	10	0.18
Total	**597**	**71**	**0.12**	**268**	**0.45**

*Within an 800-m radius survey plot

In general, the spatial data from the unlimited viewsheds show similar trends as the 800-m data (Table 3). The lowest use was observed at Stations CF1 (zero obs/hr) and CF7 (0.73 obs/hr, similar to the 800-m data. However, although points CF10 and CF11 still represent higher use points when examining unlimited viewshed data (0.54 obs/hr and 0.60 obs/hr, respectively; Table 3), the highest use was observed at Station CF3 (0.86 obs/hr). CF3 is located approximately a quarter mile west of the Project site boundary (Figure 2). Some of the eagles observed from this station were flying over portions of the Project site; however, a significant portion of the eagles seen in the visible viewshed were observed flying outside of the Project site, including to and from trees located outside of the Project site and particularly flying around active (failed) nest 18A, which is located over 800 m from CF3 but still visible.

Table 3. Golden eagle use/activity (in visible viewsheds), expressed as the number of golden eagles observed per hour of survey (Obs/hr) and the number of golden eagle flight minutes recorded per hour of survey (Flight min/hr), recorded during eagle use surveys at the California Flats Solar Project.

Survey Station		# Observations	Use (Obs/hr)	# Flight Minutes	Activity (Flight min/hr)
CF1	63	0	0	0	0
CF2	60	27	0.45	156	2.60
CF3	57	49	0.86	253	4.44
CF4	60	24	0.40	142	2.37
CF5	63	12	0.19	75	1.19
CF6	63	12	0.19	62	0.98
CF7	60	5	0.08	44	0.73
CF10	57	31	0.54	188	3.30
CF11	57	34	0.60	270	4.74

CF12	57	5	0.09	25	0.44
Total	**597**	**199**	**0.33**	**1,215**	**2.04**

Seasonal Variation

During the ten-month study period, the greatest overall golden eagle use occurred in the spring, with use appearing to gradually decrease throughout the summer, and increasing somewhat during the fall and early winter. As shown in Figure 3 and Tables A.1 and A.2 in Appendix A, the 800-m viewshed data showed the highest number of eagles observed per survey hour and the greatest number of eagle flight minutes observed per survey hour recorded in May (0.24 obs/hr), reaching the lowest point in August (0.02 obs/hr), and increasing somewhat, particularly in September and November (0.14 obs/hr and 0.13 obs/hr respectively).

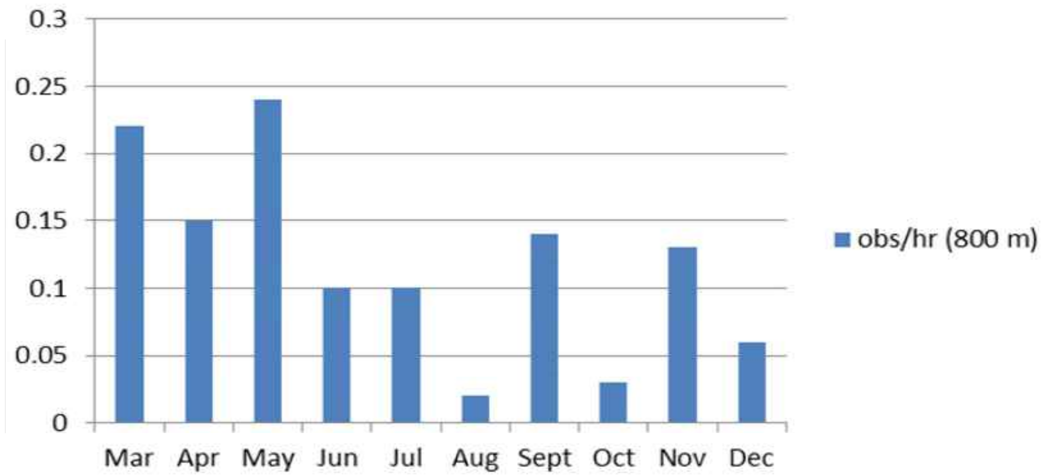

Figure 3. Golden Eagle Seasonal Use (observations/hr/800-m viewshed) recorded during eagle use surveys at the California Flats Solar Project.

As shown in Figure 4 and Tables A.3 and A.4 in Appendix A, the visible viewshed data shows a similar seasonal trend as the 800-m data, with highest use observed in the spring, although the highest use month was March (0.70 obs/hr) rather than May (0.53 obs/hr). The lowest use was also in August (0.16 obs/hr) using this dataset, and the use increased somewhat in the fall and early winter, with September, October, November and December all showing relatively similar use (varying between 0.22 to 0.29 obs/hr)

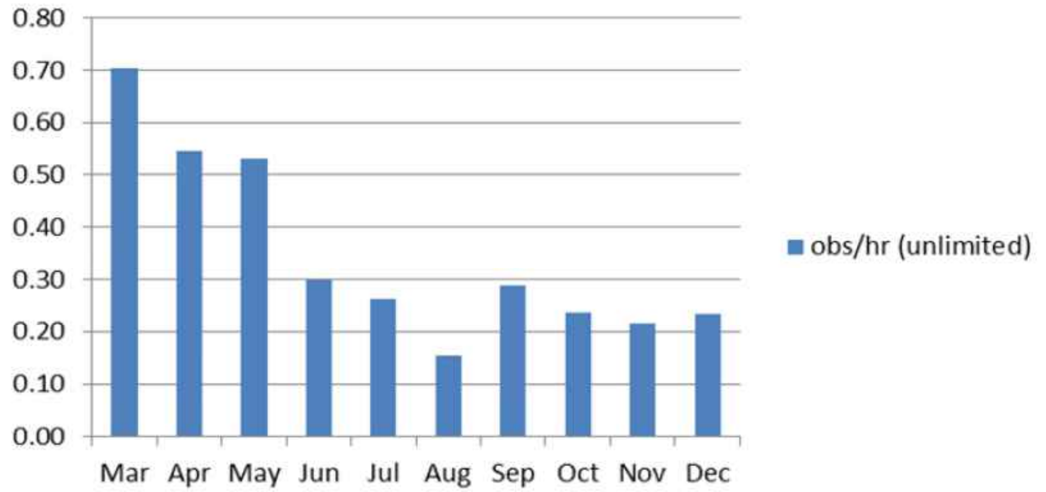

Figure 4. Golden Eagle Seasonal Use (observations/hr/visible viewshed) recorded during eagle use surveys at the California Flats Solar Project.

Spatial Variation

All eagle flight paths mapped during the entire study period are shown on Figure 5; Appendix B contains flight paths on a month by month basis. Additionally, seasonal illustrations of eagle flight activities are presented in Figures 6 through 8 in which the 100 m x 100 m grids are color coded based on the number of flight paths that cross a particular grid – thus providing a “heat index” of eagle activity. Separate figures are presented for the early breeding season (March and April; Figure6), the late breeding season (June through August; Figure 7), and the migration/early winter season (September through December; Figure 8).

While Figures 5 through 8 show that golden eagles do fly through the Project site, the areas of concentrated eagle use are generally situated outside of the site. During the early breeding season, golden eagle activity was concentrated around the two active (failed) golden eagle nests (GE18A and GE19A) located near the northeastern boundary of the site, two areas near the southwestern boundary of the site and surrounding the two survey locations within the Cholame Valley several miles west and south of the site (Figure 6). The activity documented at Stations CF3 and CF5 on the southwest boundary of the Project site was associated with golden eagles traveling to and from trees outside of the Project site, which they used as temporary perching points. During the late breeding season, golden eagles continued to concentrate their activity at the active nest GE19A, at two sites on the southwestern boundary of the Project, and in the Cholame Valley; however, flight activity was not recorded within the northern half of the Project site (Figure 7). During the migration/early winter period, the areas with the greatest activity included the Cholame Valley and several locations on the outskirts of the Project site (Figure 8). Throughout the study period, substantial portions of the Project site, particularly in some of the flatter areas where solar arrays would be located, were used only inconsistently by golden eagles and at lower levels than areas of steeper topography in the surrounding landscape.

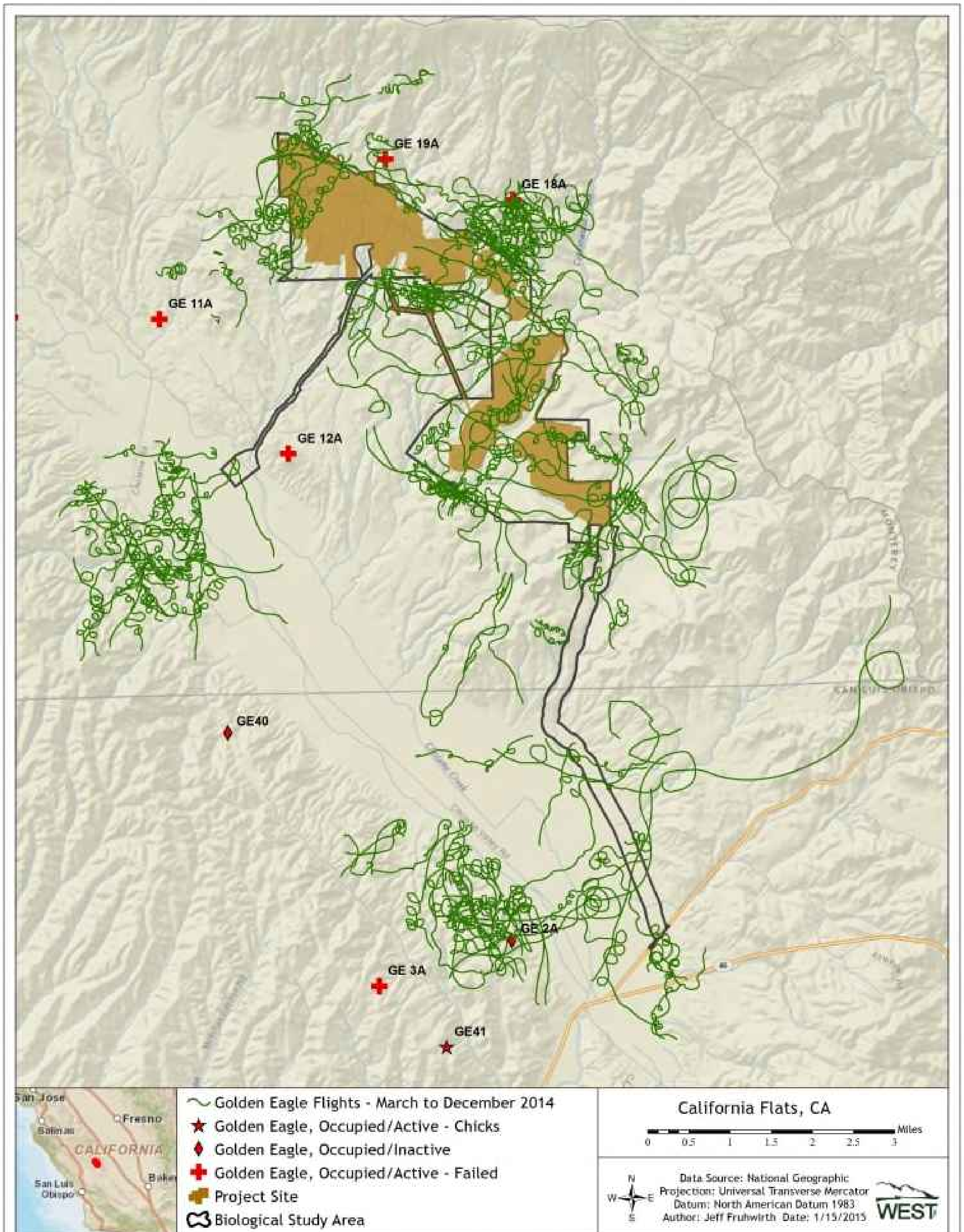

Figure 5. Digitized golden eagle flight paths recorded during eagle surveys at the California Flat Solar Project, March 10 to December 22, 2014. Also shown are the locations of occupied golden eagle nests in the project vicinity identified during 2014 aerial nest surveys.

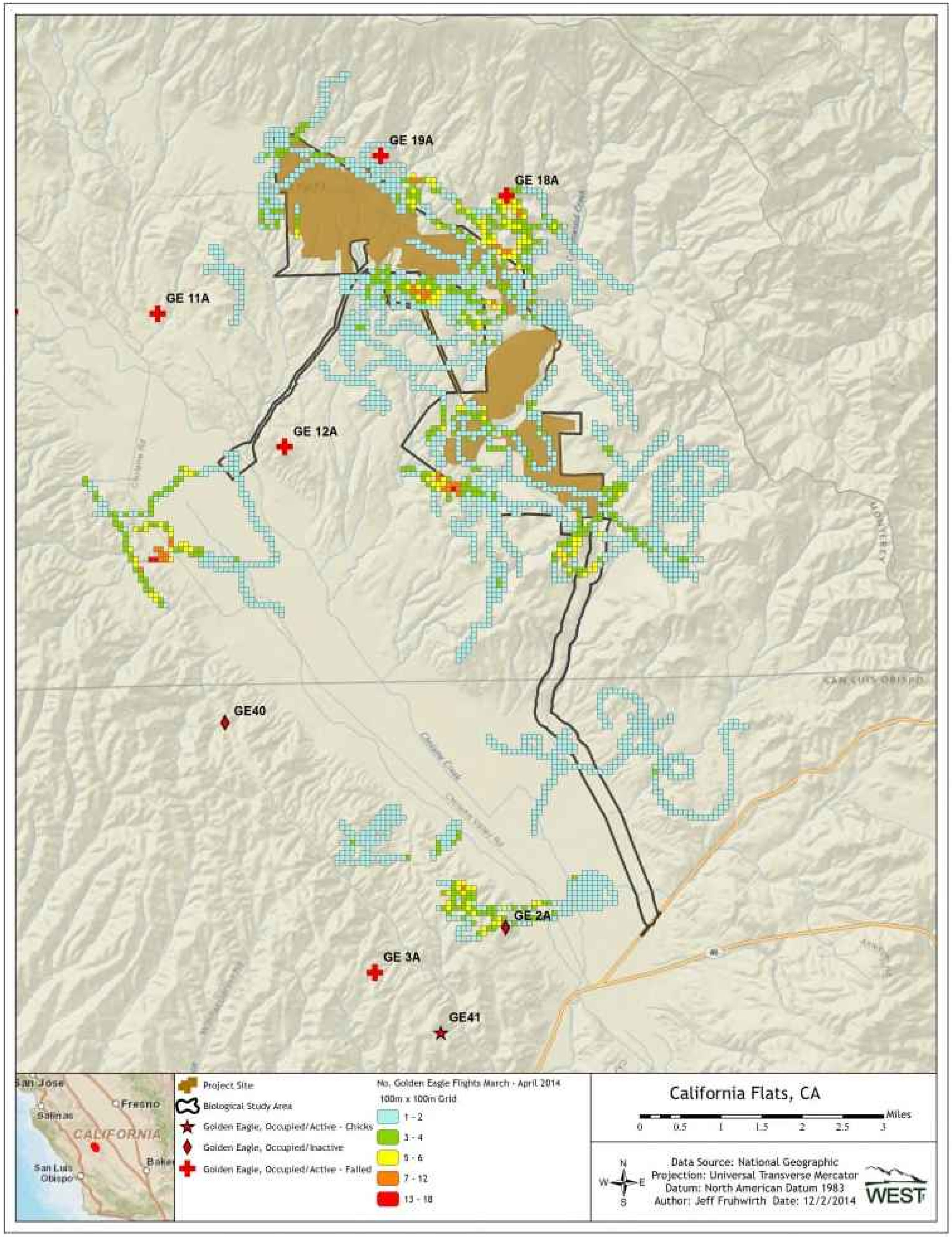

Figure 6. Golden eagle flights recorded during eagle use surveys at the California Flats Solar Project during March and April (early breeding season).

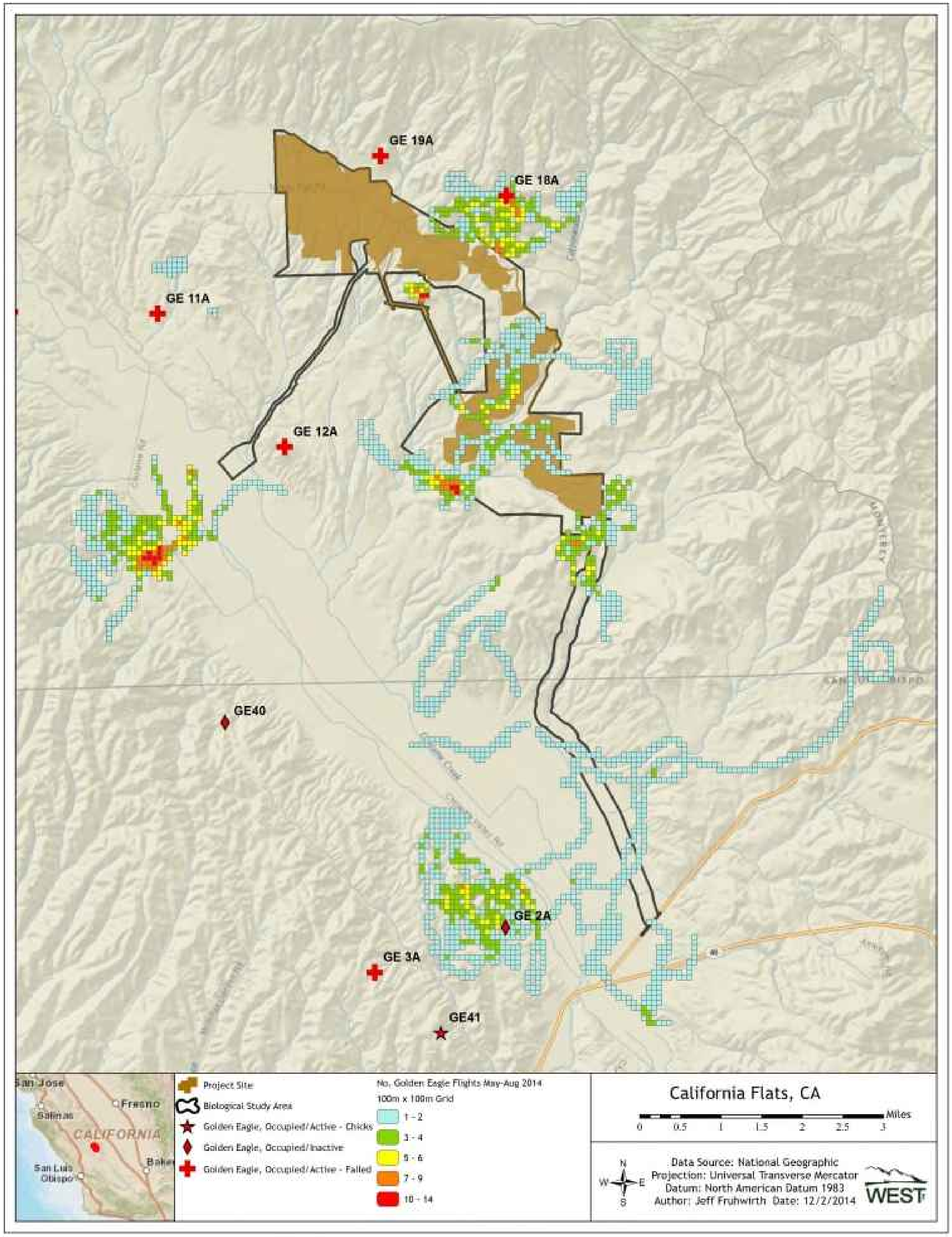

Figure 7. Golden eagle flights recorded during eagle use surveys at the California Flats Solar Project during May through August (late breeding season).

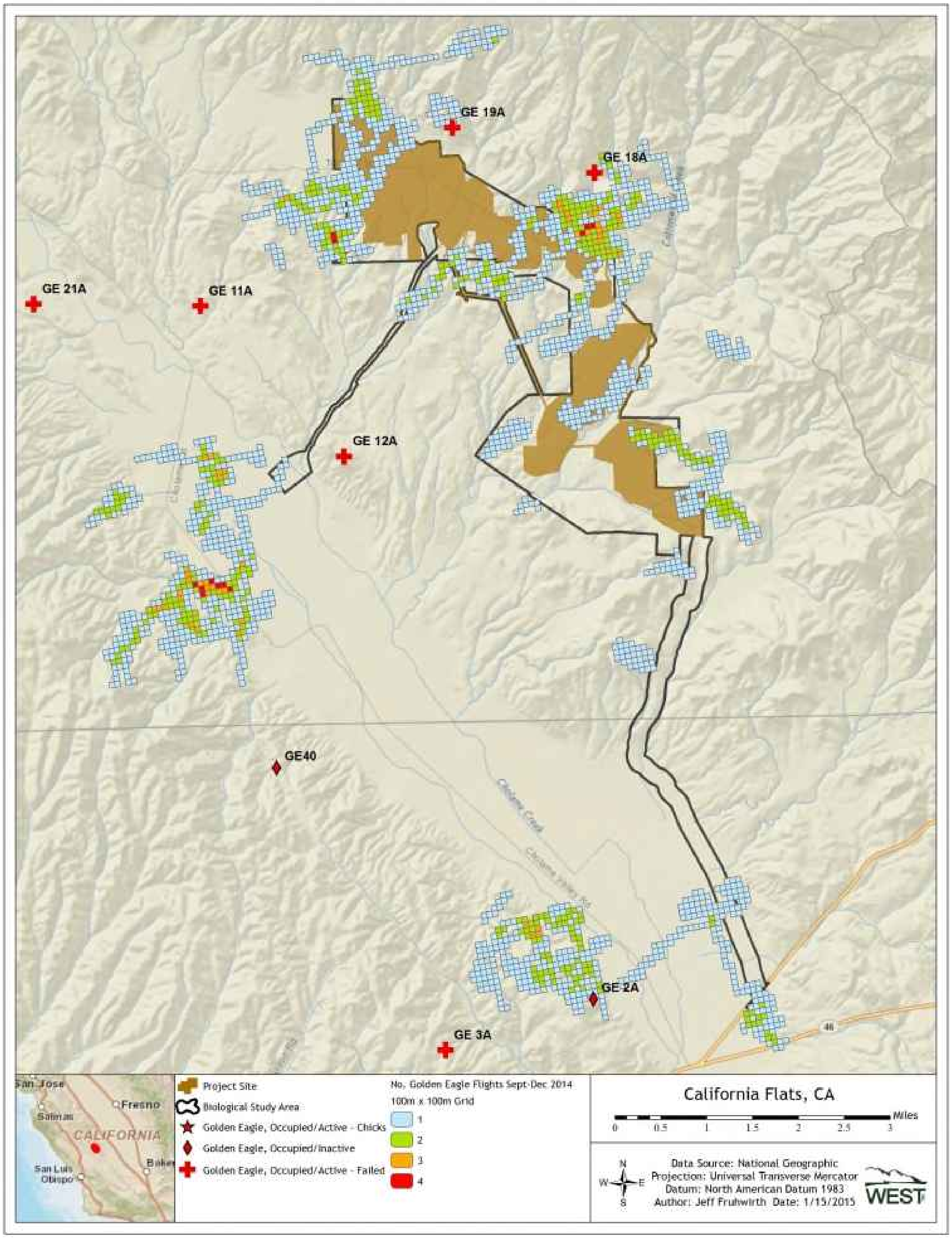

Figure 8. Golden eagle flights recorded during eagle use surveys at the California Flats Solar Project during September through December (post fledging, migration, and early wintering seasons).

Other Raptors and Sensitive Species Observed During Eagle Use Surveys

In addition to golden eagles, biologists also noted any other raptors or sensitive avian species seen during the eagle use surveys or during transit between survey stations. Between March 10 and December 22, 2014, 12 such species were noted (along with one unidentified eagle and two unidentified raptors; Table 1). Not including golden eagles, the most common raptor species observed during surveys were red-tailed hawks (*Buteo jamaicensis*; 177 observations), bald eagles (42 observations), American kestrels (*Falco sparverius*; 27 observations), ferruginous hawks (*Buteo regalis*; 12 observations), and prairie falcons (*Falco mexicanus*; 10 observations; Table 4). The remaining raptor species were recorded only infrequently, with fewer than 10 individuals observed during the ten-month study.

These results are similar to what was observed during the 2013/2014 baseline avian activity survey (HTH 2014). From March 2013 through March 2014, seven species of raptors were observed, including American kestrels (39 observations), red-tailed hawks (113 observations), golden eagles (16 observations), ferruginous hawks (11 observations), prairie falcons (5 observations), northern harriers (2 observations) and Swainson's hawks (1 observation). During the baseline survey, no peregrine falcons, Cooper's hawks, sharp-shinned hawks, osprey or bald eagles were observed,

Table 4. Other Raptor Species Recorded During Eagle Use Surveys at the California Flats Solar Project from March 10 to December 22, 2014.

Common name	Scientific name	Status*	# Grps	# Obs
American kestrel	*Falco sparverius*	-	23	27
bald eagle	*Haliaeetus leucocephalus*	SE, EA, FSC	42	42
burrowing owl	*Athene cunicularia*	SSC, FSC	3	6
Cooper's hawk	*Accipiter cooperii*	-	1	1
ferruginous hawk	*Buteo regalis*	-	11	12
golden eagle	*Aquila chrysaetos*	SFP, EA	216	216
northern harrier	*Circus cyaneus*	SSC	8	8
osprey	*Pandion haliaetus*	-	1	1
peregrine falcon	*Falco peregrinus*	SFP, FSC	2	2
prairie falcon	*Falco mexicanus*	-	9	10
red-tailed hawk	*Buteo jamaicensis*	-	140	177
sharp-shinned hawk	*Accipiter striatus*	-	1	1
Swainson's hawk	*Buteo swainsoni*	ST	1	1
unidentified eagle		-	1	1
unidentified raptor		-	5	5

ST = State Threatened (CDFW 2013); FSC = Federal Species of Concern within Bird Conservation Region 32 (USFWS 2008); SSC = State Species of Special Concern (CDFG 2011); SE = State Endangered. (CDFG 2013); EA = Bald and Golden Eagle Protection Act (BGEPA 1940); SFP = State Fully Protected Species (CDFG 2011).

All identified raptor species in Table 4 are listed and protected under the Migratory Bird Treaty Act. Additionally, six species considered sensitive at the state and/or federal level were recorded during the study. These included one state endangered species (bald eagle), one state threatened species (Swainson's hawk), two state fully protected species (golden eagle and peregrine falcon), and two state species of special concern (burrowing owl and northern harrier]). Bald eagles, burrowing owls, and peregrine falcons are further considered federal species of concern within Bird Conservation Region 32 (Coastal California; USFWS 2008) and both the bald and golden eagle are further protected under the federal BGEPA (1940). No other state or federal listed species, or species of concern, were noted during the eagle use surveys.

Beyond the bald and golden eagle observations, which were observed throughout the year, observations of other sensitive species were relatively rare. The three groups of burrowing owls were all sighted during spring. One peregrine falcon was observed during the spring, and one during the fall; the one Swainson's hawk observed during the 2014 surveys was observed during spring. The eight observations of northern harriers occurred in summer, fall and winter.

Special-status birds observed in the 2014 eagle use surveys also were similar to the 2013 baseline survey results. In 2013, seven special-status bird species were observed during the scheduled surveys or incidentally: Swainson's hawk (1 observation in spring), golden eagle (throughout the year), northern harrier (1 observation each in spring and fall), burrowing owl (1 observation in winter), loggerhead shrike; SSC and BCC; 15 observations throughout the year), short-eared owls (SSC; 1 observation each in spring and fall) and several small flocks of tricolored blackbirds (SSC and BCC; observed late winter/early spring).

DISCUSSION

Over the course of the ten-month study, the survey stations with the highest overall golden eagle use within the 800-m radius survey plot, both in terms of eagle observations per hour and eagle flight minutes per hour, were Stations CF10 and CF11. These two stations are located within the Cholame Valley to the southwest of the Project site; Station CF10 is approximately 3.5 miles southwest of the Project site and Station CF11 is approximately 4.75 miles south of the Project site (Figure 2). When the eagle use observed within the visible viewsheds is analyzed, Station CF3 had the highest use, with CF 10 and CF11 having the next highest use. Station CF3 is located approximately 0.25 miles west of the Project site. The Station with the lowest overall golden eagle use was CF1, located on the northeastern boundary of the Project, which had zero golden eagle observations within both the 800-m radius survey plot and the visible viewshed. Stations CF7 and CF12 also had relatively low eagle use both within the visible viewshed and the 800-m radius survey plot, and were located approximately 3 miles and 6 miles, respectively, to the south of the Project site.

While the mapped flight paths shown on Figures 5 through 8 indicate golden eagles are clearly using the general Project area, they do suggest that golden eagles flying in the vicinity of the Project are not using the landscape consistently and/or evenly. Furthermore, the mapped flight pathways illustrate that over extended periods of observation of the Project site during the spring, summer, fall, and early winter of 2014, golden eagles did not appear to be consistently using substantial portions of the Project site, particularly in some of the flatter areas where panels would be constructed. This may be due to a combination of factors that seem to attract higher levels of eagle use such as prey availability (based on the HTH burrowing animal survey, ground squirrel burrows appear particularly concentrated along the edge of drainages) and/or areas of steeper topography creating wind updrafts conducive to efficient soaring. Additionally, a substantial amount of the activity that was observed near point CF1 on the northeast edge of the Project site was associated with golden eagle activity in the vicinity of the two active (failed) nests (GE19A and GE18A), while activity near points CF3 and CF5 on the west and southwest edge of the Project site was associated with golden eagles traveling to and from trees in the ravines outside of the Project site, which they used as temporary perching points.

Golden eagle use observed at the California Flats Project during the 2014 study was compared to golden eagle use rates at other project sites in the western U.S. with similarly collected data. For the majority of these other publicly available studies, eagle use rates are limited to an 800-m survey radius and a survey duration of 20-minutes. Therefore, the same use metric was calculated using the California Flats data resulting in a mean golden eagle use rate of 0.04 obs/20-min. Figures 9 and 10 show that overall golden eagle use at the California Flats Project is low when compared to other sites studied throughout the western U.S. and moderate when compared to other sites in California. Overall annual golden eagle use at the Project was lower than the use found at six other study sites in California, and higher than five California sites (Figure 10). When the golden eagle use at the Project was compared to other California sites with data available at the seasonal level, the use data still shows relatively moderate use during spring, summer, and fall (see Figures 11-13), with relatively low use during the winter (Figure 14).

While bald eagles were regularly observed within Cholame Valley, in the vicinity of an active bald eagle nest identified during 2014 aerial eagle nest surveys (WEST 2014a), they were not observed within the Project site. In additional to golden eagles and bald eagles, 11 other raptor species were identified during the study, the most common of which were red-tailed hawks, American kestrels, ferruginous hawks, and prairie falcons. The remaining raptor species were recorded only infrequently, with fewer than 10 individuals observed during the ten-month study. Of the raptor species recorded during surveys, six are considered sensitive at the state and/or federal level including one state endangered species (bald eagle), one state threatened species (Swainson's hawk), two state fully protected species (golden eagle and peregrine falcon), and two state species of special concern (burrowing owl and northern harrier). Bald eagles, burrowing owls, and peregrine falcons are further considered federal species of concern within Bird Conservation Region 32 (Coastal California; USFWS 2008) and both the bald and golden eagle are further protected under the federal BGEPA (1940). The relatively low level of observations of non-eagle sensitive species is consistent with what was observed during the March 2013 – March 2014 baseline avian surveys (HTH 2014).

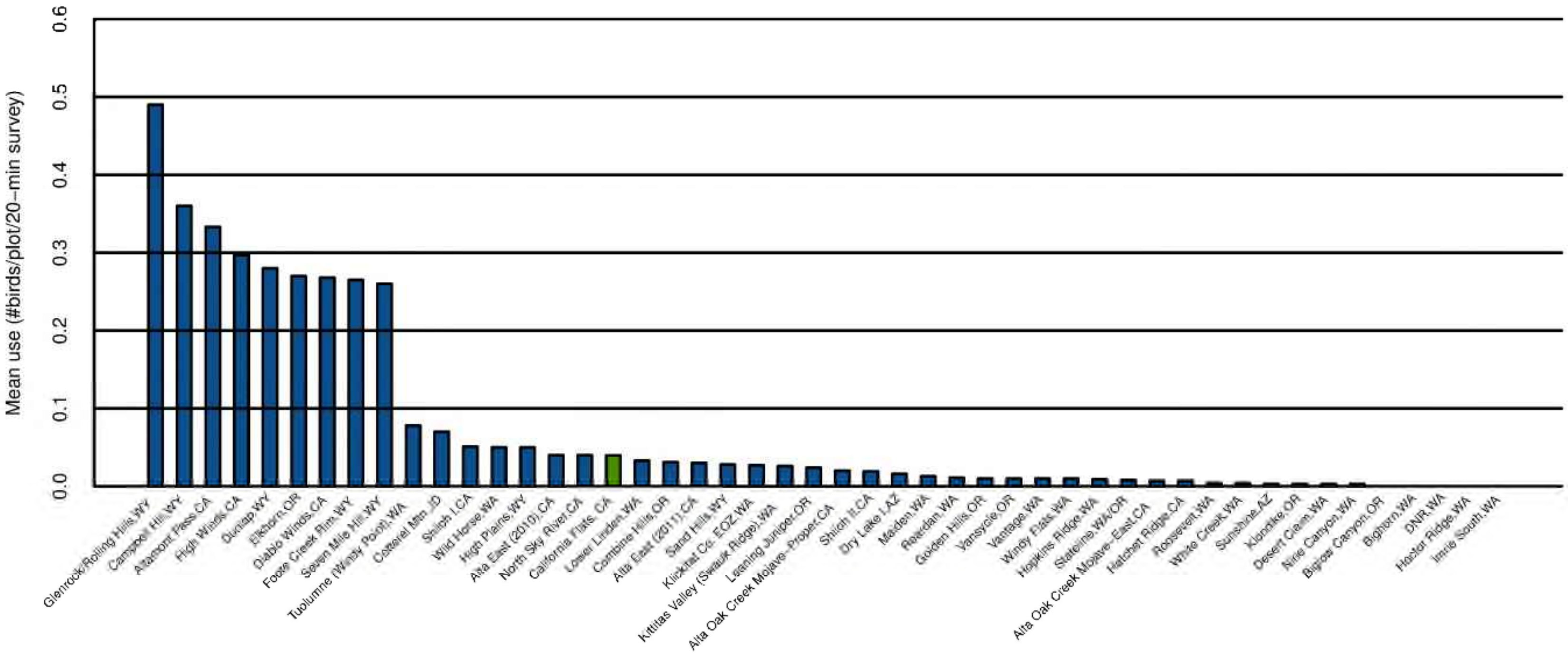

Figure 9. Comparison of estimated annual golden eagle use (observations/20-min/800-m plot) during eagle use surveys at the California Flat Solar Project and golden eagle use at other projects in the western U.S.

Study and Location	Reference	Study and Location	Reference	Study and Location	Reference
Glenrock/Rolling Hills,WY	Johnson et al. 2008	Lower Linden,WA	Johnson et al. 2007	Hopkins Ridge,WA	Young et al. 2003
Campbell Hill,WY	Taylor et al. 2009	Combine Hills,OR	Young et al. 2003	Stateline,WA/OR	Erickson et al. 2003
Altamont Pass,CA	Erickson et al. 2002	Alta East (2011),CA	Chatfield et al. 2011	Alta Oak Creek Mojave-East,CA	Erickson and Chatfield 2009
High Winds,CA	Kerlinger et al. 2006	Sand Hills,WY	Johnson et al. 2006	Hatchet Ridge,CA	Young et al. 2007
Dunlap,WY	Johnson et al. 2009	Klickitat Co. EOZ,WA	Johnson et al. 2003	Roosevelt,WA	NWC and WEST 2004
Elkhorn,OR	WEST 2005	Kittitas Valley (Swauk Ridge),WA	Erickson et al. 2003	White Creek,WA	NWC and WEST 2005
Diablo Winds,CA	WEST 2006	Leaning Juniper,OR	Kronner et al. 2005	Sunshine,AZ	WEST 2006
Foote Creek Rim,WY	Johnson et al. 2000	Alta Oak Creek Mojave-Proper,CA	Erickson et al. 2009	Klondike,OR	Johnson et al. 2002
Seven Mile Hill,WY	Johnson et al. 2007	Shiloh II,CA	Kerlinger et al. 2006	Desert Claim,WA	Young et al. 2003
Tuolumne (Windy Point),WA	Johnson et al. 2006	Dry Lake I,AZ	Young et al. 2007	Nine Canyon,WA	Erickson et al. 2001
Cotterel Mtn.,ID	BLM 2006	Maiden,WA	Young et al. 2002	Biglow Canyon,OR	WEST 2005
Shiloh I,CA	Kerlinger et al. 2006	Reardan,WA	WEST 2005	Bighorn,WA	Johnson & Erickson 2004
Wild Horse,WA	Erickson et al. 2003	Golden Hills,OR	Jeffrey et al. 2008	DNR,WA	Johnson et al. 2006
High Plains,WY	Johnson et al. 2009	Vansycle,OR	WCIA & WEST 1997	Hoctor Ridge,WA	Johnson et al. 2006
Alta East (2010),CA	Chatfield et al. 2010	Vantage,WA	WEST 2007	Imrie South,WA	Johnson et al. 2006
North Sky River,CA	Chatfield and Bay 2011	Windy Flats,WA	Johnson et al. 2007		

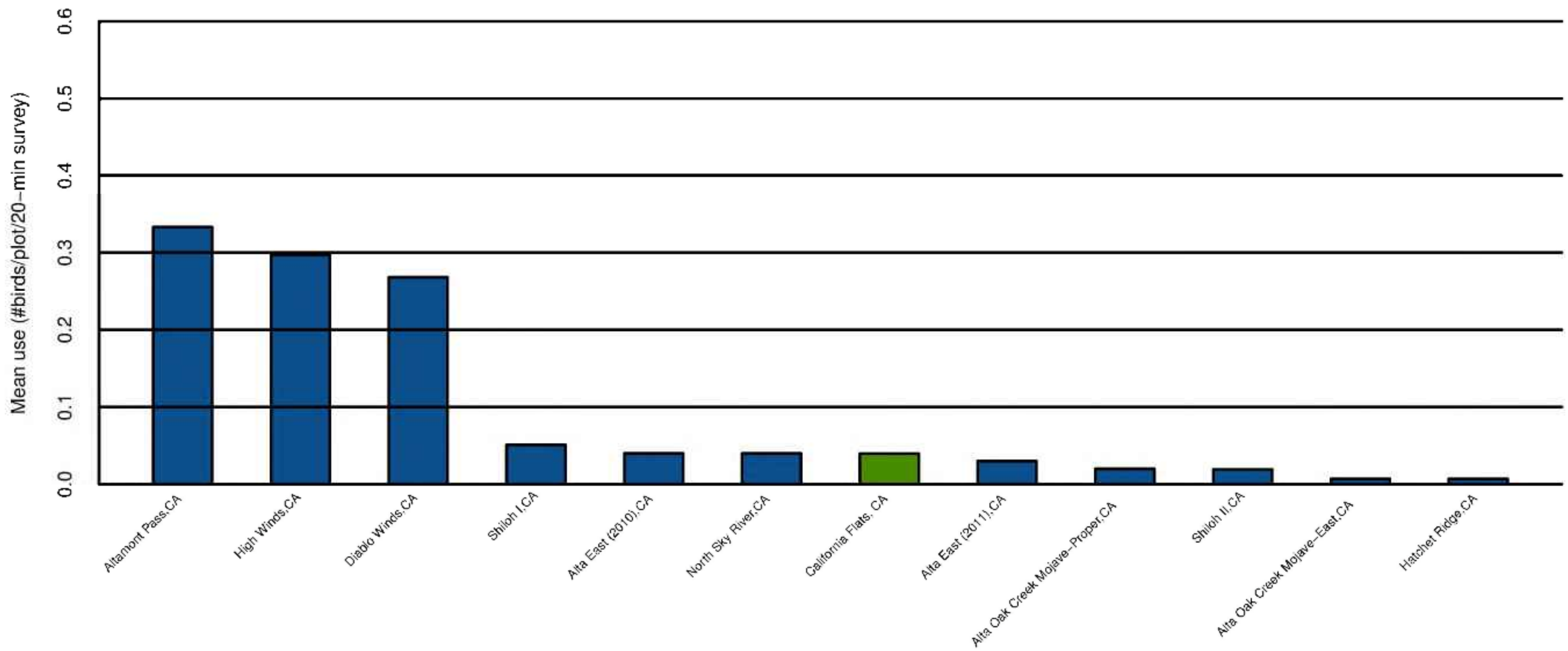

Figure 10. Comparison of estimated annual golden eagle use (observations/20-min/800-m plot) during eagle use surveys at the California Flats Solar Project and golden eagle use at other projects in California.

Data from the following sources:

Study and Location	Reference	Study and Location	Reference
California Flats, CA	This study.		
Altamont Pass,CA	Erickson et al. 2002	North Sky River,CA	Chatfield and Bay 2011
High Winds,CA	Kerlinger et al. 2006	Alta Oak Creek Mojave-Proper,CA	Erickson et al. 2009
Diablo Winds,CA	WEST 2006	Shiloh II,CA	Kerlinger et al. 2006
Shiloh I,CA	Kerlinger et al. 2006	Alta Oak Creek Mojave-East,CA	Erickson and Chatfield 2009
Alta East (2011),CA	Chatfield et al. 2011	Hatchet Ridge,CA	Young et al. 2007
Alta East (2010),CA	Chatfield et al. 2010		

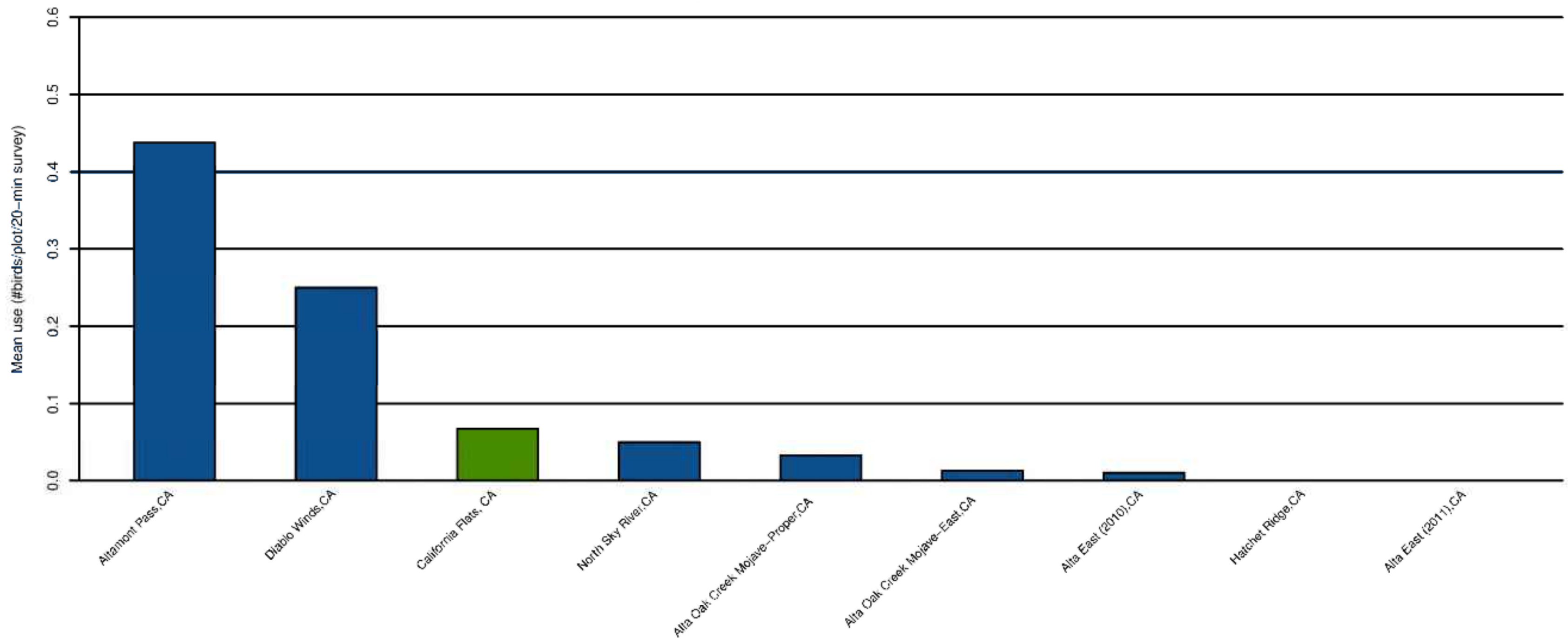

Figure 11. Comparison of estimated spring golden eagle use (observations/20-min/800-m plot) during eagle use surveys at the California Flats Solar Project and golden eagle use at other projects in California.

Data from the following sources:

Study and Location	Reference	Study and Location	Reference
California Flats, CA	This study.		
Altamont Pass,CA	Erickson et al. 2002	Alta Oak Creek Mojave-East,CA	Erickson and Chatfield 2009
Diablo Winds,CA	WEST 2006	Alta East (2010),CA	Chatfield et al. 2010
North Sky River,CA	Chatfield and Bay 2011	Hatchet Ridge,CA	Young et al. 2007
Alta Oak Creek Mojave-Proper,CA	Erickson et al. 2009	Alta East (2011),CA	Chatfield et al. 2011

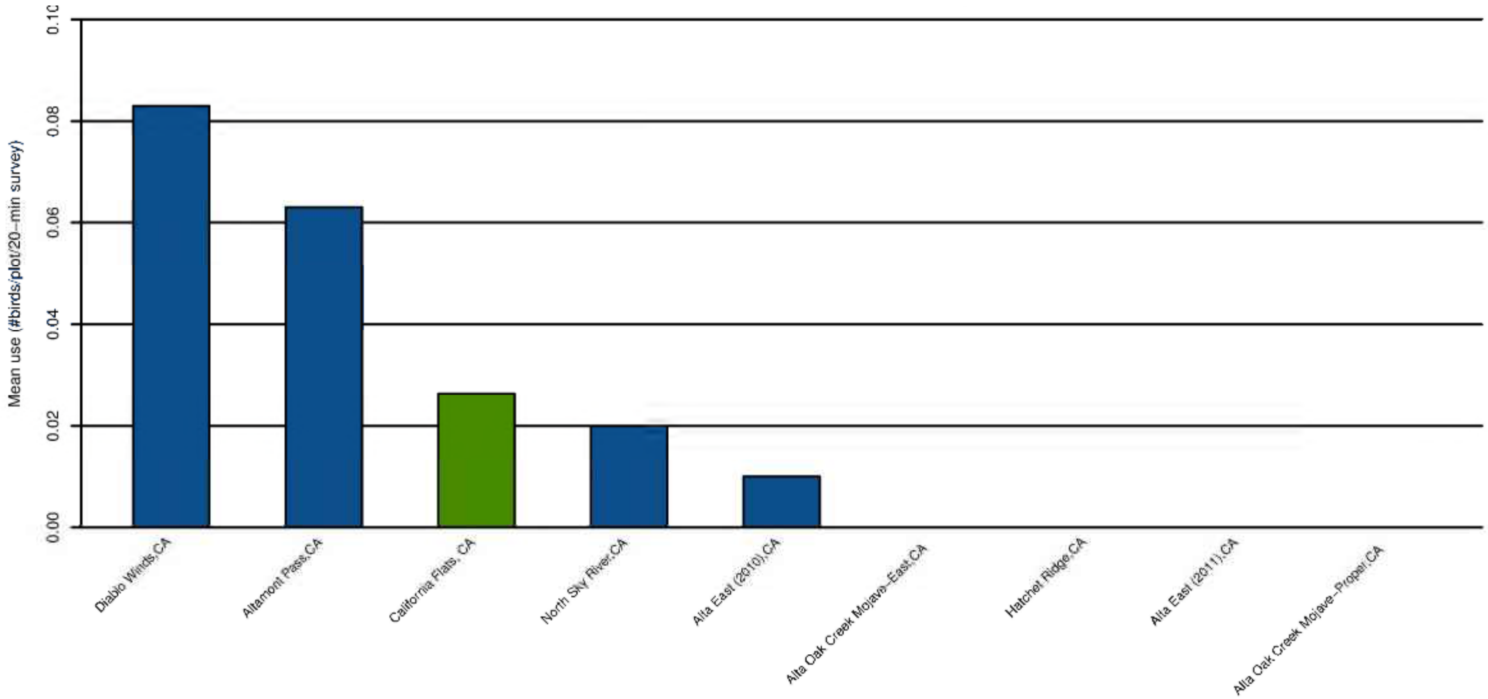

Figure 12. Comparison of estimated summer golden eagle use (observations/20-min/800-m plot) during eagle use surveys at the California Flats Solar Project and golden eagle use at other projects in California.

Data from the following sources:

Study and Location	Reference	Study and Location	Reference
California Flats, CA	This study.		
Diablo Winds,CA	WEST 2006	Alta Oak Creek Mojave-East,CA	Erickson and Chatfield 2009
Altamont Pass,CA	Erickson et al. 2002	Hatchet Ridge,CA	Young et al. 2007
North Sky River,CA	Chatfield and Bay 2011	Alta East (2011),CA	Chatfield et al. 2011
Alta East (2010),CA	Chatfield et al. 2010	Alta Oak Creek Mojave-Proper,CA	Erickson et al. 2009

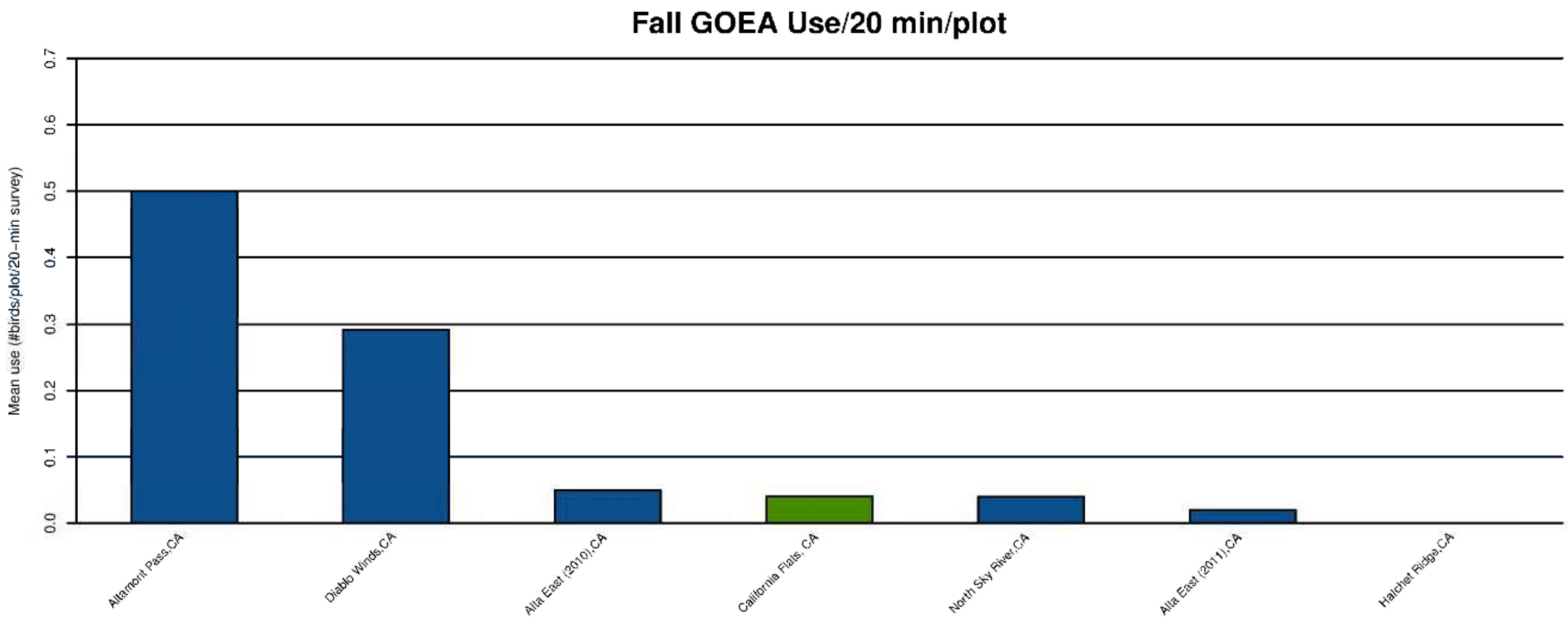

Figure 13. Comparison of estimated fall golden eagle use (observations/20-min/800-m plot) during eagle use surveys at the California Flats Solar Project and golden eagle use at other projects in California.

Data from the following sources:

Study and Location	Reference	Study and Location	Reference
California Flats, CA	This study.		
Altamont Pass,CA	Erickson et al. 2002	North Sky River,CA	Chatfield and Bay 2011
Diablo Winds,CA	WEST 2006	Alta East (2011),CA	Chatfield et al. 2011
Alta East (2010),CA	Chatfield et al. 2010	Hatchet Ridge,CA	Young et al. 2007

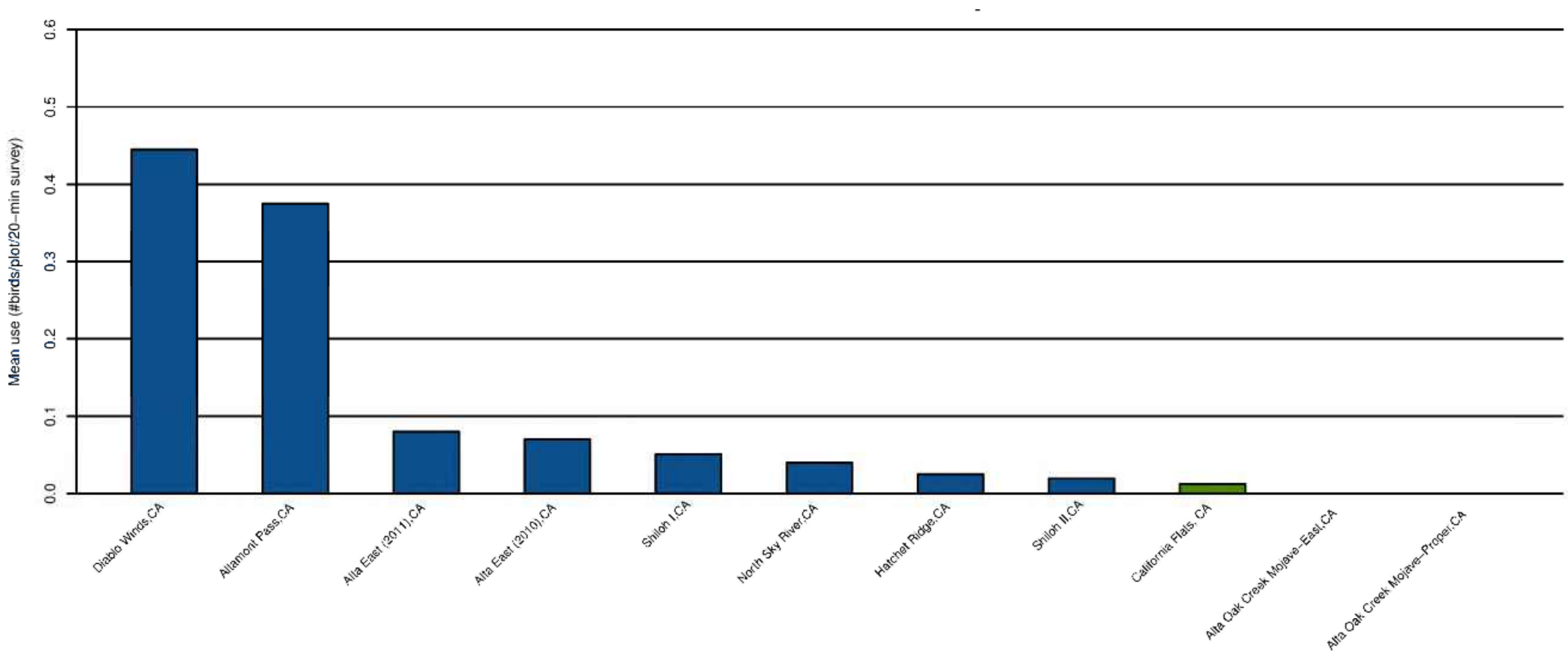

Figure 14. Comparison of estimated winter golden eagle use (observations/20-min/800-m plot) during eagle use surveys at the California Flats Solar Project and golden eagle use at other projects in California.

Data from the following sources:

Study and Location	Reference	Study and Location	Reference
California Flats, CA	This study.		
Diablo Winds,CA	WEST 2006	North Sky River,CA	Chatfield and Bay 2011
Altamont Pass,CA	Erickson et al. 2002	Hatchet Ridge,CA	Young et al. 2007
Alta East (2011),CA	Chatfield et al. 2011	Shiloh II,CA	Kerlinger et al. 2006
Alta East (2010),CA	Chatfield et al. 2010	Alta Oak Creek Mojave-East,CA	Erickson and Chatfield 2009
Shiloh I,CA	Kerlinger et al. 2006	Alta Oak Creek Mojave-Proper,CA	Erickson et al. 2009

CONCLUSION

Based on golden eagle use estimates and mapped flight pathways, it does not appear that golden eagles are relying relatively more on the Project site for foraging than on any of the surrounding landscape; in fact two of the highest use points are located more than three miles from the proposed solar arrays and eagles have not been observed using large portions of the Project site.

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Appendix A

Detailed Golden Eagle Use and Activity Tables

Table A-1. Golden eagle use (Obs/hr)* by survey station for each month of eagle use surveys at the California Flats Solar Project, March 10 to December 22, 2014

	Golden Eagle Use (Obs/hr)										
Month	**CF1**	**CF2**	**CF3**	**CF4**	**CF5**	**CF6**	**CF7**	**CF10**	**CF11**	**CF12**	**Total**
Mar	0	0	0.33	0.17	0.33	1.00	0	0	0	0	**0.22**
Apr	0	0.11	0.33	0	0.22	0	0	0.50	0.17	0	**0.15**
May	0	0	0	0	0.17	0.22	0.11	1.00	1.00	0	**0.24**
Jun	0	0	0	0.33	0	0	0.17	0.33	0.16	0	**0.10**
Jul	0	0	0	0	0.33	0	0	0	0.11	0.33	**0.10**
Aug	0	0	0	0	0	0.17	0	0	0	0	**0.02**
Sept	0	0.22	0	0.33	0.22	0	0	0.44	0.11	0	**0.14**
Oct	0	0.33	0	0	0	0	0	0	0	0	**0.03**
Nov	0	0.33	0.33	0	0	0.17	0	0.33	0.16	0	**0.13**
Dec	0	0	0.33	0	0	0	0	0.33	0	0	**0.06**
Total	**0**	**0.12**	**0.12**	**0.10**	**0.14**	**0.11**	**0.03**	**0.33**	**0.19**	**0.05**	**0.12**

*Within an 800-m radius survey plot

Table A-2. Golden eagle activity (Flight min/hr)* by survey station for each month of eagle use surveys at the California Flats Solar Project, March 10 to December 22, 2014.

	Golden Eagle Use (Flight min/hr)										
Month	**CF1**	**CF2**	**CF3**	**CF4**	**CF5**	**CF6**	**CF7**	**CF10**	**CF11**	**CF12**	**Total**
Mar	0	0	0.33	0.17	2.33	2.00	0	0	0	0	**0.56**
Apr	0	0.11	0.67	0	0.78	0	0	2.00	0.17	0	**0.41**
May	0	0	0	0	0.83	2.00	0.11	1.50	6.00	0	**1.05**
Jun	0	0	0	1.33	0	0	0.17	1.50	1.00	0	**0.40**
Jul	0	0	0	0	0.89	0	0	0	0.11	1.11	**0.26**
Aug	0	0	0	0	0	0.33	0	0	0	0	**0.04**
Sept	0	2.33	0	1.33	0.44	0	0	1.78	0.44	0	**0.66**
Oct	0	1.33	0	0	0	0	0	0	0	0	**0.13**
Nov	0	1.50	1.67	0	0	0.83	0	2.17	0.83	0	**0.70**
Dec	0	0	0.33	0	0	0	0	0.67	0	0	**0.10**
Total	**0**	**0.65**	**0.32**	**0.35**	**0.49**	**0.49**	**0.03**	**1.11**	**0.93**	**0.18**	**0.45**

*Within an 800-m radius survey plot

Table A-3. Golden eagle use (Obs/hr – unlimited viewshed) by survey station for each month of eagle use surveys at the California Flats Solar Project, March 10 to December 22, 2014

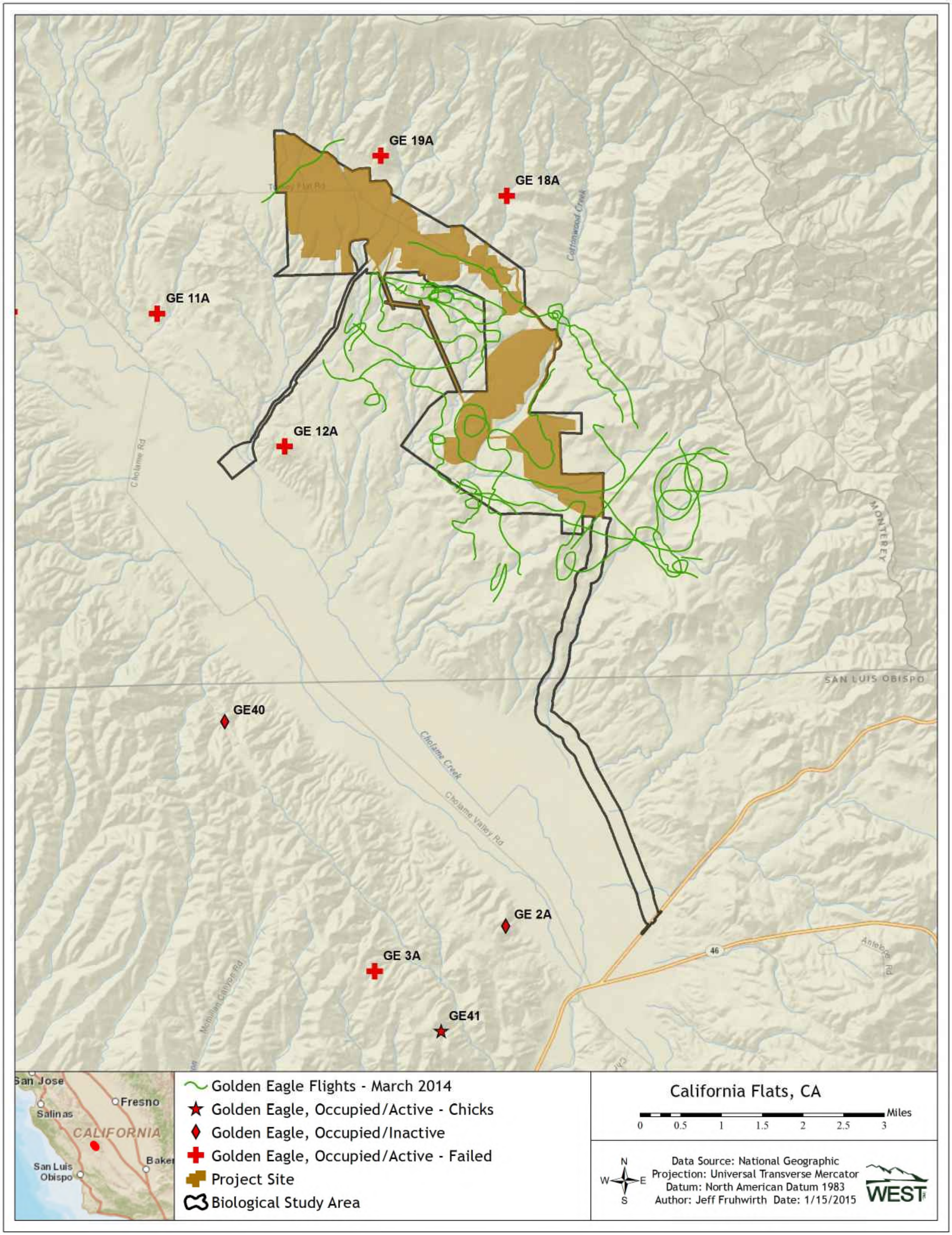
	Golden Eagle Use (Obs/hr)										
Month	**CF1**	**CF2**	**CF3**	**CF4**	**CF5**	**CF6**	**CF7**	**CF10**	**CF11**	**CF12**	**Total**
Mar	0	0	1	1	1	2.33	0	0	0	0	**0.70**
Apr	0	1	1.11	0	0.33	0	0.67	0.83	1.17	0	**0.55**
May	0	0.67	0.67	1.17	1.17	0.33	0.11	1.17	1.17	1.17	**0.53**
Jun	0	0.17	1.5	0.5	0	0	0.17	0.33	0.33	0	**0.30**
Jul	0	0	1	0.44	0.33	0	0	0	0.33	0.33	**0.26**
Aug	0	0.33	0.67	0	0	0.17	0	0.33	0	0	**0.16**
Sept	0	0.33	0.83	0.33	0.22	0	0	0.56	0.78	0	**0.29**
Oct	0	0.33	0.78	0.17	0	0	0	0.5	0.33	0	**0.24**
Nov	0	0.67	0.33	0	0	0.17	0.17	0.67	0.17	0	**0.22**
Dec	0	0.67	0.33	0	0	0	0	0.5	0.83	0.17	**0.24**
Total	**0**	**0.45**	**0..86**	**0.40**	**0.19**	**0.19**	**0.08**	**0.54**	**0.60**	**0.09**	**0.33**

Table A-4. Golden eagle activity (Flight min/hr – unlimited viewshed) by survey station for each month of eagle use surveys at the California Flats Solar Project, March 10 to December 22, 2014.

	Golden Eagle Use (Flight min/hr)										
Month	**CF1**	**CF2**	**CF3**	**CF4**	**CF5**	**CF6**	**CF7**	**CF10**	**CF11**	**CF12**	**Total**
Mar	0	0	3.33	4.83	6	8.33	0	0	0	0	**3.04**
Apr	0	4.11	7.67	0	2.22	0	5.67	4.83	10.33	0	**3.54**
May	0	2.17	3.33	6.00	1.5	3.11	1.33	2.67	15.5	0.83	**3.51**
Jun	0	0	6.17	4.00	0	0	1.00	2.50	4.5	0	**1.82**
Jul	0	0	3.00	1.56	2.11	0	0	0	1.11	2.22	**1.13**
Aug	0	0	4.00	0	0	0.67	0	2.00	0	0	**0.62**
Sept	0	5.78	4.33	3.67	1.00	0	0	4.78	4.00	0	**2.29**
Oct	0	2.5	3.89	1.00	0	0	0	2.00	1.83	0	**1.25**
Nov	0	5.5	3.5	0	0	0.83	1.5	7.17	1.17	0	**1.97**
Dec	0	2.00	1.67	0	0	0	0	3.00	4.00	0	**1.04**
Total	**0**	**2.60**	**4.44**	**2.37**	**1.19**	**0.98**	**0.73**	**3.30**	**4.74**	**0.44**	**2.04**

Appendix B

Monthly Golden Eagle Flight Path Maps



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Golden Eagle Flights - March 2014
Golden Eagle, Occupied/Active - Chicks
Golden Eagle, Occupied/Inactive
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Author: Jeff Fruhwirth Date: 1/15/2015
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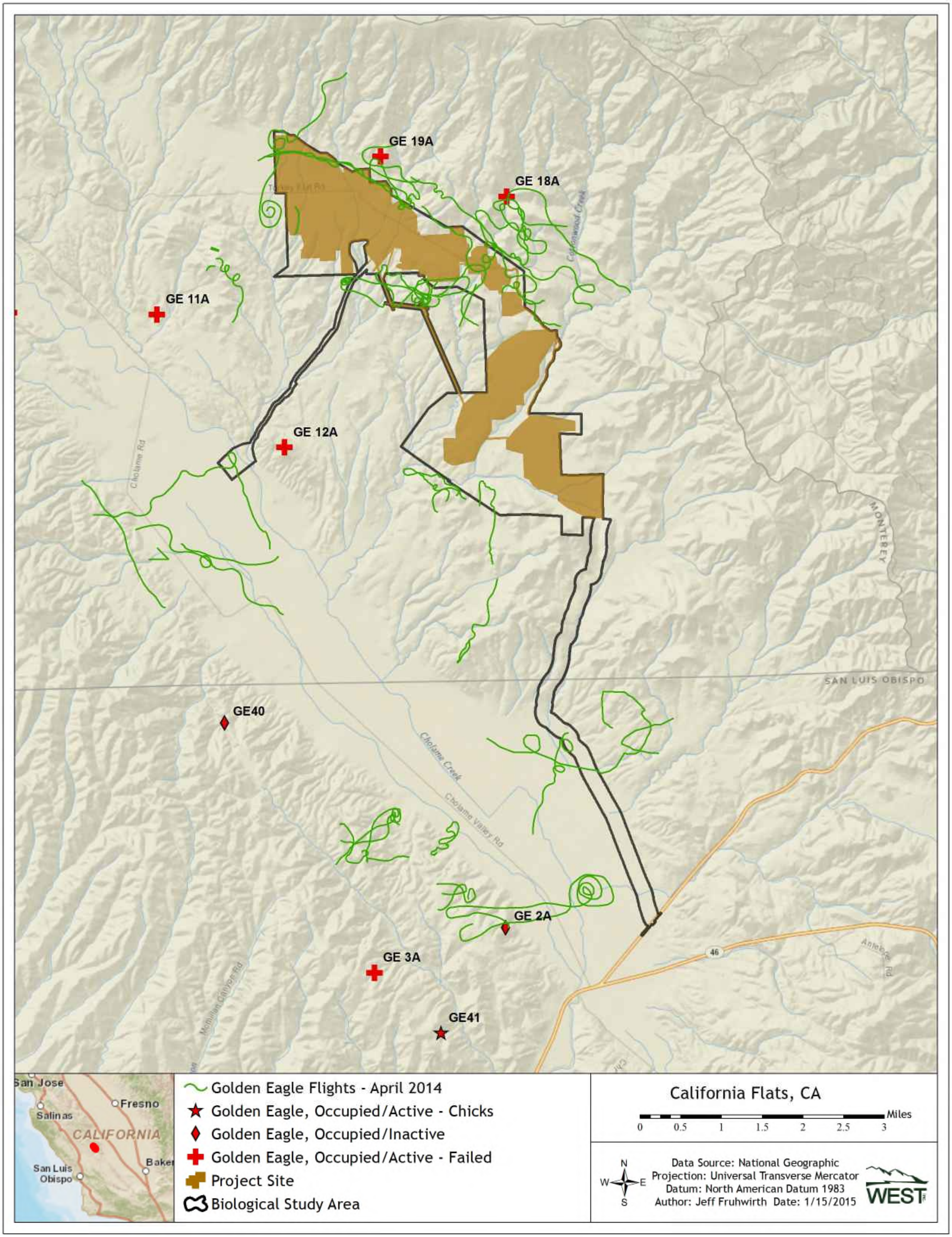

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Golden Eagle Flights - April 2014
Golden Eagle, Occupied/Active - Chicks
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Project Site
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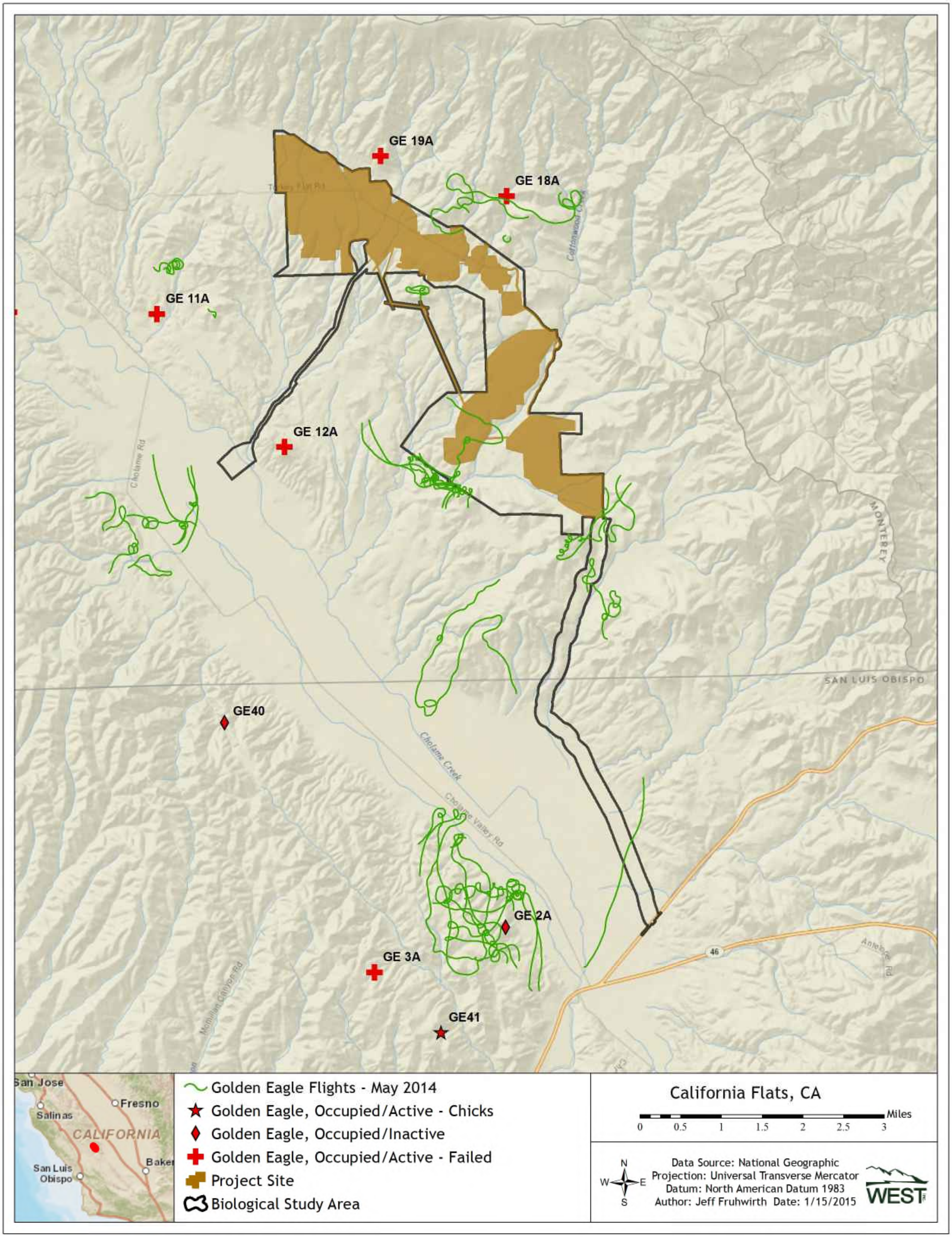
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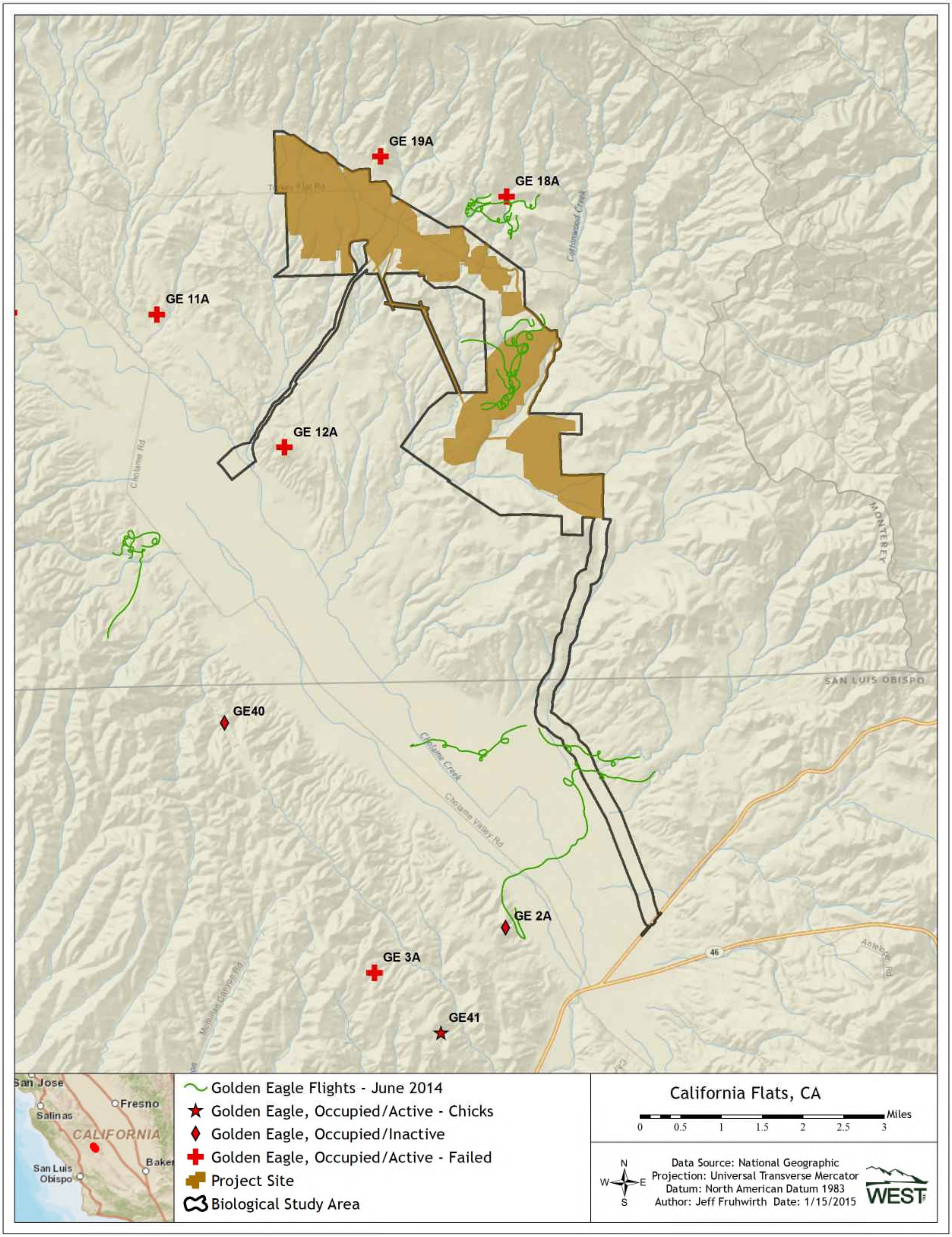
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Golden Eagle Flights - June 2014
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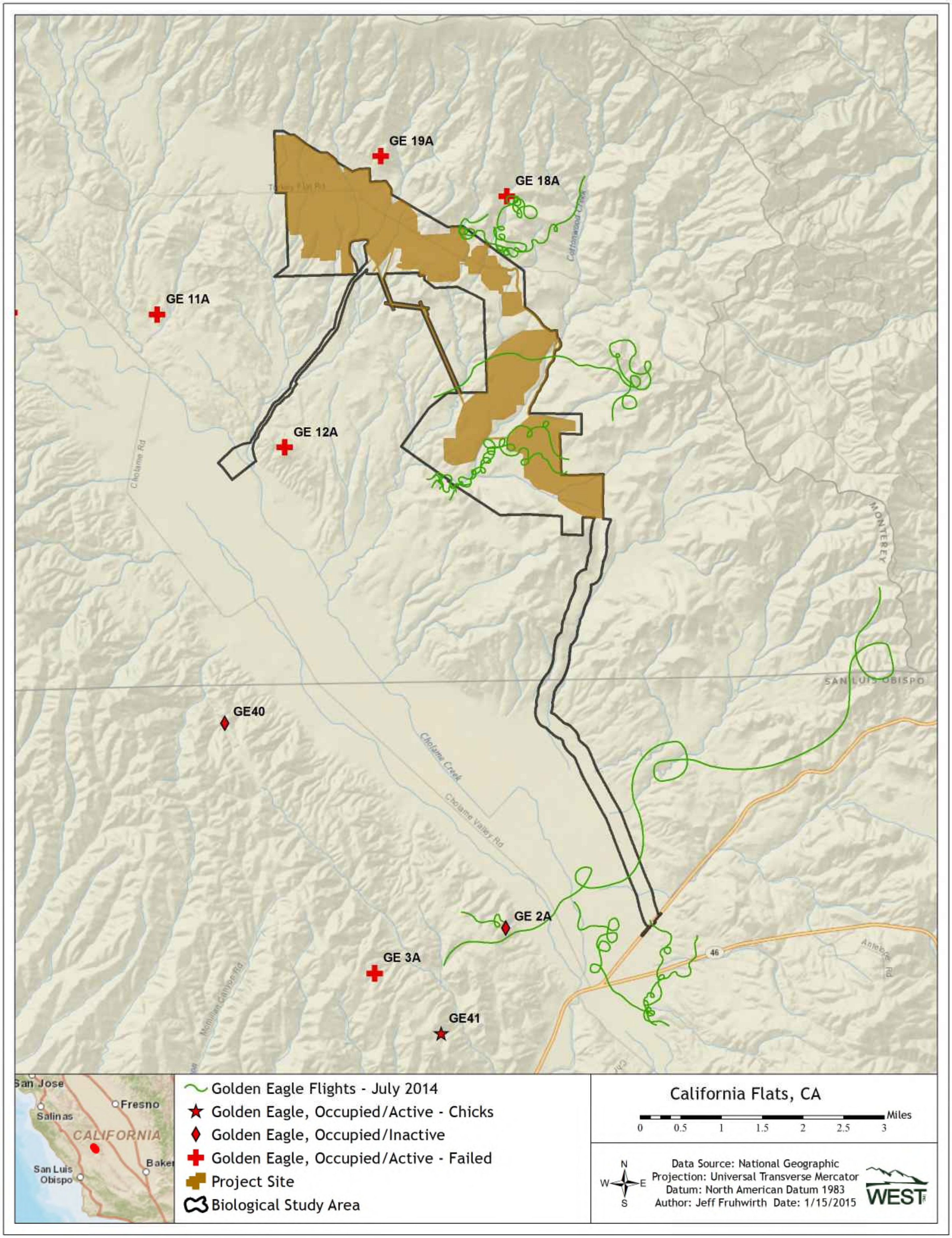
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Golden Eagle Flights - July 2014
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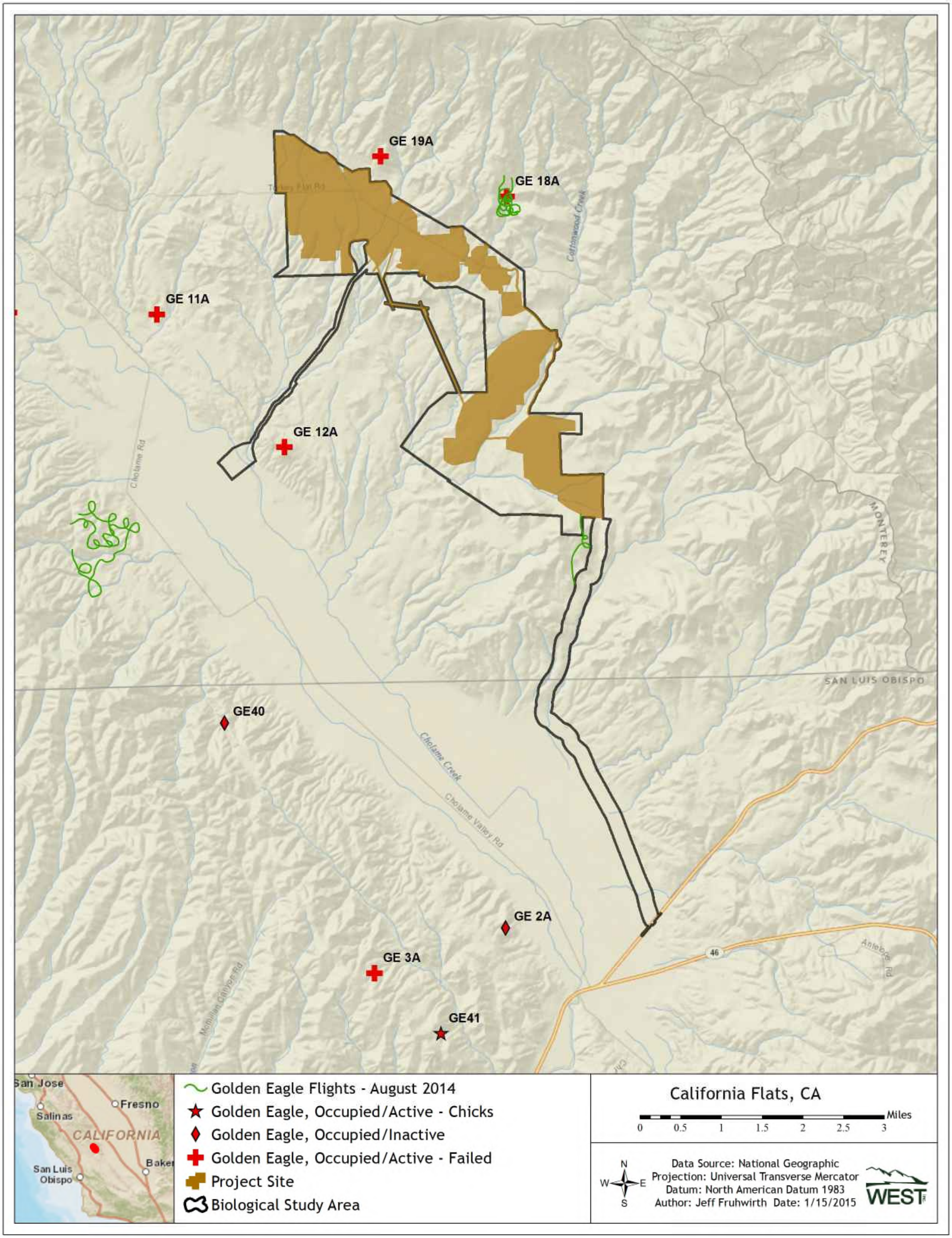
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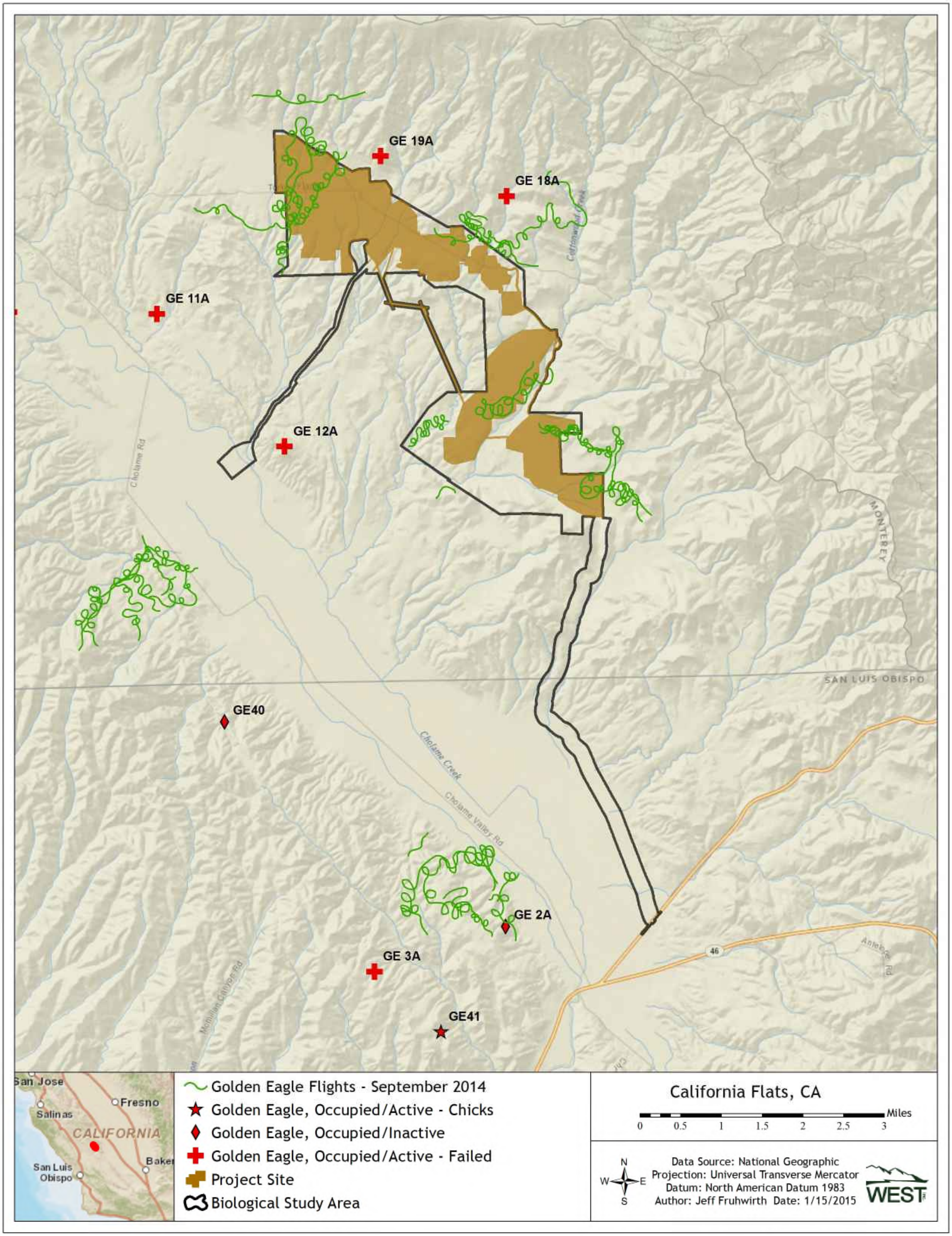
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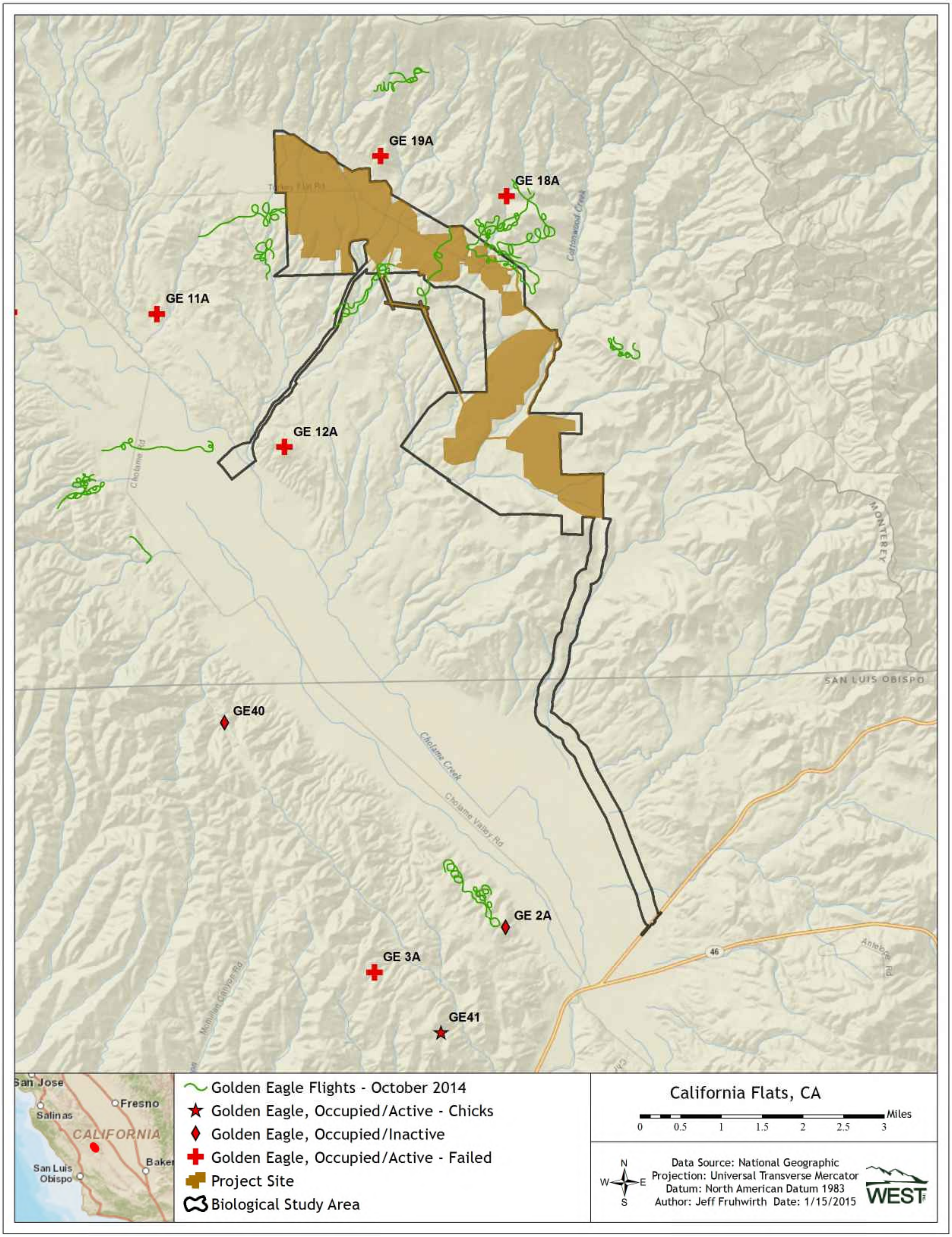

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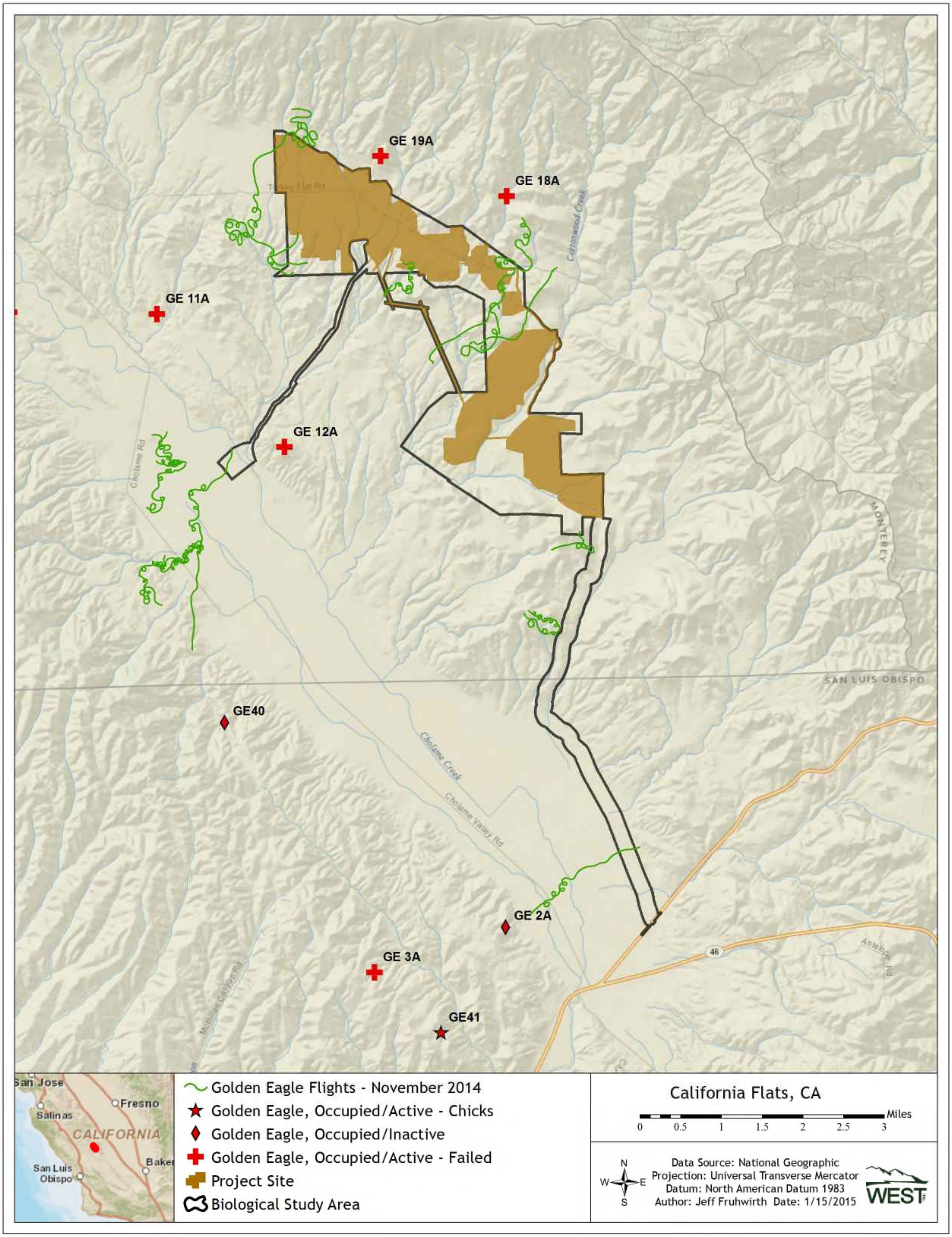
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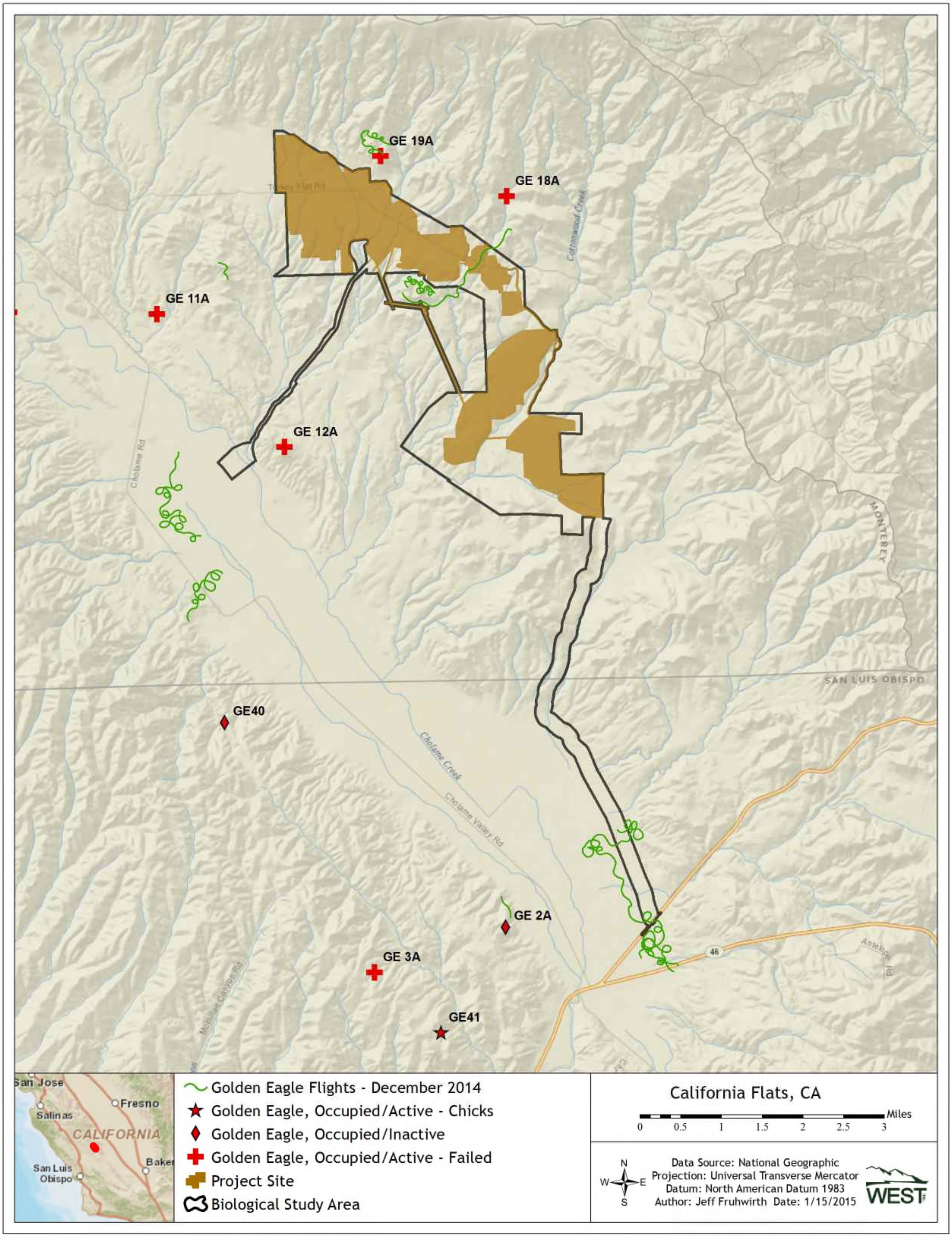
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Appendix E

2013 Bat Assessment

H. T. HARVEY & ASSOCIATES
ECOLOGICAL CONSULTANTS

California Flats Solar Project Bat Habitat Assessment and Acoustic Surveys

Project # 3308-01

Prepared for:

California Flats Solar, LLC
135 Main Street, 6th Floor
San Francisco, CA 94105

Prepared by:

H. T. Harvey & Associates

November 2013

Executive Summary

The California Flats Solar Project (Project) is a 280-megawatt photovoltaic solar power plant proposed for development in southeastern Monterey County, California. When approved, the solar facility and related operations infrastructure will be built on approximately 1037 hectares (2562 acres) (Project site) of the 29,137-hectare (72,000-acre) Jack Ranch, which is a working cattle ranch. The overall development will include improvements to an existing access road and its connection to State Route 41 (access road/Hwy 41 improvement areas). Together, the Project site and access road/Hwy 41 improvement areas constitute the 1058-hectare (2615-acre) Project impact area (PIA), where all direct, Project-related impacts will occur. A biological study area (BSA) was delineated around the PIA, within which most Project-related biological surveys and assessments are being conducted.

The Project site is located in a landscape dominated by gently rolling terrain and grasslands, interspersed with several, mostly ephemeral, riparian corridors and drainages. Numerous wildlife species are known to occur in the region, some of which have been identified as candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife or U.S. Fish and Wildlife Service. Regarding special-status bat species, four observations of the pallid bat (*Antrozous pallidus*) and two observations of the western mastiff bat (*Eumops perotis*), both California Species of Special Concern, have been recorded within 32 kilometers (about 20 miles) of the Project site. Additionally, the western red bat (*Lasiurus blossevillii*), a California Species of Special Concern, and the Townsend's big-eared bat (*Corynorhinus townsendii*), a California Species of Special Concern and designated as a candidate for Threatened or Endangered species status by the California State Fish and Wildlife Commission (CDFW 2013), could potentially occur in the BSA.

To identify suitable bat habitat that may be affected by the proposed Project, H. T. Harvey & Associates conducted a bat habitat assessment and an acoustic survey of the BSA. After potential habitat in the BSA was identified during an initial survey, bat sound recorders were placed in five locations to assess activity levels and to identify species.

The bat habitat assessment determined that low- to moderate-quality roosting habitat (rocky outcrops with crevices, deciduous trees and snags with cavities and exfoliating bark) is present on the BSA for mostly solitary-roosting bats or small congregations of bats. No roosting habitat for bats occurs within the PIA; however, pallid bats are expected to roost in small numbers in larger trees occurring in the riparian areas and as individuals in the crevices of rocky outcrops within the BSA. The western red bat is expected to roost in the foliage of riparian trees during spring and fall migratory periods, but is not expected to breed (raise young) in the BSA. The Townsend's big-eared bat is expected to occur occasionally as dispersed males, particularly in the winter, in buildings within the BSA. No western mastiff bat roosting habitat occurs in the BSA.

The acoustic survey data suggest that the pallid bat occurs within the BSA in small numbers. No western red bats, Townsend's big-eared bats, or western mastiff bats were detected by the bat detectors; however, western red bats are expected to forage in very small numbers within the BSA riparian areas during migratory periods and dispersed male Townsend's big-eared bats may visit the BSA during winter months. Pallid bats and western mastiff bats are expected to forage on the Project Site and a change in foraging habitat may result in indirect impacts to these species.

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Figures

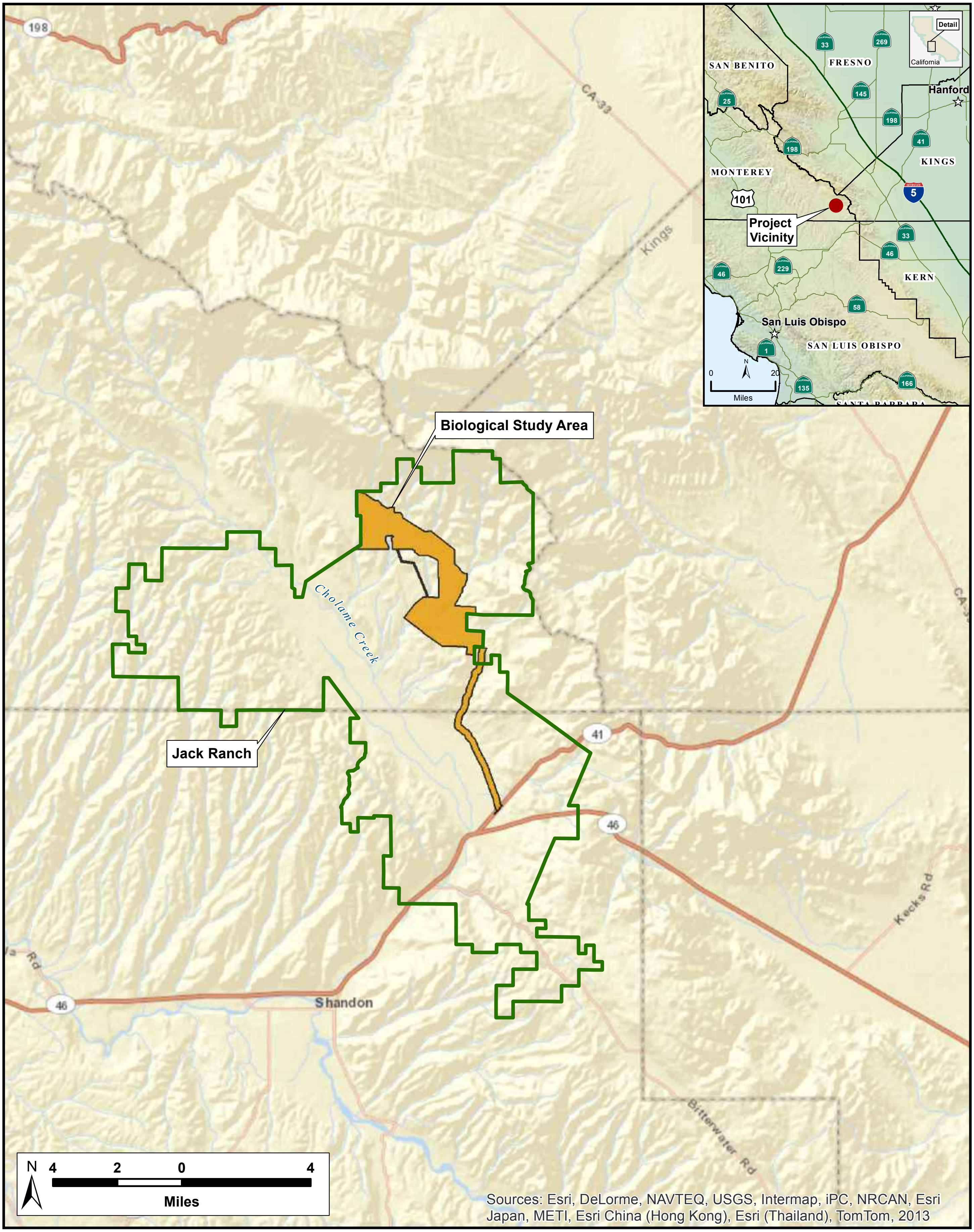
Tables

Section 1.0 Introduction

The California Flats Solar Project (Project) is a 280-megawatt photovoltaic solar power plant proposed for development in southeastern Monterey County, California (Figure 1). When approved, the Project will be built on approximately 1037 hectares (2562 acres) (Project site) of private ranchland. The 29,137-hectare (72,000-acre) Jack Ranch is a working cattle ranch located in an unincorporated area of southeastern Monterey County and northeastern San Luis Obispo County, near the borders of Kings and Fresno counties. The Project will include construction, installation, and operation of energy-related infrastructure (e.g., solar panels, inverters, substations, and new power poles and transmission lines) and improvements needed to operate and maintain facilities (e.g., buildings, internal roadways, access roads, fencing, and lighting). The Morro Bay–Gates 230-kilovolt transmission line crosses the Project site, with capacity sufficient to accommodate the new power plant, negating the need for development of additional transmission corridors. The overall development will also include improvements to an existing access road and its connection to State Route (Hwy) 41, approximately 8 kilometers (5 miles) south of the Project site. The access road/Hwy 41 improvement areas will encompass approximately 21.4 hectares (53 acres). Together, the Project site and access road/Hwy 41 improvement areas constitute the 1058-hectare (2615-acre) Project impact area (PIA), where all direct, Project-related impacts will occur. A biological study area (BSA) was delineated around the PIA, within which most Project-related biological surveys and assessments are being conducted.

The Project site is located in a landscape dominated by gently rolling terrain and grasslands, interspersed with several, mostly ephemeral, riparian corridors and drainages. Numerous wildlife species are known to occur in the region, some of which have been identified as candidate, sensitive, or special-status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Wildlife (CDFW) or U.S. Fish and Wildlife Service (USFWS). For special-status bats, the California Natural Diversity Database (2013) lists four records for the pallid bat (*Antrozous pallidus*) and Pierson and Rainey (1998) reported two observations of the western mastiff bat (*Eumops perotis*). Both species are California Species of Special Concern, and occur within 32 kilometers (about 20 miles) of the Project site (Figure 2). Additionally, a Townsend's big-eared bat colony historically occurred approximately 8 kilometers (about 5 miles) northwest of the BSA; however, this colony was considered extirpated as of 1991 (Pierson and Rainey 1998). Based on recent unpublished records (Robert Stafford, pers. comm.) of Townsend's big-eared bats occurring in the Carrizo Plains area as solitary males, this species likely also occurs similarly on the BSA.

To identify suitable bat habitat that may be affected by the proposed Project, H. T. Harvey & Associates conducted an assessment, including an acoustic survey, of the BSA. This area provides roosting habitat for mostly crevice-roosting bats (which could use rocky outcrops, trees, and anthropogenic structures such as the ranch granary), foliage-roosting bats, and cavernous roosting bats in the attics of a few buildings. Species expected to occur in the BSA as seasonal migrants or as year-round residents are the Townsend's big-eared bat (*Corynorhinus townsendii*), pallid bat, western red bat (*Lasiurus blossevillii*), hoary bat (*Lasiurus cinereus*), Mexican free-tailed bat (*Tadarida brasiliensis* ssp. *mexicanus*), western mastiff bat, big brown bat (*Eptesicus fuscus*), canyon bat (*Parastrellus hesperus*), California myotis (*Myotis californicus*), western small-footed bat (*Myotis ciliolabrum*), Yuma myotis (*Myotis yumanensis*), long-legged myotis (*Myotis volans*), and fringed myotis (*Myotis thysanodes*). Of these species, the pallid bat, Townsend's big-eared bat, California mastiff bat, and western red bat are designated special status in the state of California (Table 1).



J:\Reports\Wildlife Reports\Bat Habitat Assessment\Fig 1 Vicinity Map.mxd

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ECOLOGICAL CONSULTANTS

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Figure 1: Vicinity Map

California Flats Solar Project, California (3308-01)

November 2013

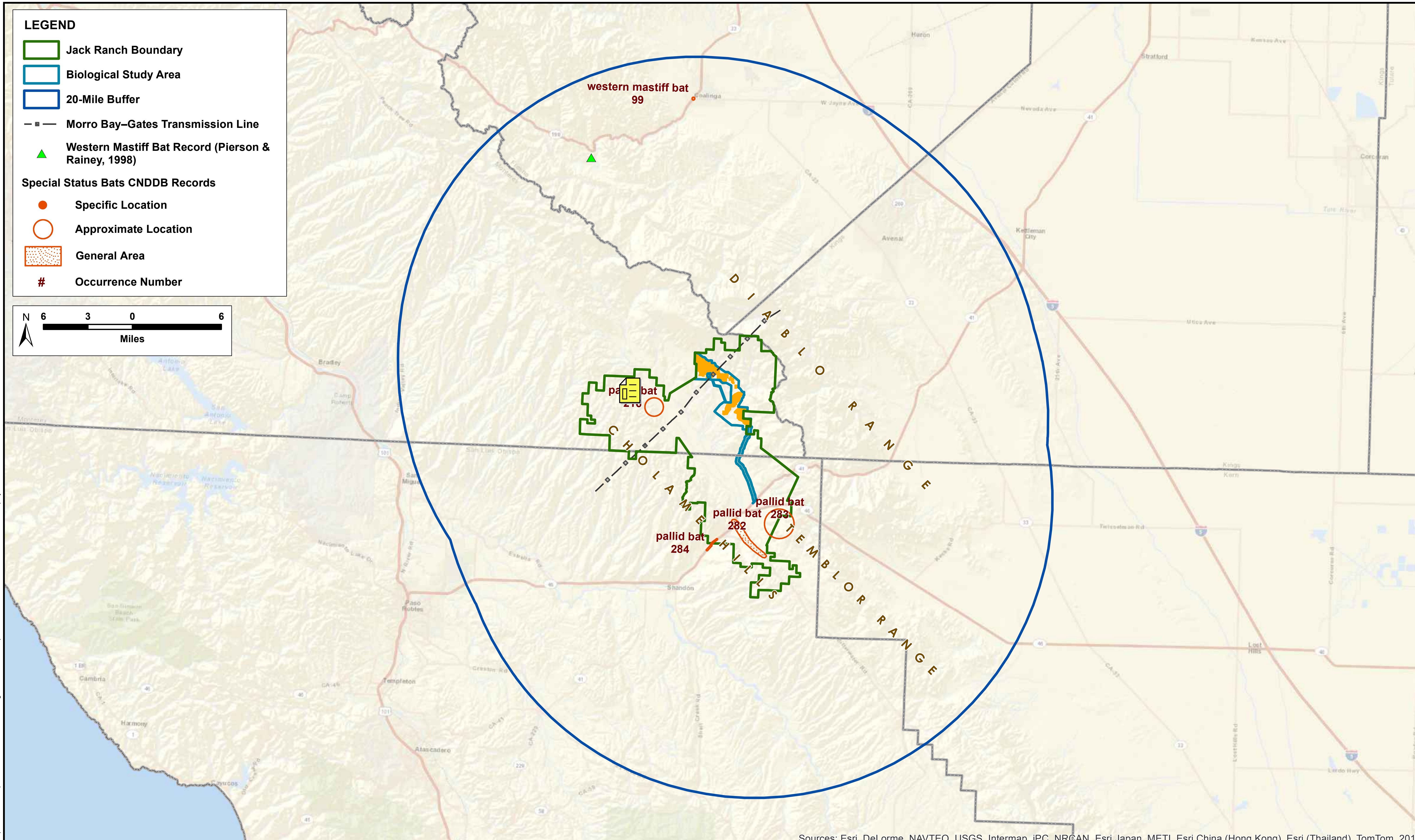

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Figure 2: Occurrences of Special Status Bats within a 20-miles Radius of the Project Site
California Flats Solar Project, California (3308-01)
November 2013

Table 1. Conservation Status of Special-status Bat Species that Could Occur on the BSA

	Conservation Status by Agency			
Species	**U.S. Bureau of Land Management**	**California Department of Fish and Wildlife**	**U.S. Forest Service**	**Western Bat Working Group**
Pallid bat *Antrozous pallidus*	Sensitive	Species of Special Concern	Sensitive	High Priority
Townsend's big-eared bat *Corynorhinus townsendii*	Sensitive	Species of Special Concern	Sensitive	High Priority
Western mastiff bat *Eumops perotis*	Sensitive	Species of Special Concern	No status	High Priority
Western red bat *Lasiurus blossevillii*	No status	Species of Special Concern	Sensitive	High Priority
Hoary bat *Lasiurus cinereus*	No status	No status	No status	Medium Priority
Western small-footed bat *Myotis ciliolabrum*	Sensitive	No status	No status	Medium Priority
Fringed myotis *Myotis thysanodes*	Sensitive	No status	No status	High Priority
Yuma myotis *Myotis yumanensis*	Sensitive	No status	No status	Low–Medium Priority

Note: Species found in the BSA, but not listed in the table, have no conservation status with any of the four listed agencies. Source: California Department of Fish and Game 2011.

To identify potential bat habitat and habitat use by bats within the boundaries of the BSA and PIA, H. T. Harvey & Associates bat biologists Dr. Dave Johnston, Kim Briones, and Meredith Jantzen assessed all rocky outcrops, riparian areas, and one building in the area. The specific goal of the assessment was to identify and map suitable habitat for roosting, especially by special-status species and maternity colonies, and to identify and map other evidence (e.g., guano, staining, and insect parts) of use by bats. The habitat assessment was conducted over three full days. Subsequent acoustic surveys of the BSA were conducted for eight nights from 16 October through the night starting 23 October. Acoustic surveys revealed moderate bat activity (see "Results").

Section 2.0 Methods

2.1 Initial Habitat and Tree Assessment

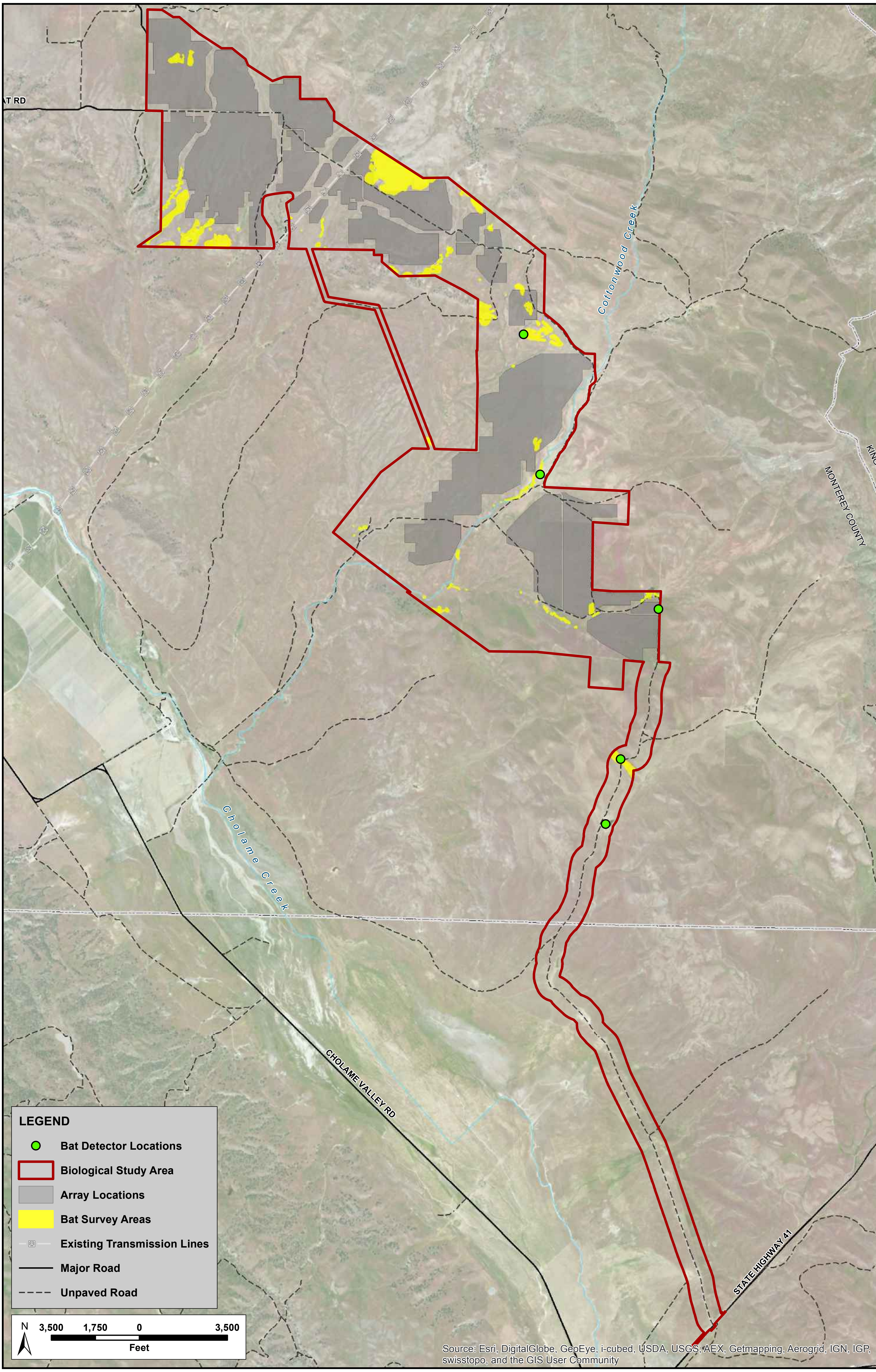
The initial habitat assessment was conducted on 4 and 15 October 2013. On both days, the biologists conducted the assessment by driving the entire main access road, beginning at the northern edge of the Project site at Turkey Flat Road and ending at the southern edge of the Project site, near Hwy 41 (Figure 1). Biologists walked from the vehicle parked alongside the main road to access many parts of the BSA such as rocky outcroppings and riparian areas. During the assessment, survey biologists used an aerial map highlighting areas of rocky outcrops, trees, and buildings to target potential bat roosting habitat in the BSA and within 200 feet of the BSA. All rocky outcrops identified on the aerial map were evaluated for their height, overhanging features, and examined for the quality of cracks and fissures that could potentially support roosting bats by walking and visually inspecting these areas. All trees within the Project Area were assessed by an unpublished evaluation system developed by Dr. Johnston that assigns a number from 0 to 3 based on the probability of bats roosting in a given tree. A score of 0 designates no probability of bats roosting in a tree, a score of 1 designates a very low probability, a score of 2 designates a possible but unlikely probability, and a score of 3 designates potentially occupied bat roosting habitat. Only scores of 3 for trees within the PIA were recorded. Trees outside the PIA were not evaluated individually because these trees will not be removed or cut. Rather, these areas (e.g., the riparian habitat) were evaluated only generally. In addition to rocky outcrops and trees, an abandoned granary building and several riparian areas with mature trees and snags were also examined by walking and visually inspecting these areas for the presence of cavities or gaps and guano (granary), and exfoliating bark or cavities (trees). Any tree, within the PIA that scored a 3 or any riparian area or rocky habitat within the entire BSA that showed bat sign or the potential for bat roosting habitat was acoustically surveyed for further information on bat use and species distribution.

2.2 Acoustic Survey

Based on the initial assessment of the site, the bat biologists set out five Song Meter SM2 BAT bat detectors (Song Meter) (Wildlife Acoustics Inc., Concord, MA, USA); one each at five locations in the BSA, to monitor for bat activity (Figure 3). Bat detectors can record ultrasonic vocalizations (echolocation) of bats and convert them to frequencies detectable to humans. These vocalizations can be heard and recorded as digitized sonograms and made available for visual inspection and species identification. The sites selected for acoustic surveys comprise two rocky outcrops, the granary, a riparian area with a perennial stream and mature cottonwoods, and a stock pond. The detectors were set to record acoustic data from sunset to sunrise during the period of 16–24 October 2013.

For the data analysis the .wac2wav converter was used to convert raw .wac files to .wav format. Because a large number of files are produced during this conversion, it was necessary to reconvert the files into zero-cross files, which can be analyzed and processed more quickly. All zero-cross files were visually examined one by one as sonograms on the computer screen to ensure that they contained bat calls, and activity levels were summed using the Count Labels tool in AnaLook, v.3.9c (Corben 2011). Finally, the .txt file outputs of the acoustic recordings were imported from AnaLook into Excel, and examined for temporal and spatial activity patterns that would indicate the presence of maternity colonies in the area.

Where possible, all calls were identified to species. However unlike bird vocalizations, bat vocalizations do not function as a species marker, but rather function as a means of orientation and prey detection (Barclay 1999). Therefore, while some bat species may have distinct call characteristics and can be readily identified, other species will produce similar vocalizations when they occupy similar niches or consume similar prey (Barclay 1999). Five of the thirteen possible species that could occur in the Project vicinity have distinct call parameters, and are easily identifiable; the Townsend's big-eared bat, western red bat, western mastiff bat, fringed myotis, and canyon bat. Townsend's big-eared bat, frequently referred to as a whispering bat because of its low-intensity calls, likely occurs in the Project vicinity but is frequently missed by bat detectors.



H. T. HARVEY & ASSOCIATES
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Figure 3: Bat Detector Locations

California Flats Solar Project, California (3308-01)

November 2013

Eight species that could occur in the Project vicinity are difficult to distinguish because they have similar call characteristics (call frequency, shape, duration, and intervals between calls). These species were grouped into 20-, 30-, 40-, and 50-kHz groups, based on their minimum frequencies (Table 2). For ease of interpretation, frequency groups will be referred to as follows: hoary/Mexican free-tailed bats (20-kHz bats), pallid/big brown bats (30 kHz), small-footed/long-legged bats (40 kHz), and California/Yuma myotis bats (50 kHz).

Table 2. Bat Species with Similar Call Characteristics that Could Occur on the Project Site

Scientific Name	Common Name	Frequency Group
Tadarida brasiliensis mexicanus	Mexican free-tailed bat	20 kHz
Lasiurus cinereus	Hoary bat	
Antrozous pallidus	Pallid bat	30 kHz
Eptesicus fuscus	Big brown bat	
Myotis ciliolabrum	Western small-footed bat	40 kHz
Myotis volans	Long-legged myotis	
Myotis californicus	California myotis	50 kHz
Myotis yumanensis	Yuma myotis	

Finally, the .txt file outputs of the acoustic recordings were imported from AnaLook into Excel, and examined for temporal and spatial activity patterns that would suggest the presence of maternity colonies in the area.

Section 3.0 Results

3.1 Initial Habitat and Tree Assessment

The bat habitat assessment determined that low- to moderate-quality roosting habitat (rocky outcrops with crevices, deciduous trees and snags with cavities and exfoliating bark), and a few anthropogenic structures that have cave-like areas like attics, is present on the BSA for mostly solitary-roosting bats or small congregations of bats. Three rocky outcrop areas include crevices that could potentially provide day roosting habitat for solitary pallid bats and canyon bats although none of these appeared large enough to support maternity colonies of either species. Many trees within the riparian areas included cavities and exfoliating bark that would support roosting bats including small maternity roosts of pallid bats. The western red bat is expected to roost in the foliage of riparian trees during spring and fall migratory periods, but is not expected to breed (raise young) in the BSA. Cavernous roosting habitat occurs in a very few areas of the BSA where structures provide potential habitat for the Townsend's big-eared bats. This species may occasionally occur as dispersed males, particularly in the winter, in buildings within the BSA. No western mastiff bat roosting habitat occurs in the BSA, and no roosting habitat for any species of bats occurs within the PIA; however, pallid bats are expected to roost in small numbers in larger trees occurring in the riparian areas and as individuals in the crevices of rocky outcrops.

3.2 Acoustic Survey

It is not unusual for bat detectors to occasionally fail; when it happens, it is important to indicate the time periods during which such failures occur. During this study, the Song Meter placed at the pond failed to record any data, because the power switch slipped from internal power to external power after deployment, so the unit was not properly energized. Likewise, the Song Meter at the granary recorded for only the first three nights of the eight-night survey, and the Song Meter at the riparian site only recorded for the first four nights. When the unit was retrieved, the charge appeared sufficient and the data card was not full, so the reason for this detector's failure to record for the remaining five nights is unknown. Otherwise, all other detectors worked for the entire time period of the survey.

Recorded bat activity levels ranged from 0 to 60 minutes of activity per hour at all four sites where data were successfully collected. Among sites, all activity tended to occur at the beginning of the night, although the total level of activity varied substantially (Figure 4).

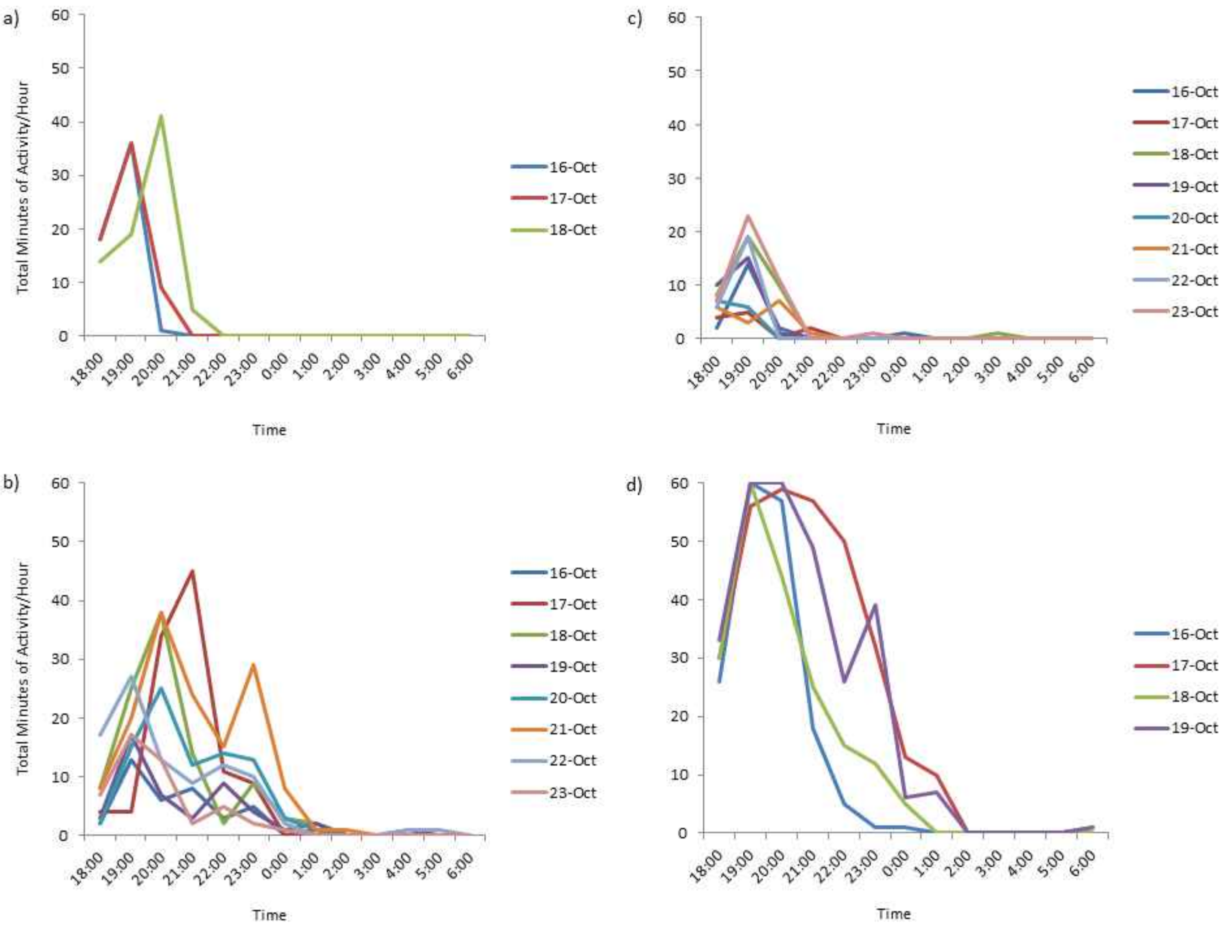

Figure 4. Total Minutes of Bat Activity per Hour by Site. Sites represented are as follows: a) the granary, b) the southern outcrop, c) the western outcrop, and d) the riparian area. Only nights with complete recordings are presented here.

The average minutes of activity per site per hour ranged from 1.8 minutes at the western outcrop to 18.2 minutes at the southern outcrop (Figure 5). Although only four nights of data were collected at the riparian site, this site showed the most activity in the early evening hours, and this activity was sustained over the evening, as would be expected in an area supporting aquatic foraging habitat. The general pattern of activity at all sites demonstrated a strong pulse of activity early in the evening that gradually tapered off until the following morning. There were no pulses of activity in the early morning hours at any of the sites, but rather very low levels of activity. There was no activity at the granary past 11 PM on any of the three nights during which data were collected. Because high activity levels were generally absent in the early morning hours, it is presumed that there are no large (> 75 individuals), sensitive colonial roosts in the BSA. Bats are generally most active in the early evening after sunset and then in the early morning before sunrise (Hayes 1997). Peaks in bat activity in early morning hours generally indicate final foraging and commuting before returning to day roosts (Kunz 1974), and if placed in proximity to a potentially suitable roost site, a bat detector may also detect the presence of a bat roost.

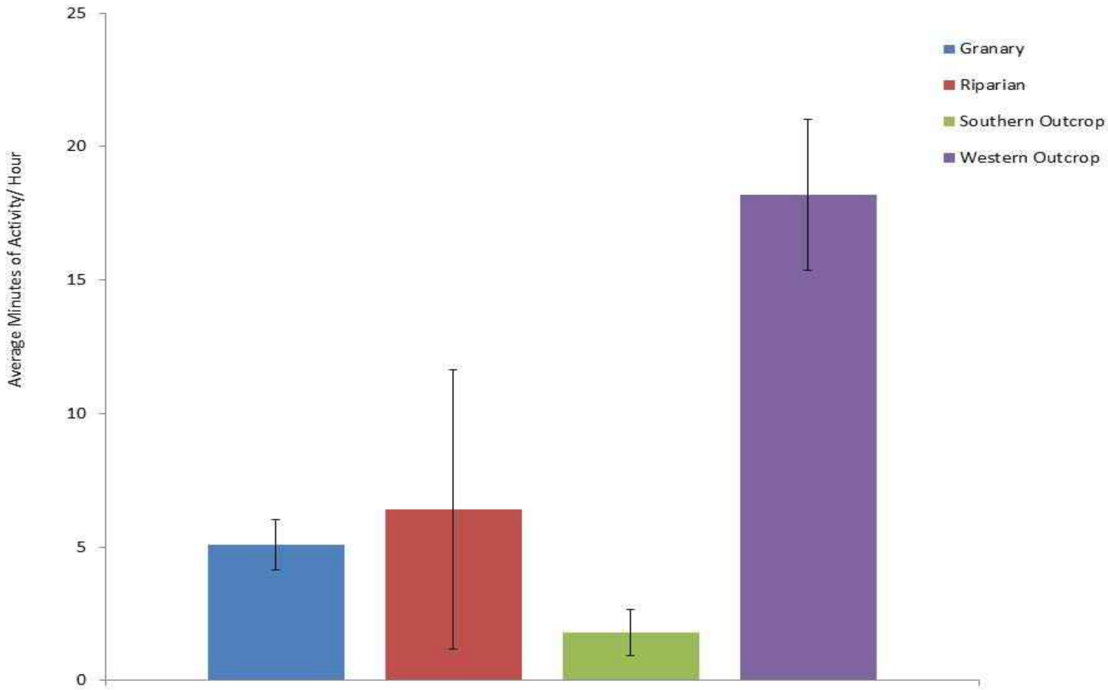

Figure 5. Average Minutes of Bat Activity per Hour at Each of Four Sites. Error bars represent one standard deviation.

The species identified through acoustic analysis varied across the surveyed sites. At the granary site, the dominate frequency group detected was California/Yuma myotis bats. Because Yuma myotis are considered riparian obligates that forage primarily over flat water, nearly all, if not all, of the 50-kHz bats recorded at the granary were likely California myotis, not Yuma myotis. At the other three sites, there was considerably more species richness. At the southern outcrop, we detected hoary/Mexican free-tailed bats, small-footed/long-legged bats, and canyon bats. At the western outcrop, we detected canyon bats as well as all four of the broader frequency groups (Table 2). All frequency groups were also detected in the riparian area. Given the known presence of pallid bats in the region and the high-quality foraging habitat for the pallid bat in the BSA, this sensitive species is presumed to be among the 30-kHz bats detected.

The PIA does not support roosting habitat for bats, and the BSA contains no high-quality roosting habitat in rocks, such as vertical or horizontal crevices on large or small rocky cliff faces (Miller and Jensen 2013), that could support a large maternity colony of pallid bats or other cliff-roosting bats. Additionally, no signs of pallid bat or any other bat roosts were detected in any of the areas inspected during the assessment. There were numerous small cracks, fissures, and crevices in the rocky outcrop areas that could support solitary-roosting species or small congregations (two or three individuals) of pallid bats. However, these areas are not considered to have strong potential to support any of the other potentially occurring special-status bats (Townsend's big-eared bat or western mastiff bat). The riparian areas support broadleaf trees such as sycamore (*Platanus occidentalis*), which could provide suitable roosting habitat for western red bat and small maternity colonies of the pallid bat. However, western red bats were not detected during acoustic surveys, and any maternity colony of pallid bats occurring in the riparian area would not be directly affected by the PIA. Finally, the granary building could support roosting bats, but no bat sign was detected that suggested that bats roost at this site.

Section 4.0 Discussion

Four species of special-status bats are expected to occur in the BSA; however, no roosting habitat occurs within the PIA. Although pallid bats were likely detected during acoustic surveys, and they have been documented in the region, potential roosting habitat observed on the PIA is not expected to provide habitat for moderate to large colonies. Numerous smaller cracks and crevices were observed in the rocky outcrop habitat; these are likely suitable for only individual pallid bats or small congregations (i.e., two or three individuals). Although solitary roosting bats or small congregations of bats may roost in these outcrop areas or roost as small maternity colonies in large riparian trees, these habitats are located outside the PIA, and would not be directed affected by the proposed activities. No roosting habitat occurs within the BSA for the western mastiff bat and the western red bat is expected to only winter or migrate through the BSA and then only within the small riparian area. Further, the Townsend's big-eared bat is considered mostly extirpated from the region but dispersed solitary males may occur occasionally occur in unused attics or other cavernous habitats within the BSA.

The granary was the only building within the PIA considered to potentially support roosting bats. However, because very little activity was detected at this site, the low activity levels suggest few if any bats roosted at this location.

The habitat assessment and acoustic surveys were conducted just after the high-activity season for bats (May through September). Data collection during the high-activity season is optimal for making a complete assessment of activity levels. Nevertheless, given the absence of high-quality roosting habitat and the fact that roosting habitats occur outside the PIA, direct impacts on roosting bats are not expected to result from the Project.

On a landscape scale, the addition of solar arrays to an area that previously had minimal structural attributes may affect bat activity in several ways. Bats are known to commute and forage along linear landscape elements (Verboom and Huitema 1997). At clearly demarcated edges, such as forest-field interfaces in early stages of succession, all bat species have been shown to increase their activity (Jantzen and Fenton 2013). If panels are stored at an angle at night, operation the Project may cause insects to gather in higher concentrations at the edges of the arrays, particularly at the leeward edges on windy nights (Morris et al. 2010); such concentrations of prey would attract bats to these edges. However, because solar panels do not, in most circumstances, extend to the ground, the effect of the edges may be somewhat weaker than that of well-studied edges, such as forests and hedgerows. Although limited, bat activity levels at solar photovoltaic plants suggest that some bats (e.g., canyon bats) may increase their activity in solar arrays while other species (e.g., pallid bats) may decrease their activity in solar arrays (H. T. Harvey & Associates 2013), but results are somewhat inconclusive, to date.

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Persons Contacted:

Robert Stafford. (Pers. Comm.) 11 June 2011. California Department of Fish and Wildlife, 20 Lower Ragsdale Road, Monterey, CA 93940.

Appendix F

Avian and Bat Fatality Monitoring Plan

Avian and Bat Fatality Monitoring Plan
California Flats Solar Project
Monterey County, California

Prepared for:

California Flats Solar, LLC

135 Main Street, 6th Floor
San Francisco, CA 94105

Prepared by:

Western EcoSystems Technology, Inc.

415 West 17th Street, Suite 200
Cheyenne, Wyoming 82001

April 3, 2017

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STUDY PARTICIPANTS

Western EcoSystems Technology

Todd Mattson	Project Manager
Daniel Riser-Espinoza	Statistician

REPORT REFERENCE

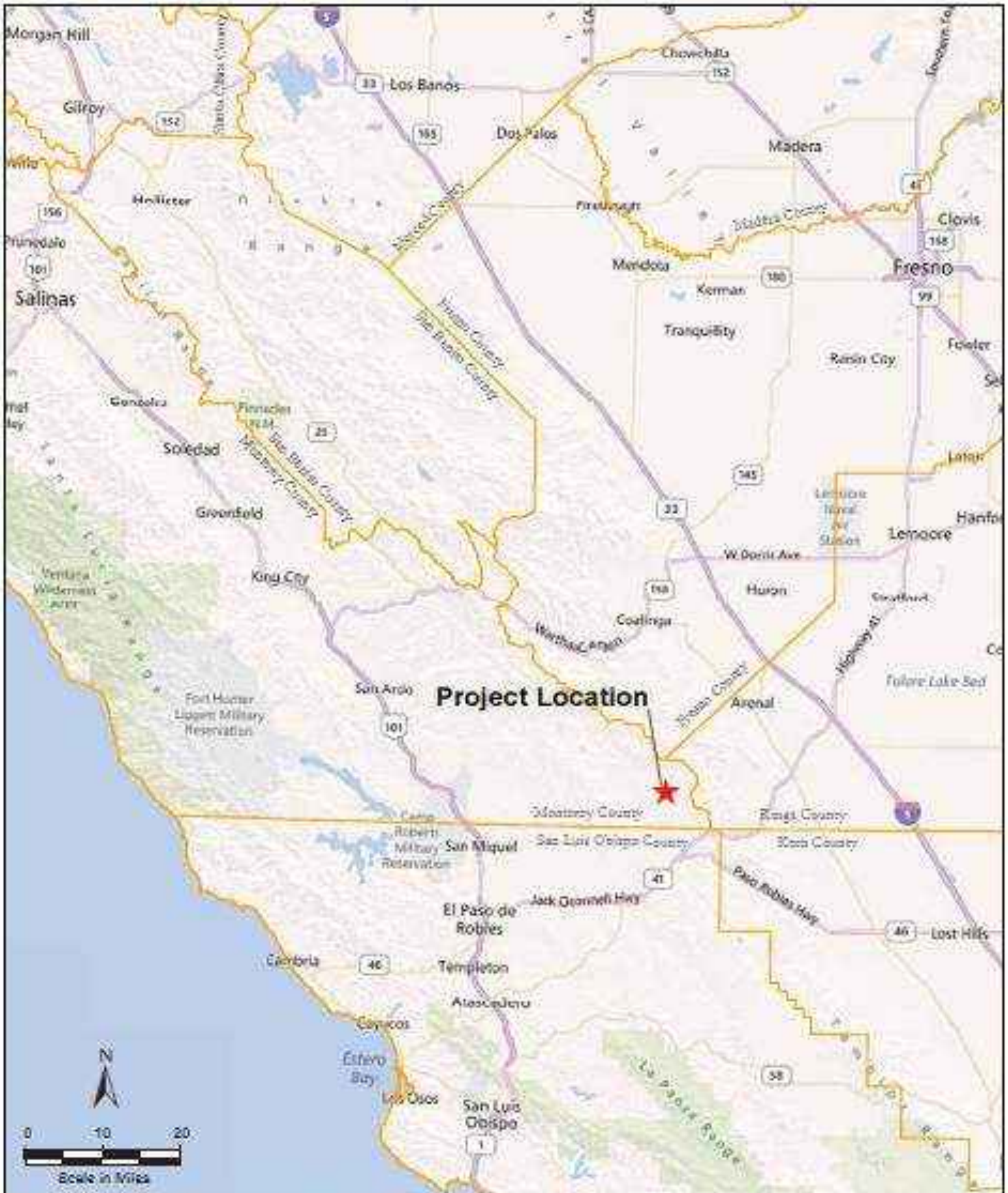
Western EcoSystems Technology, Inc. (WEST). 2016. Avian and Bat Fatality Monitoring Plan for the California Flats Solar Project, Monterey County, California. Prepared for California Flats Solar, LLC, San Francisco, CA. Prepared by WEST, Cheyenne, Wyoming.

1.0 INTRODUCTION

California Flats Solar, LLC (California Flats) proposes to construct and operate a 280-megawatt (MW) photovoltaic (PV) solar generating facility referred to as the California Flats Solar Project (Project) in southeastern Monterey County, California (see Figure 1). When approved, the solar facility and related operations infrastructure will be built on approximately 2,720 acres (1,101 hectares) of a 72,000-acre (29,137-hectare) working cattle ranch.

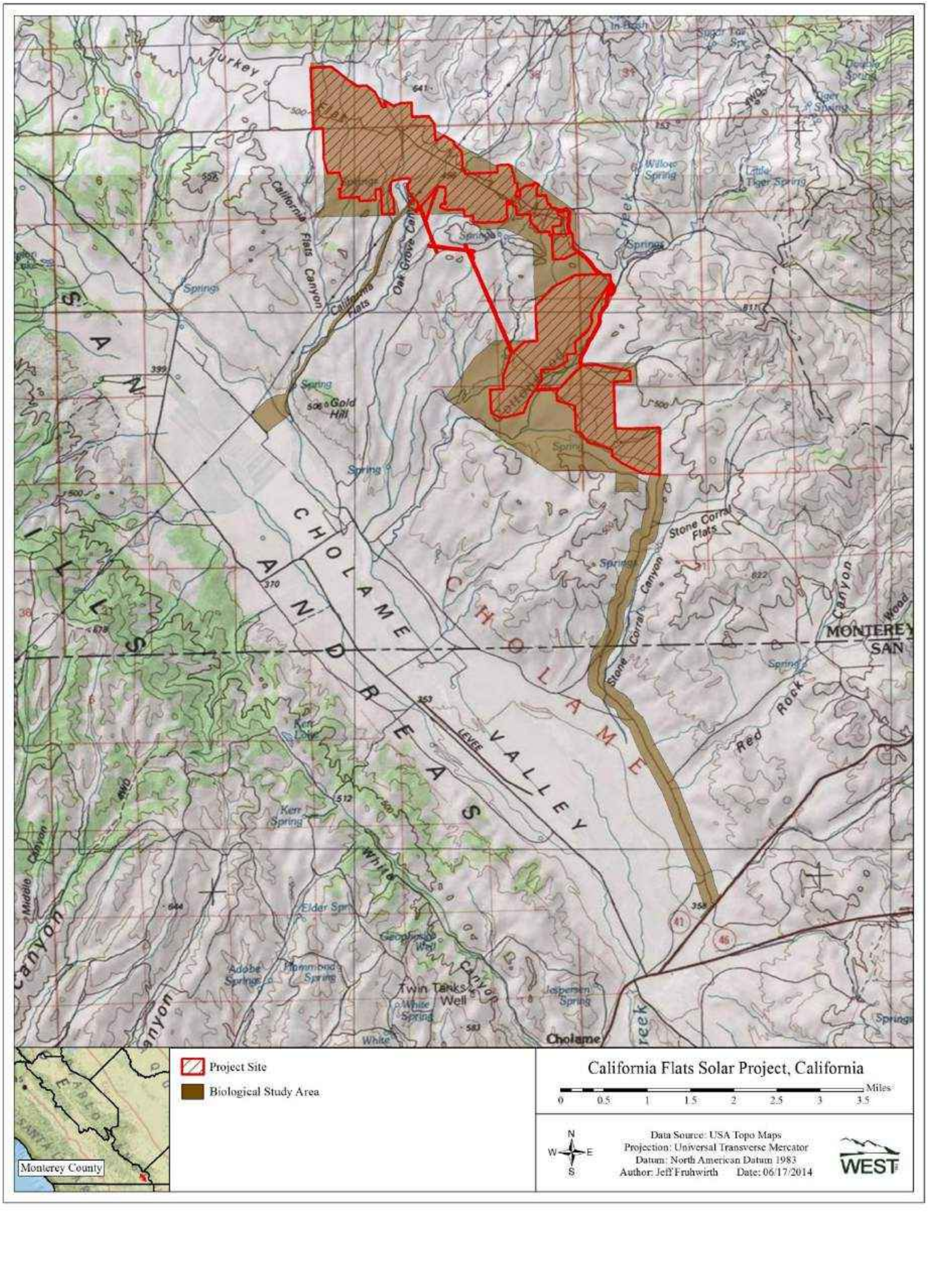
This Avian and Bat Fatality Monitoring Plan (hereafter referred to as the "Plan") establishes search protocols to monitor avian and bat fatalities at the site following construction, and establishes analytic methods to estimate post-construction fatality rates associated with the PV array field, perimeter fence, and interconnection line. Specifically, the Plan outlines a statistically sound yet reasonable spatial and temporal sampling plan, including protocols for establishing corrections for detection biases associated with estimating fatality rates, including searcher-efficiency and scavenger removal biases. The Plan includes a provision to review the data after one and two years, and to adjust the monitoring design as appropriate. It describes specific data to collect during scheduled carcass searches, protocols to address any injured birds that are found, and procedures for reporting incidents involving federally or state-listed species to US Fish and Wildlife Service or California Department of Fish and Wildlife, as appropriate.

Figure 1. Vicinity map for the proposed California Flats Solar Facility



Base map source: Denise Duffy and Associates, 2012.

Figure 2. California Flats Solar Facility location detail.



1.1 Goals and Objectives

The goal of this Plan is to provide data and analysis that will assess the level of bird and bat fatalities within the PV array field over a two-year period.

The specific objectives of this Plan are as follows:

1. Conduct fatality searches for two years after construction is complete according to a spatial and temporal sampling plan that provides representative and statistically sound coverage of the solar array field, overhead interconnection lines, perimeter fences, and other features of the Project that may result in injury and fatality. Monitoring after the second year is contingent on a review of the results to date.
2. Conduct statistically sound assessments to quantify and evaluate carcass removal rates (i.e., carcass removal, destruction, or burial in sand due to scavengers, decay, or other abiotic [e.g., wind] or human [e.g., vehicle activity] factors) and support calculation of adjusted fatality rates that account for variation in carcass removal rates by carcass type/size classes.
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.

2.0 MONITORING METHODS

2.1 Post-construction Monitoring

The fundamental components of a sampling program designed to produce valid estimates of fatality rates for a solar facility include sampling methods, spatial sample coverage, temporal sample coverage, adjustment of counts for search efficiency, adjustment of counts for carcass removal, and selection of an appropriate statistical fatality estimator.

The following hierarchical terminology is useful for describing the spatial and temporal sampling design outlined here:

1) **PV module:** the basic unit of a photovoltaic solar facility consisting of a semiconductor material sandwiched between two layers of glass and measuring about 0.6 m by 1.2 m (2 feet by 4 feet)
2) **Row:** A collection of PV modules that are mounted on long steel and aluminum support structures in a horizontal “table” device that may be fixed, or that may track the sun (i.e., “fixed-tilt” system and/or “single-axis” horizontal tracking system).
3) **Array:** A collection of rows treated as one electrical system. The whole solar facility will comprise multiple arrays, which is described as the array field.
4) **PV Array Field:** The collection of all of the arrays that comprise the solar facility.

2.1.1 Sampling methods

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 modules are close together (i.e., less than five m [16 ft] at the Project). Because the modules 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 module; the other side of the transect would need to be searched in the evening when the modules were in a different position. However, traveling perpendicular to module rows along the edges of the rows allows observers to see a greater distance of the ground beneath the modules. Surveyors will walk or drive the rows in vehicles. Should driving surveys be used, searcher efficiency trials will be conducted prior to implementation; results will be reviewed within two weeks of completion of the trials to determine if conducting surveys using vehicles provides an acceptable level of searcher efficiency. 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 typically 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). 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 searcher efficiency based on the carcass data. Carcass persistence bias will be addressed by carcass persistence trials as described below.

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 may entail walking parallel to rows of modules, searching the ground between and beneath modules.

2.1.2 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 medium and large-bird fatality.

Observers will survey sampling units by driving or walking along the outer perimeter of rows and scanning between each row for fatalities. Observers will carry binoculars, which they will use at their discretion to help identify objects that may be carcasses. The walking surveys will occur along roadways that run perpendicular to the rows, to facilitate scanning between rows. In general, survey routes will be set up so that searchers are facing west (fixed tilt rows) or north (tracker rows) to minimize the degradation of searcher efficiency due to the sun (Figure 3). The perimeter-only survey design reflects two concerns:

1) Minimizing movement between rows of solar modules, because the area between electrified module rows is an area of elevated risk and best practices are to avoid sending personnel into elevated risk zones unnecessarily; and
2) Achieving an effective balance between logistic efficiency and sampling rigor.

In support of the latter objective, a field trial was conducted at another California solar facility (Desert Sunlight) to evaluate the ability of observers to detect carcasses of different types and sizes based on perimeter-only surveys (H.T. Harvey and Associates 2013). The surveys involved walking along edges of arrays perpendicular to the rows of modules and using naked-eye and binocular-aided scanning to search for placed carcasses of five non-native bird species, ranging in size from small house sparrows (*Passer domesticus*) to large ring-necked pheasants (*Phasianus colchicus*). Results showed that effective sampling for medium and larger birds could be expected to extend to 140 m, and for smaller birds or bats, effective sampling could extend to at least 35 m. Visibility at the Desert Sunlight facility was relatively high during the first year of monitoring, with detection of small birds extending to 70 m, and high detection of medium and large birds out to 140 m.

Based on data collected from previous studies at PV solar facilities, recommendations provided in Huso et. al (2016b), consultation with relevant permitting and wildlife agencies, and the characteristics of this particular Project, sampling will encompass approximately 40% of the completed solar arrays using a 140 m viewshed for distance sampling surveys; the exact sampling proportion and size of the viewshed will be determined once ground conditions and the array layout can be evaluated in full. Samples will be selected in a stratified random design to ensure a spatially balanced sampling design and an approximately 40% sample of the array field.

2.1.3 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 and waterbirds/waterfowl 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. Carcass persistence times may vary substantially depending on the habitat, the types of scavengers present, climatic conditions, the season, and the number of carcasses typically present on the landscape (Smallwood 2007, 2013).

The search interval for fatality monitoring ideally should not be more than twice the median persistence time for a carcass. Huso et al. (2016b) suggest, as an initial target, selecting a search interval that will enable at least 50% of carcasses to persist through a standard search interval. Comparative analyses have demonstrated, however, that biases can be limited by using different analytical methods to estimate fatality rates corrected for searcher efficiency and carcass persistence, depending on whether the search interval is shorter or longer than the average carcass-persistence time (Huso 2010, 2012; Korner-Nievergelt et al. 2011; Strickland et al. 2011).

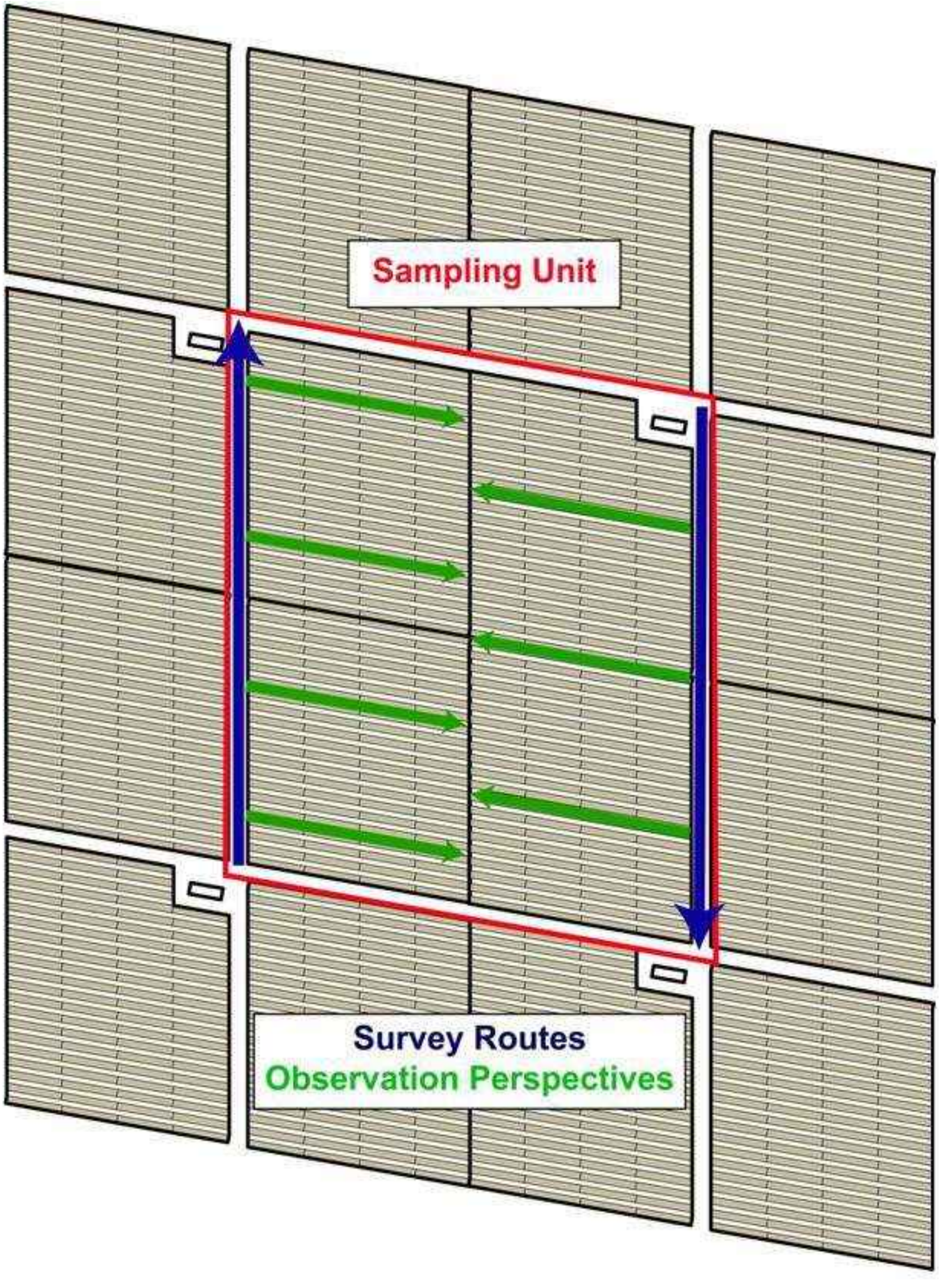


Figure 3. Illustration of a typical sampling unit and perimeter survey with travel routes and search areas ('observation perspectives').

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, 2012). The benefit of the variable search interval approach is the ability to concentrate effort during seasons of interest or higher risk, when it is desirable to obtain higher precision in 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 will be developed and followed, such that some surveys occur on each day of the standard workweek and all sampling units are surveyed on a regular schedule, as dictated by the season.

Based on these considerations, the search interval for fatality monitoring will be variable depending on season (Table 1). Searches will be conducted every 7 days during spring and fall migration (March 1 – May 31, and September 1 – October 31), and every 21 days during summer and winter (June 1 to August 31, and November 1 to February 28/29). The initial search intervals are consistent with other, completed or ongoing fatality monitoring studies at PV solar projects in California (e.g. Desert Sunlight, Blythe, etc.). After evaluating the first 6 months of fatality monitoring and concurrent carcass persistence trials (see below), the search interval may be adjusted based on estimates of carcass persistence.

Table 1. Solar array field and sampling area characteristics.

Total area	858 ha
Proportion sampled	40%
Sampling unit	~5.7 to 6.8-ha array
Number of sampling units (whole facility)	76 (~25 fixed, 51 tracker)
Migration season search interval (March thru May, September thru October)	7 days
Non-migration season search interval (June thru August, November 1 through Feb)	21 days
Surveys per year	~30

2.1.4 Survey and Data Collection Protocols

Fatality surveys will be conducted on foot or by vehicle, 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 modules. Surveyors will never be far from a vehicle and will be encouraged to take breaks. Additionally, the Project has rigorous safety protocols that address heat 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 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 Special Purpose Utility (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 Monitoring Team 2007, CEC and CDFG 2007), which dictate that when only feathers are found, to be classified as a fatality, each find must include a feather spot of at least five tail feathers or two primaries within 5 m (16.4 ft) or less of each other, or a total of 10 feathers. Searchers will make their best attempt to classify feather spots by 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, and when possible, plausible cause of death will be indicated on data sheets based on evidence (such as blood or fecal smears on solar modules, 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).

All fatalities will be assigned to a size class, a taxonomic family, and an ecological guild according to Appendix A. Carcasses from species that are nonresident and are night-migrants will be considered night-time fatalities; and those that are nonresident and day-migrants will be considered day-time fatalities. Residents and species known to migrate both at night and during the day will be classified as uncertain with respect to likely time of death. It is necessary to know size classes to appropriately correct for searcher efficiency and scavenging, and information about taxonomic family, ecological guild, and time of day when active are relevant to the specific USFWS and project goals of the monitoring plan.

To ensure accurate delineation of the fatality locations, the observer will record Global Positioning System (GPS) coordinates at the site of the fatality, using a handheld device accurate to ± 3 to 4 m (9.8 to 13.1 ft), and a measurement of the distance from the fatality location to the end of the module row from which the carcass was detected. When an observer proceeds down module rows to confirm and document detected fatalities, they may detect other fatalities that they did not observe based on the perimeter-only survey. These “secondary” detections will be processed and included in the record of fatalities as well.

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.

All personnel involved in implementing this Plan will be covered 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 zip-locked plastic bags, clearly label each bag with the incident number, and deliver the bags for storage in the designated freezer at the Project facility.

2.1.5 Fence Line Monitoring

The perimeter fence is subject to inspections approximately once every 7 days during spring and fall migration, and approximately once every 21 days during winter and summer periods. A searcher will drive the entire inner perimeter of the fence, scanning for fatalities within an approximate 6-m strip transect centered on the fence. Travel speed will be no greater than 5 miles per hour (8 kilometers per hour) 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. 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 in a similar fashion to the trials at the solar arrays. Carcass removal trials conducted at solar arrays will include areas near the inside of the fence as well.

2.1.6 Interconnection Line Monitoring

The aboveground interconnection line will be built to APLIC (2005, 2006, 2012) guidelines; as such potential risk of avian fatalities due to this line has been minimized. However, a 50% sample of the overhead interconnection line will be monitored every seven days during spring and fall migration and approximately every 21 days during summer and winter. Searchers will drive or walk 50% of the interconnection line during each visit, scanning for birds within 15 m from the line. Injuries and fatalities along the interconnection 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.

Some overhead electrical feeder and distribution power lines may also be 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, but excluded from adjusted fatality estimates attributed to PV arrays.

2.1.7 Clearance Surveys

Depending on when fatality surveys commence, a one-time clearance survey will be conducted beginning approximately 21 days before the first round of official surveys begins in all areas planned for survey (fenceline, interconnection line sample areas and solar arrays). 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 will cause an upward (conservative) bias in the fatality estimate.

2.1.8 Incidental and Secondary Detections

Bird and bat carcasses that are discovered incidentally will be documented and reported under the First Solar Wildlife Incident Reporting System procedures (Appendix A). Incidental discoveries in sampled areas of the facility will be included in the analysis, assuming the detection would have been available on the next scheduled search. The inclusion of these detections may add positive bias to the overall fatality estimates and thus result in a conservative estimate of fatalities. Similarly, “secondary” detections present a challenge. A “secondary” detection is one incidentally made while in transit to process a primary detection (described in Section 2.1.4). “Secondary” detections may be obscured by a shadow, project infrastructure, or vegetative cover. Including such “secondary” detections in the fatality estimate does confound estimation of fatalities, particularly when using a distance-sampling approach; however, this type of detection can be included in the carcass counts used to estimate fatality rates, with the caveat that it may result in positive bias, and thus results in a conservative estimate of fatalities. Therefore, all secondary detections will be included in final fatality estimates, assuming these detections meet all other criteria for being included in the estimation process (e.g., time of death occurred within the search interval).

Surveyors will record any injured or rescued birds and bats found during the surveys. Observers will immediately report injured birds and bats to the nearest permitted rehabilitation facility for rescue and proper care. Waterbirds that are stranded and unable to take off but otherwise uninjured will be immediately reported to the nearest permitted rehabilitation facility for rescue. 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 and bat species (respectively) are:

- Pacific Wildlife Care, Morro Bay, CA; (805) 543-9453

If a surveyor discovers a dead individual of a species that is fully protected by the state or federally or state-listed as threatened or endangered, he/she will collect data and photos as for any other fatality. If it is a federally or state-listed species, the surveyor will within 24 hours contact a USFWS or CDFW office (as applicable) to determine the appropriate follow-up action.

2.1.9 Searcher-Efficiency

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 will be conducted to augment survey data and to help assess and adjust for potential spatial bias in the distribution of fatalities.

A 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 quarterly (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), module type (fixed and tracker), 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. To ensure reasonable mathematical integrity and statistical power, the software package developed by Huso et al. (2012) for estimating wind-energy-related fatalities requires a minimum of 10 bias-trial samples for each covariate-group analyzed. If there was no substantive variation in habitat/substrate cover within the Solar Farm, this requirement would translate a minimum need to place at least 10 small, 10 medium, and 10 large birds as test specimens among each array type (fixed and tracker) during each seasonal period, for a total of 40 carcasses per size class per year. 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, greater sample sizes will help to account for variation in habitat visibility. Thus, a minimum of 50 searcher efficiency trials carcasses (25 small birds, 15 medium birds, and 10 large birds) per season is anticipated within solar array areas, and a minimum of 35 trials carcasses (15 small birds, 10 medium birds, and 10 large birds) per season is anticipated within each of the fence line and overhead line sampling areas. If different visibility strata exist within any of the sampling areas (e.g., arrays, fence, overhead line), additional trails may be needed to account for multiple visibility classes.

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 and module class, and at similar repeated levels if testing in different habitat visibility classes is required.

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 trails; 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. All trial carcasses will be obtained and deployed in accordance with state and federal regulations.

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 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 14-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, habitat visibility classes, and, where relevant, 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 occur sporadically throughout the year (appropriately organized to provide season-specific estimates, if required), with few specimens placed at any one time. Carcasses will be placed carefully to minimize disturbance of substrates that may bias carcass detection.

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 between rows of modules, under modules, near i-beams supporting the modules, or in the open. Therefore, carcasses will be tossed towards the designated, randomly chosen placement spot from a distance of one to two m. 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 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.

2.1.10 Carcass Persistence Assessments

The degree to which carcasses persist on the landscape depends on a variety of factors reflecting seasonal and inter-annual 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. The scavenger community may also vary substantially from year to year because of variation in annual reproduction and survival related to changes in landscape condition. Seasonally and annually 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 typically are assessed on a quarterly or at least semi-annual basis during each year that fatality surveys are conducted (CEC and CDFG 2007, USFWS 2012, Smallwood 2013). 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 rates, a minimum of 30 small, 20 medium, and 10 large birds will be randomly placed and monitored throughout the fenced array areas each quarter; placements will include trials among arrays and along fence lines. The carcasses will be monitored, using motion-triggered, digital game cameras (e.g., see Smallwood et al. 2010), for 30 days or until the carcass has been removed to the point where it would no longer qualify as a documentable fatality. Fake cameras or cameras without bias trial carcasses may 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 Solar Farm, not just in areas subject to standard surveys, and new specimens will be placed every two to three weeks in small numbers.

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, specimens used will be strictly limited to species known to occur in the area or that are substantially similar to such species. Surrogates, such as game birds and domestic waterfowl, will not be used unless required by permit restrictions, because the scavenging rates for these birds are known to be artificially high (Smallwood 2007, 2013).

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 a small piece of green electrical tape wrapped around a leg 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 unscavenged 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 (at least five tail feathers or two primaries within 5 m (16.4 ft) or less of each other, or a total of 10 feathers)

Removed: Not enough remains to be considered a fatality during standard surveys, as defined above

2.1.11 Estimating Adjusted Fatality Rates

The sampling design will enable calculation of fatality estimates adjusted for searcher-efficiency, carcass persistence 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.

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. It is instructive to briefly review the history of methodologies applied in the context of renewable-energy studies, relevant insights about important factors to consider, and example formulations that will be applicable. It is also important to recognize that developing methods for conducting fatality surveys and associated bias trials, and for deriving accurate, adjusted, facility-wide fatality estimates is an actively evolving science. Accordingly, the analytical methods ultimately applied in this investigation may evolve over time to ensure application of the most current, rigorous and scientifically sound methods.

For illustrative purposes, we summarize here a modification of the Huso estimator that accommodates distance sampling. The Huso estimator is currently the best-suited estimator for the proposed study design, but it should be noted that fatality estimation is an area of active research and 'best methods' are changing rapidly.

The model is formulated in terms of 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.

Additionally, there is bias in the Huso estimator if carcasses that are not detected during a survey are still available during subsequent surveys (Huso et. al 2016a). 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 be reliably aged will be assumed fresh; which may result in an upward (conservative) bias in the fatality estimate.

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. For simplicity, we drop the notation for stratum, understanding that the following applies to each stratum.

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 using techniques for analyzing distance sampling data (Buckland et al. 1993). These techniques can be applied to the combined data from actual fatalities and bias-trial carcasses. Without going into detail, detection (*d*) is estimated from the carcass data as a function of distance, (*x*):

$$\widehat{d} = \hat{f}(x)$$

and the overall probability of detection is the average value of the detection function between 0 (carcasses on the transect line) and some distance, *w*, which is the width of the search area (the width of an array row, or the distance at which detection falls below some threshold, typically about 0.1):

$$\hat{p} = \frac{\int_0^w \hat{f}(x)\, dx}{w}$$

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 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:

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

where $\hat{F}_{ij}$ is the number of fatalities on plot *i* in search interval *j*, and *a* is the proportion of sample units that was searched. The total number of searched sample units is *n*, and the 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 Solar Facility will be expressed per MW of nameplate capacity per year.

2.1.12 Minimum credentials of monitoring personnel or appropriate training

All personnel conducting monitoring will be given practical training in distance sampling search methodology, appropriate documentation of carcasses, notification of a rehabilitation center in the event of injured or stranded birds, and setup and maintenance of carcass removal bias trial carcasses and cameras.

3.0 REPORTING

California Flats will maintain an internal database and tracking system in which to organize information derived from this monitoring program. This internal database will be designed to provide comprehensive tracking of survey effort, details of documented injuries and fatalities, and any relevant actions/responses taken to rectify or mitigate documented issues.

After the second quarter of monitoring, California Flats or its consultants will prepare and submit to the U.S. Fish and Wildlife Service an interim report that will summarize the dates, durations, and results of all fatality monitoring conducted to date. The intention of the interim report is to provide an initial data summary of one migration and one non-migration season of fatality monitoring, and evaluate the need for any changes in the monitoring protocol prior to beginning the following year of monitoring. After the fourth quarter of monitoring, California Flats or its consultants will prepare and submit a final, annual report. The annual report will analyze any Project-related bird and bat fatalities or injuries detected; and provide context for the findings in the form of fatality rates at similar PV solar facilities or suitable reference sites. To address the specific objectives of the monitoring plan, data summaries will include overall fatality estimates with confidence intervals. Specific study plan modifications or requirements for a second year of monitoring will be contingent on an evaluation of the results from the first year.

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Appendix A:

First Solar
WILDLIFE INCIDENT REPORTING SYSTEM (WIRS)

First Solar
WILDLIFE INCIDENT REPORTING SYSTEM (WIRS)

BACKGROUND AND INTRODUCTION

First Solar has voluntarily implemented a wildlife incident response and reporting system for all their solar facilities. This system is being implemented for the purpose of providing long-term monitoring data for First Solar's fleet of projects. Information. First Solar will record and report all dead and injured wildlife including but not limited to birds found incidentally in the project areas over the entire life of the project as part of the project operations and monitoring efforts. The purpose of this Wildlife Incident Reporting System (WIRS) is to standardize the actions taken by site personnel in response to wildlife incidents found within project boundaries. The WIRS provides direction for site personnel who may encounter a wildlife incident in an effort to fulfill obligations in reporting wildlife incidents. Wildlife fatalities or injuries found by project personnel or others will be reported and processed following the protocols described in this document.

First Solar WIRS POLICY

This WIRS will be active for the life of the solar projects. All employees, contractors and subcontractors of FS have a responsibility to comply with all environmental laws and regulations. Most birds are protected by the federal MBTA, and eagles are further protected by the BGEPA. In addition, the state of California has an Endangered Species Act (CESA). Under the federal statutes, it is illegal to harm, harass, kill, or collect birds that may be found in the solar facility. A summary of these statutes is presented below. It is recognized that other wildlife including bats are generally not protected by federal or state law unless listed as a threatened or endangered species. However, it is the policy of FS to treat all wildlife incidents the same as avian incidents and include them in the WIRS.

It is illegal to collect an injured or dead bird without appropriate federal and state permits. **THE TOUCHING, POSSESSION, TRANSFER, OR TAMPERING WITH ANY WILDLIFE SPECIES (ALIVE OR DEAD) BY FS EMPLOYEES OR SUBCONTRACTORS IS STRICTLY PROHIBITED.** The WIRS is designed to provide a means of recording and collecting data about wildlife species found in the solar facilities to increase the understanding of solar and wildlife interactions. FS maintains an ongoing commitment to investigate wildlife incidents involving company facilities and to work cooperatively with federal and state agencies in an effort to minimize the potential for future bird and wildlife fatalities. The objective of this policy is to insure that the best available information about wildlife incidents found in FS facilities is recorded and the proper authorities are notified. It is the responsibility of FS employees, contractors and subcontractors to report all wildlife incidents as outlined in this WIRS.

APPLICABLE LAWS AND REGULATIONS

Migratory Bird Treaty Act

The Migratory Bird Treaty Act of 1918 (MBTA) (16 USC 703-712) is the cornerstone of migratory bird conservation and protection in the United States. The MBTA implements four treaties that provide for international protection of migratory birds. It is a strict liability statute wherein proof of intent is not an element of a "taking" violation. Wording is clear that most actions resulting in a taking or possession (permanent or temporary) of a protected species can be a violation, regardless of intent.

Specifically, the MBTA states: "Unless and except as permitted by regulations...it shall be unlawful at any time, by any means or in any manner, to pursue, hunt, take, capture, kill, attempt to take, capture or kill, possess…any migratory bird, any part, nest, or egg of any such bird…(The Act) prohibits the taking, killing possession, transportation, and importation of migratory birds, their eggs, parts, and nests, expect when specifically authorized by the Department of the Interior." The word "take" is defined as "to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap capture, or collect."

The MBTA protects 836 species of migratory birds (listed in 50 CFR 10.13), including waterfowl, shorebirds, seabirds, wading birds, raptors, and passerines. Generally, the MBTA protects all birds in the U.S. except upland gamebirds (e.g., pheasant, quail, etc), rock doves (pigeons), European starlings, and English house sparrows. Nearly all birds found at the FS are protected under the MBTA.

Bald and Golden Eagle Protection Act

In June 1940, Congress signed into law the Bald and Golden Eagle Protection Act (BGEPA) (16 USC 668-688d) which affords additional protection to the bald and golden eagle. Specifically, the BGEPA states: "Whoever, with the United States or any place subject to the jurisdiction thereof, without being permitted to do so as provided…shall knowingly or with wanton disregard for the consequences of his act take, possess, transport…at any time or in any manner, any bald or golden eagle, alive or dead, or any part, nest or egg thereof shall be fined…that the commission of each taking or other act prohibited by this section, with respect to a bald or golden eagle, shall constitute a separate violation of this section." Penalties for violations of the BGEPA are up to $250,000 and/or 2 years imprisonment for a felony (violations are defined as a felony), with fines doubled for organizations. FS

Endangered Species Act

In 1973, the Endangered Species Act (ESA) (16 USC 1513-1543) was passed to protect endangered and threatened species and to provide a means to conserve their ecosystems. Under the ESA, Federal agencies are directed to utilize their authorities to conserve listed species, as well as "Candidate" species that may be listed in the near future, and make sure that federal agencies' actions do not jeopardize the continued existence of these species. As with the MBTA and the BGEPA, the ESA as amended prohibits the taking of species listed under the act as threatened or endangered.

California Endangered Species Act

The California Endangered Species Act (CESA) (Fish and Game Code §§ 2050-2098) was passed to conserve and enhance endangered species and their habitats. The CESA provides protection and prohibits the take of plant, fish, and wildlife species listed by the state of California. Take is defined similarly to the federal ESA, and is prohibited for both listed and candidate species.

California Code of Regulations

The California Code of Regulations (§460) protects fur-bearing mammals, including fisher, marten, river otter, desert kit fox and red fox. This sections states that fisher, marten, river otter, desert kit fox and red fox may not be taken at any time.

BLM Sensitive Species

BLM Sensitive Species are species designated by the State Director and includes only those species that are not already federal listed proposed, or candidate species, or State listed because of 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."

Flat-tailed Horned Lizard Rangewide Management Strategy

The Flat-tailed Horned Lizard Rangewide Management Strategy was prepared in order to provide management and conservation guidelines for FTHL habitat throughout the species’ range. Five Management Areas (MAs), four of which are in California, were designated in order to promote the maintenance of self-sustaining stable or increasing populations. For habitat outside of the MAs, a land mitigation and compensation program is in effect to balance future activities in FTHL habitat.

California Fish and Game Code

Sections 3511, 4700, 5050, and 5515 of the California Fish and Game Code outline protection for fully protected species of mammals, birds, reptiles, amphibians, and fish. Species that are fully protected by these sections may not be taken or possessed at any time. CDFW cannot issue permits or licenses that authorize the "take" of any fully protected species, except under certain circumstances such as scientific research and live capture and relocation of such species pursuant to a permit for the protection of livestock. Furthermore, is the responsibility of the CDFW to maintain viable populations of all native species. To that end, the CDFW has designated certain vertebrate species as Species of Special Concern because declining population levels, limited ranges, and/or continuing threats have made them vulnerable to extinction**.**

FS WILDLIFE INCIDENT REPORTING

The following procedures are to be followed when FS personnel or subcontractors discover a wildlife fatality or injury while on site. These procedures are intended to be in place for the life of the project and are independent of the post-construction monitoring studies. Prior to the initiation of operations, on-site training will be provided to FS personnel and subcontractors regarding the implementation of this WIRS.

When To Use The WIRS - What Constitutes A Reportable Incident?

For the purposes of this reporting system, *incident* is a general term that refers to any wildlife species, or evidence thereof, that is found dead or injured within the wind project. Note that an incident may include an injured animal and does not necessarily refer only to a carcass or fatality.

An intact carcass, carcass parts, bones, scattered feathers, or an injured wildlife species all represent reportable incidents. FS personnel and subcontractors shall report all such discoveries even if you are uncertain if the carcass or parts are associated with the facility.

> A ***fatality*** is any find where death occurred, such as a carcass, carcass parts, bones, or feather spot (at least five tail feathers or two primaries within 5 m (16.4 ft) or less of each other, or a total of 10 feathers).
>
> An ***injury*** or injured animal is any wildlife species with an apparent injury, or that exhibits signs of distress to the point where it cannot move under normal means or does not display normal escape or defense behavior.

Prior to assuming a wildlife species is injured, it should be observed to determine if it cannot or does not display normal behaviors. For example, raptors will occasionally walk on the ground, especially if they have captured a prey item. Raptors also "mantle" or hold their wings out and down to cover a prey item. These types of behaviors may make the wings appear broken or the animal injured. Identification of specific behaviors typical to the life cycles and distress behaviors of wildlife will be part of the FS wildlife education program. Always exercise caution before approaching an injured wildlife species. **<u>Under no circumstances are site personnel permitted to handle carcasses or injured animals.</u>**

Note: *Any incident involving a federally or state listed threatened or endangered species, bald eagle, or golden eagle must be reported to USFWS and/or California Department of Fish and Wildlife (CDFW) <u>within 24 hours of identification</u>. See project personnel listing for contact information.*

<u>MATERIALS NEEDED TO REPORT AN INCIDENT</u>

1. A copy of this WIRS
2. A Wildlife Incident Report Form (see Attachment 1)

3. Project Personnel Listing and Contact Information
4. Pencil, Pen
5. Camera
6. Flagging

FS **WILDLIFE INCIDENT REPORTING PROCEDURES**

The following procedures apply if the incident involves a **Wildlife Fatality** or **Injured Wildlife Species**:

- **<u>Leave the subject animal in place</u>**. A flag may be used to mark its location for easy finding while the data sheet is being completed. It is recommended that any flagging be marked with the date, time, and initials of the recorder. **DO NOT HANDLE THE CARCASS.**

- **<u>Report</u>** the find to the Site Operations Manager immediately.

- The Site Operations Manager shall complete the following steps:

    - **<u>Photograph</u>** the incident as it was found in the field. Take at least two pictures: a close up shot of the animal as it lays in the field and a broader view of the animal (marked by a flag) with the road, turbines, or other local features in the view. For the close up picture, place an object (e.g., radio, pencil, coin, etc.) next to the carcass for a scale of size.

    - **<u>Prepare a Wildlife Incident Report Form.</u>** The form and associated instructions are presented below.

    - **<u>Report</u>** the find to First Solar's Environmental Affairs Lead (EAL) immediately.

The following procedures apply if the incident involves an **Injured Wildlife Species**:

- **<u>Move</u>** to a distance far enough away that it is not visibly disturbed or uneasy due to your presence. **DO NOT ATTEMPT TO CAPTURE OR HANDLE AN INJURED ANIMAL.**

- **<u>Report</u>** the find immediately to the Operations Site Manager

- The Site Operations Manager shall complete the following steps:

    - **<u>Report</u>** the find to the Environmental Affairs Lead immediately.

    - **<u>Contact</u>** a local rehabilitation center (*see contact list below*) for further instructions on handling and transport/pickup of the injured animal.

    - **<u>Prepare a Wildlife Incident Report Form.</u>** The form and instructions for filling out the form are provided below.

*** Any incident involving a federally or state listed threatened or endangered species or a bald or golden eagle must be reported to the USFWS and/or CDFW within 24 hours of identification. These incidents**

will be reported to the agency verbally by the Operations Manager or First Solar's Environmental Affairs Lead (*see contact list below)*.

FIRST SOLAR
INCIDENTAL WILDLIFE REPORTING FORM

INCIDENT DETAILS

Project Location/Name:

Name of Observer/s:________________________ Date: _____________ Time: _________

Type of Incident: ☐ Injury ☐ Fatality

Carcass Condition: ☐ Intact Carcass ☐ Partial Carcass ☐ Feathers Only

Age of Remains (days): ☐ 1-2 (fluid filled eyes) ☐ 2-4 (maggots) ☐ 5+ (dried bones/feathers)

Photos Taken: ☐ Yes ☐ No (Take photos of - Birds: beak, legs, feathers, body. Wildlife: face and ears, tail and feet, body)

Who was notified of incident? (see contact list below)______________________________________

Comments on Carcass Condition or Behavior of Injured Animal:________________________________

____

LOCATION

Where Found: ☐ On Access Road ☐ Solar Array ☐ Under Power Line ☐ Substation

GPS Coordinates: UTM N:_________________ UTM E:_________________ DATUM:__________

Comments on Location:____

IDENTIFICATION

☐ Bird ☐ Bat ☐ Mammal ☐ Other:________________________

Species (to best of ability):____

Description of Color/Markings:____

Does Animal Resemble a Species of Concern discussed at Training? ☐ Yes ☐ No

Identification Remarks:____

____

(Describe details of - Birds: beak size, color, and shape; leg size, color, and shape; feather color; body size. Bats: color of fur and wings; muzzle long or short, tail attached or extending; ear color and shape); Other Wildlife: color of fur, any markings, and body size.

ENVIRONMENTAL CONDITIONS

Weather (Check all that apply): ☐ Clear ☐ Cloudy ☐ Rain ☐ Dust Storm

Approximate Temperature (F°):_________

Wind: ☐ Calm ☐ Breezy/Gusty ☐ Strong Winds

Habitat where found: ☐ Gravel (access road/turbine pad) ☐ Bare Ground ☐ Wash ☐ Desert scrub

OTHER NOTES/COMMENTS:____

CONTACT LIST (Immediately notify one of these individuals of incident)

1. Operations Manager:
2. Environmental Affairs Lead:

Appendix G

U.S. Fish & Wildlife Service Pacific Southwest Region eagle nest buffer recommendations

U.S. FISH AND WILDLIFE SERVICE, REGION 8
RECOMMENDED BIO MONITOR PROTOCOL TO AVOID TAKE OF NESTING EAGLES:
CALIFORNIA FLATS SOLAR PROJECT
APRIL 7, 2016

RECOMENDATIONS

For activities that have temporary impacts, such as the use of loud machinery or an increase in vehicle activity, the U.S. Fish and Wildlife Service (Service) recommend seasonal restrictions. These types of activities can generally be conducted outside of the breeding season without causing disturbance. The recommended restrictions for these types of activities can be lifted for inactive alternate nests within a particular territory.

In general, activities should be kept as far away from nest sites as possible; loud and disruptive activities should be conducted when eagles are not nesting; and activity between the nest and the nearest foraging area should be minimized.

Following are our recommendations for the California Flat Solar Project's proposed construction in the vanity of the active golden eagle nests:

1) We recommend no construction within 1 mile except as described in our recommendations below. Please see the attached table for our general recommendations about activities and appropriate temporal and spatial buffers to avoid disturbance take at active golden eagle nests.
2) PG&E Substation installation of transmission poles located within 1 mile buffer of nest 19A, that is not within line of site: this work may proceed with implementation of Service revised bio monitor protocol described in measure number 3 below.
3) The U.S. Fish and Wildlife Service recommend a qualified biologist monitor the eagle nest during construction activities. If activities are deemed to have a negative effect on nesting eagles, the biologist shall immediately inform the construction manager that work should be halted. Specifically:
    - If an eagle appears agitated, the bio monitor will request a stop work order prior to an eagle flushing off the nest.
    - If an eagle flushes off its nest, the bio monitor will request an immediate stop work order.
4) We advise against other construction work within the 1 mile buffers of active golden eagle nest (12a). Pipeline construction should be delayed until after breeding season (late July early August). The project proponent may alternatively truck in water to meet their construction needs.
5) We advise the project not to use the Farm Road to access the water line and telecom line construction areas until after the eagle breeding season ends. The Farm Road is located within 0.5 mile of a breeding eagle's nest (12a). Instead, they can use the main southern road to access the project site.

U.S. Fish and Wildlife Pacific Southwest Region recommended buffer zones for level and duration of activities during golden eagle nesting.

NESTING PHENOLOGY (Risk Level)				
Length of Activity	**Courtship and Nest Building (High)**	**Incubation, and Brooding (High)**	**Post-Brooding Nestling Period (Moderate)**	**Post Fledging Dependency (Moderate)**
In-Vehicle, Recreational[a] Activity: Any recreational vehicle driving off-road, or on dirt roads, and not part of a routinely used transportation corridor.				
less than 1 hour[b]	None	None	None	None
less than 1 hour[c]	½ Mile	½ Mile	None	None
greater than 1 hour	1 Mile	1 Mile	½ Mile	½ Mile
Out-of-Vehicle, Recreational Activity: including, but not limited to hiking, dispersed camping, rock climbing, bird watching, fishing, hunting, biological surveys.				
less than 1 hour[b]	½ Mile	½ Mile	None	None
less than 1 hour[c]	1 Mile	1 Mile	½ Mile	½ Mile
greater than 1 hour	1 Mile	1 Mile	1 Mile	1 Mile
Developed Recreation: including, but not limited to snowmobile and off-road vehicle courses, developed campground sites, and group tour operations.				
	1 Mile	1 Mile	1 Mile	1 Mile
Industrial, Municipal, and Transportation Disturbance: including, but not limited to urbanization; mining; oil and gas development; logging; power line construction; road construction & maintenance; agricultural operations; fixed wing and helicopter over flights.				
less than 1 hour[b]	1 Mile	1 Mile	½ Mile	½ Mile
less than 1 hour[c]	1 Mile	1 Mile	1 Mile	½ Mile
greater than 1 hour	1 Mile	1 Mile	1 Mile	1 Mile
Blasting and other loud, intermittent noises[d]: This recommendation applies to the use of fireworks classified by the Federal Department of Transportation as Class B explosives, which includes the larger fireworks that are intended for licensed public display.				
	2 Mile	2 Mile	2 Mile	1 Mile

[a] Recreational activities are defined as those providing outdoor recreation, entertainment, or adventure.

[b] No more than 1 repetition in a 24 hour period for a duration of less than 1 hour is allowable.

[c] More than one repetition per 24 hours, spaced no less than 2 hours apart, occurs during daylight hours. Full buffer zone is required for any activities occurring during nighttime hours.

[d] Avoid blasting and other activities that produce extremely loud noises within 2 miles of active nests, unless greater tolerance to the activity (or similar activity) has been demonstrated by the eagles in the nesting area.

Appendix C. Results of the golden eagle local area population (LAP) analysis for the California Flats Solar Project

Focal Project: California Flats Solar Project

Predicted eagle take (annual)	**1.18**

Local Area Population (LAP) Estimates by Local Area Density Unit (LADU):

Focal Project_Density Unit	Estimated Number of Eagles
California Flats_COASTAL_CALIFORNIA	242.51
California Flats_SIERRA_NEVADA	3.47
California Flats LAP (total)	**245.98**

1% LAP Benchmark	**2.46**
5% LAP Benchmark	**12.3**

Permitted Projects with Overlapping LAPs:

Project ID	Estimated Annual Take	Percent Overlap With Focal Project	Overlapping Area (SqMi)	Overlapping Take
Project 00542B	0.6	34.04%	11749.53	0.2
Project 41348D	0.59	23.93%	6759.48	0.14
Project 67633A	1	12.93%	3906.4	0.13
All Projects (total)	**2.19**			**0.47**

Known Unpermitted Take Summary				
Cause of take	**All Known (1950-2019)**	**Reported Years**	**# Years**	**Average Annual Take**
Electrocution;Starvation	1	2002-2002	1	1
Unknown	51	2001-2017	17	3
Electrocution;Poisoned (pesticide)	2	2015-2015	1	2
Other	3	2013-2015	3	1
Trauma	3	2001-2016	16	0.19
Electrocution	32	1993-2019	27	1.19
Collision with wind turbine	108	1997-2016	20	5.40
Infection;Collision with wind turbine	1	2014-2014	1	1
Collision with wind turbine;Poisoned (pesticide)	2	2014-2015	2	1
Infection;Poisoned (pesticide);Starvation	1	2016-2016	1	1
Other;Starvation	1	2016-2016	1	1

Trauma;Other	1	2016-2016	1	1
Collision with vehicle;Poisoned (pesticide)	2	2014-2015	2	1
Poisoned (pesticide);Starvation	1	2015-2015	1	1
Shot	1	2004-2004	1	1
Collision with vehicle	3	2002-2014	13	0.23
Infection;Poisoned (lead)	1	2000-2000	1	1
Trauma;Starvation	1	2015-2015	1	1
Collision/electrocution	1	2018-2018	1	1
Poisoned (pesticide)	2	1996-2014	19	0.11
Poisoned (lead)	4	1997-2016	20	0.2
Total				**25.68**

Cumulative Take Results	Number of Eagles (Annual)	Percent of LAP
Permitted Take		
Total Overlapping Take	0.47	0.19%
Focal Project Predicted Take	1.18	0.48%
Total Permitted Take (Focal Project + Total Overlapping Take)	**1.65**	**0.67%**
Unpermitted Take	**25.68**	**10.44%**