# Eagle Conservation Plan

Panoche Valley Solar Energy Project

San Benito County, California

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# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| ACP | Advanced Conservation Practice |
| amsl | Above mean sea level |
| BGEPA | BGEPA Bald and Golden Eagle Protection Act |
| BMPs | Best Management Practices |
| CDFW | California Department of Fish and Wildlife |
| CEC | California Energy Commission |
| CESA | California Endangered Species Act |
| CFR | Code of Federal Regulations |
| County | San Benito County |
| Guidance | Eagle Conservation Plan Guidance Module 1 – Land-based Wind Energy Version 2 Guidance |
| ECP | Eagle Conservation Plan |
| EIS | Environmental Impact Statement |
| ˚F | Fahrenheit |
| FR | Federal Regulation |
| GPS | GPS global positioning system |
| km | kilometer |
| $km^2$ | square kilometer |
| MBTA | Migratory Bird Treaty Act |
| MW | megawatts |
| PG&E | PG&E Pacific Gas and Electric Company |
| Project Footprint | The portion of the Proposed Project that includes the solar arrays and associated roads and equipment, totaling 2,506 acres. |
| Proposed Project | Panoche Valley Solar Project |
| PVS | Panoche Valley Solar, LLC |
| SCRCL | Silver Creek Ranch Conservation Lands |
| UDA | Utilization Distribution Assessment |
| USACE | U.S. Army Corps of Engineers |
| USC | United States Code |
| USFWS | U.S. Fish Wildlife Service |
| UTM | Universal Transverse Mercator |
| VFCL | Valley Floor Conservation Lands |
| VRCL | Valadeao Ranch Conservation Lands |

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# 1.0 INTRODUCTION

## 1.1 Corporate Policy

Panoche Valley Solar, LLC (PVS) is committed to implementing feasible measures to avoid and minimize eagle mortality associated with construction and operation of the Panoche Valley Solar Facility (PVS Facility or the Project) on Bald Eagles (*Haliaeetus leucocephalus*) and Golden Eagles (*Aquila chrysaetos*). These measures include but are not limited to siting considerations, panel design, best management practices, avoidance and minimization measures, incorporation of safety features into appurtenant facilities (e.g., transmission lines), compensatory mitigation, and adaptive management measures.

## 1.2 Regulatory Setting

### *1.2.1 Bald and Golden Eagle Protection Act*

The Bald and Golden Eagle Protection Act (BGEPA) is the primary law protecting eagles. The BGEPA (16 USC 668-668c) protects Bald and Golden Eagles by prohibiting the taking, possession, and commerce of such birds and establishes civil penalties for violation of this Act. BGEPA defines the action of "take" to include "pursue, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb," and prohibits take of individuals and their parts, nests, or eggs. The U.S. Fish and Wildlife Service (USFWS) expanded this definition by regulation to include the term "destroy" to ensure that "take" includes destruction of eagle nests. The term "disturb" is further defined by regulation as "to agitate or bother a Bald or Golden Eagle to a degree that causes, or is likely to cause, injury to an eagle, a decrease in productivity, or nest abandonment" (50 Federal Regulation [FR] 22.3).

The BGEPA is the primary federal authority charged with the management of Bald and Golden Eagles in the United States (U.S.). A permit for take of Golden Eagles, including take from disturbance such as loss of foraging habitat, may be required for this proposed project. USFWS guidance on the applicability of current Eagle Act statutes and mitigation is currently under review. On November 10, 2009 the USFWS implemented new rules (74 FR 46835) governing the "take" of Golden and Bald Eagles. The new rules were released under the existing BGEPA which has been the primary regulation protection unlisted eagle populations since 1940. All activities that may disturb or incidentally take an eagle or its nest as a result of an otherwise legal activity must be permitted by the USFWS under this act. The definition of "disturb" (72 FR 31132) includes "interfering with normal breeding, feeding, or sheltering behavior to the degree that it causes or is likely to cause decreased productivity or nest abandonment." Because large-scale solar projects would result in the loss of large amounts of Golden Eagle foraging habitat, there are concerns about the cumulative impacts to Golden Eagles resulting from loss of foraging habitat. If a permit is required, it is expected that the permit would be issued only for safety emergencies or if conservation measures implemented in accordance with a permit would result in a reduction of ongoing take or a net take of zero.

### *1.2.2 Migratory Bird Treaty Act*

The Federal Migratory Bird Treaty Act (MBTA) (Title 16 USC 703) prohibits killing, possessing, or trading in migratory birds except in accordance with regulations prescribed by the Secretary. This act encompasses migratory birds which includes eagles, hawks, and owls, their occupied nests, and their eggs (16 USC 703; 50 Code of Federal Regulations [CFR] 21, 50 CFR 10). Most actions that result in taking of or the permanent or temporary possession of a protected species constitute violations of the MBTA. The MBTA

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also prohibits destruction of occupied nests. The Migratory Bird Permit Memorandum dated April 15, 2003, clarifies that destruction of most unoccupied bird nests is permissible under the MBTA; exceptions include nests of federally listed threatened or endangered migratory birds, Bald Eagles, and Golden Eagles. Most bird species and their occupied nests that occur within the Project Footprint are protected under the MBTA. The USFWS is responsible for overseeing compliance with the MBTA.

### *1.2.3 National Environmental Policy Act*

NEPA is an act of Congress established to ensure that the environmental impacts of any federal action are fully considered and that appropriate steps are taken to mitigate potential environmental impacts. An Environmental Impact Statement (EIS) is being prepared for the Project in compliance with NEPA in order to analyze and disclose the potential impacts of the Project. The U.S. Army Corps of Engineers (USACE) is the lead agency responsible for preparing the EIS.

### *1.2.4 California Endangered Species Act*

The California Endangered Species Act (CESA) of 1970 states that all native species of fishes, amphibians, reptiles, birds, mammals, invertebrates, and plants, and their habitats, threatened with extinction and those experiencing a significant decline which, if not halted, would lead to a threatened or endangered designation, will be protected or preserved. The CESA prohibits the take (hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill) of species listed under CESA. In addition, California Fish and Game Code Subsections 3503, 3503.5, and 3800 prohibit the possession, incidental take, or needless destruction of eagles and other birds, as well as their nests and eggs. California Fish and Game Code Section 3511 lists birds including the Golden Eagle, that are "fully protected" as those that may not be taken or possessed except under specific permit.

## 1.3 Purpose of the Eagle Conservation Plan

PVS has prepared this Eagle Conservation Plan (ECP) to ensure that feasible avoidance and minimization measures are implemented into project design and operation, that the project remains in compliance with BGEPA requirements, and that mitigation for impacts that cannot be avoided or minimized are addressed through an appropriate program of compensatory mitigation. This plan focuses primarily on Golden Eagles since there have been no historical or present sighting of Bald Eagles in the vicinity of the Project Footprint and no foraging or nesting habitat for the Bald Eagle exists within the Project Footprint.

Golden Eagles, due to their regulatory status, population trends in some locations, and charismatic public image, have become a species of particular concern in the context of solar projects. A few facets of Golden Eagle behavior and biology bring eagles into potential conflict with solar energy production. Measures particularly relevant to Golden Eagles include avoiding artificial increases of the mammalian prey base, selecting a project site that does not support high-density eagle populations, and establishing standard setbacks from nest sites.

This ECP has been prepared to establish measures to ensure that these effects are "compatible with the preservation of the Bald Eagle and the Golden Eagle" as set forth in the Guidance (U.S. Fish and Wildlife Service 2013).

The emphasis of the current guidance from the USFWS (e.g. *Eagle Conservation Plan Guidance Module 1 – Land-based Wind Energy Version 2*) appears directed toward the establishment of new wind power

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projects, addressing the importance of siting these wind power projects at certain minimum distances from Golden Eagle use areas. Even though the Panoche Valley Solar Project (the Project) does not include wind energy generation of power, PVS has agreed to establish an ECP for the Project to demonstrate compliance with the BGEPA. This compliance with the BGEPA comes in the form of:

- Conducting early pre-construction assessments to identify important eagle use areas within the Project Footprint and surrounding Conservation Lands;
- Analyzing the pre-construction studies to estimate potential impacts on eagles;
- Avoiding and minimizing potential adverse effects to eagles due to the construction and operation of the Project; and
- Monitoring for impacts to eagles during the construction and operation of the solar facility.

## 1.4 Contents of this Eagle Conservation Plan

This ECP has been developed in accordance with requirements set forth in the Eagle Conservation Plan Guidance Module 1 – Land-based Wind Energy Version 2 Guidance (the Guidance) (USFWS 2013). The Guidance focuses on the development of ECPs in five stages, with each stage building on the prior stage. These stages include:

- Stage 1 – Site Assessment
- Stage 2 – Site-Specific Surveys and Assessment
- Stage 3 – Predicting Eagle Fatalities
- Stage 4 – Avoidance and Minimization of Risk Using Advanced Conservation Practices and Other Conservation Measures, and Compensatory Mitigation, and
- Stage 5 – Updating of the Fatality Prediction and Continued Risk-Assessment

A Stage 1 assessment will determine whether the Project is located within areas known to be used by eagles and to start assessing the extent and type of eagles using the area in and around the Project Footprint. A Stage 1 assessment will assist in the determination of whether the Project demonstrates any risk for eagles and will provide important information that will be used to determine what studies need to be completed during the Stage 2 assessment.

A Stage 2 assessment is the completion of field studies that will generate predictions of the mean number of eagle fatalities per year for an energy project. The studies under this stage will assist in the identification of eagle use areas or migration concentration sites that could be affected by the Project and also assess the likelihood of disturbance or “take” of eagles. During this stage, multiple study types could be used to measure use by eagles within the Project Area. Out of the four types of surveys recommended for assessing risk to eagles at proposed projects, three were utilized for the Panoche Valley Solar Project. The three surveys of eagles used within the Project Footprint included: (1) point count surveys, which generates occurrence data; (2) utilization distribution assessment (UDA), which shows use intensity within the Project Footprint; and (3) surveys of nesting territory occupancy in the Project vicinity.

Stage 3 utilizes the data from Stage 2 to predict any risk associated with eagles by the Project. This risk is stated as the average number of fatalities per year for the length of the take permit. The assessment of risk can compare construction type (solar or wind energy), alternative siting, construction, and operational scenarios. Also included in this stage is the evaluation of whether a “disturbance take” is likely, and if so, how much disturbance is anticipated.

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Stage 4 of this ECP will describe how the information gathered in the previous stages will be used to determine potential conservation measures and advanced conservation practices (ACPs) if necessary, to avoid or minimize any risk of impacts on eagles within the Project Footprint.

Stage 5 of this ECP will discuss, if deemed necessary, the need for conducting post-construction surveys that could be compared to the pre-construction surveys. Additionally, if necessary, this plan will also discuss the need for Panoche Valley Solar to conduct post-construction monitoring to collect data that could be compared with the pre-construction findings for any potential for eagle fatalities and disturbances.

Additionally in Stage 5, if any monitoring is necessary, PVS will use the post-construction monitoring data to assess whether compensatory mitigation is necessary and/or adequate and explore any operational changes that might be warranted at the solar project.

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# 2.0 PROJECT INFORMATION

## 2.1 Project Location

The Project is located near the intersection of Panoche Road and Little Panoche Road, in eastern San Benito County and western Fresno County. The Project Footprint is located approximately two miles north of the intersection of Panoche Road and Little Panoche Road. This location is approximately two miles southwest of the Fresno County Line and the Panoche Hills, and approximately 15 miles west of Interstate 5 and the San Joaquin Valley. The Project Footprint would be located within Township 15S, Range 10E, Sections 3-4, 8-11, and 13-16 of the United States Geologic Survey's Cerro Colorado, Llanada, Mercy Hot Springs, and Panoche 7.5-minute topographic quadrangle maps.

In addition to the Project Footprint, the Conservation Lands associated with the Proposed Project are located within Township 15S, Range 10E, Sections 3-4, 8-10, 13-16, and 25; Township 15S, Range 11E, Section 19; Township 14S, Range 10E, Sections 21-27, and 32-36; Township 14S, Range 11E, Sections 19, and 29-32; Township 15S, Range 10E, Sections 1-8, and 10-14; Section 15S, Township 11E, Sections 6-7, 19-20, and 26-36; and Township 16S, Range 11E, Sections 1-6, and 8-12.

The Project Footprint is bordered by rangeland to the north and south, by the Gabilan Range to the west, and by the Panoche Hills to the east. The Project Footprint elevation ranges from approximately 1,200 feet above mean sea level (amsl) near the southeastern end of the project site to approximately 1,400 feet amsl near the western end of the project site. Panoche Creek and Las Aquilas Creek flow through the Project Footprint. The project site was historically used for crop production, but during the past forty years the project site has been used for cattle grazing.

## 2.2 Project Description

Panoche Valley Solar, LLC (PVS) proposes to construct and operate a solar photovoltaic (PV) energy generating facility located in San Benito County, California (Figure 1, Appendix A). The Project is called the Panoche Valley Solar Facility (PVS Facility, the Project, or the Action) (Figure 2, Appendix A). The Project Footprint consists of approximately 2,506 acres in the Panoche Valley of eastern San Benito County, California. The Project includes construction and operation of the solar array complexes, an operations and maintenance (O&M) building, project perimeter roads including emergency access and egress, electricity collection lines, DC-AC inverters, an electrical substation and switchyard, Pacific Gas & Electric (PG&E) telecommunication upgrades, and decommissioning of the Project. The Project also includes the permanent preservation and management of high quality Conservation Lands that are contiguous with the Project Footprint when taken as a whole (Figure 3, Appendix A).

Approximately 2,514 acres of land that is interspersed throughout and adjacent to the Project Footprint would be left undisturbed and designated as the Valley Floor Conservation Lands (VFCL). The VFCL would include wildlife movement corridors within on-site drainages and 100-year floodplains, as well as open space in the southern portion of the Project area. These undisturbed areas would remain as open space and would be managed as conservation areas to maintain and enhance habitat conditions for listed species (Figure 3, Appendix A).

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In addition to the designation of the 2,514-acre VFCL, the Action will include two large ranches for conservation/mitigation purposes of impacts to waters, sensitive species and habitat. These ranches, the Valadeao Ranch Conservation Lands (VRCL; 10,772 acres) and the Silver Creek Ranch Conservation Lands (SCRCL; 10,890 acres), are contiguous with the Project Footprint and each other (Figure 3, Appendix A). The combined total acreage to be placed in permanent preservation and management is approximately 24,176 acres of high quality Conservation Lands.

## 2.3 Existing Conditions

### *2.3.1 Project Footprint*

The Project Footprint consists of the area within the fence line of the solar facility and is composed of approximately 2,506 acres of introduced annual grasslands. Historically, the Project Footprint was used for crop production; however, in the past approximately 40 years the site has been used for cattle grazing. The site is surrounded by rangeland and bordered by hills of the Gabilan Range to the west and the Panoche Hills to the east. The topography of the site dips gently down to the east-southeast. The site elevation ranges from approximately 1,200 feet amsl near the southeast end of the site to approximately 1,400 feet amsl near the west end.

The Project area experiences a Mediterranean type climate with dry hot summers and cool wet winters. However, this region does not experience heavy rainfall. Annual precipitation in the general vicinity of the site ranges from eight to ten inches per year. Approximately 85 percent of precipitation falls between October and March. Temperatures average approximately 80 degrees Fahrenheit (˚F) in the summer and 40˚F in the winter, mid-summer temperatures are often over 100˚F, and winter lows can be close to freezing. Nearly all precipitation infiltrates into the site's soils and flows in creeks and drainages when soil capacity has been reached.

Panoche Creek and Las Aquilas Creek run between portions of the Project Footprint but are contained entirely within the VFCL (Figure 2, Appendix A). They are ephemeral creeks that are dry in the summer. Smaller washes and drainages feed these larger creeks. The Project site supports several seasonally flooded pools and stock ponds, predominantly in the northern portion of the Project Footprint along unnamed washes. Habitat for aquatic species and breeding habitat for amphibians within the Project Footprint is limited to the stock ponds and ephemeral pools.

There is no urban development on the Project site or surrounding area. Two ranching communities are located within the Panoche Valley, Panoche and Llanada. Both communities are within two miles of the Project Footprint. The nearest rural community is Firebaugh, approximately 15 miles from the perimeter of the Project Footprint.

Prominent grass species within the Project Footprint include ripgut brome (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), red brome (*Bromus madritensis*), foxtail barley (*Hordeum murinum* ssp*. leporinum*), and rat-tail fescue (*Vulpia myuros*). Dominant forbs included broad-leaved filaree (*Erodium botrys*), red-stemmed filaree (*Erodium cicutarium*), shining peppergrass (*Lepidium nitidum* var. *nitidum*), and vinegarweed (*Trichostema lanceolatum*). Fiddleneck (*Amsinckia menziesii*), devils lettuce (*Amsinckia tessellata*), shepherds purse (*Capsella bursa-pastoris*), turkey mullein (*Eremocarpus setigerus*), and bur clover (*Medicago polymorpha*) were also common, especially along ranch roads. Areas which have not been previously disturbed by grazing or historic cultivation also include a variety of native wildflowers such as blow wives (*Achyrachaena mollis*), blue dicks (*Dichelostemma capitatum*), California gold fields

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(*Lasthenia californica*), yellow daisy tidy-tips (*Layia platyglossa*), and California creamcups (*Platystemon californicus*).

### *2.3.2 Conservation Lands*

Project Conservation Lands include three areas totaling 24,176 acres that would be preserved in perpetuity for the benefit of the Golden Eagles, as well as many other species of wildlife. Approximately 2,514 acres of land that is interspersed throughout and adjacent to the Project Footprint would be left undisturbed and designated as the VFCL. In addition to the designation of the VFCL, the Proposed Action will include two large ranches for conservation purposes. These ranches, the VRCL (10,772 acres) and the SCRCL (10,890 acres), are contiguous with the Project site and each other (Figure 3, Appendix A).

**Valley Floor Conservation Lands**

The VFCL (approximately 2,514 acres) are contiguous with the Project Footprint, and primarily consist of the non-native annual grassland habitat found within the Project Footprint with some seasonal ponds and vernal and ephemeral pools, as well as the seasonally dry Panoche and Los Aquilas Creeks. The VFCL also includes the entire 100-year floodplain within the Proposed Project boundary on the valley floor.

The dominant vegetation in the VFCL includes ripgut brome, soft chess, red brome, foxtail barley, rat-tail fescue, broad-leaved filaree, red-stemmed filaree, shining peppergrass, and vinegarweed. Fiddleneck, devils lettuce, shepherds purse, turkey mullein, and bur clover were also common, especially in disturbed areas. Areas which have not been previously disturbed include a variety of native wildflowers such as blow wives, blue dicks, California gold fields, yellow daisy tidy-tips, and California creamcups.

**Valadeao Ranch Conservation Lands**

The VRCL (approximately 10,772 acres) are contiguous with the Project Footprint directly to the west, east, and northeast of the site (Figure 3, Appendix A). These lands are also contiguous with the VFCL and Silver Creek Ranch Conservation Lands (SCRCL). The VRCL include several seasonal drainages. Soils on this site are complex and range from sandy to sandy loam to clay loam to badlands. The VRCL contain approximately 2,945 acres with slopes between 0 and 11 percent. Elevations on the VRCL range from approximately 1,400 feet to 2,100 feet amsl. The property which is currently grazed is dominated by introduced annual grasslands (approximately 6,700 acres), which have a very similar species makeup to the Project Footprint and VFCL. This property also includes ephedra shrubland (approximately 2,700 acres), barrens, and saltbush shrubland.

Ephedra shrublands within the VRCL range from nearly pure California ephedra (*E. californica*) stands to highly diverse associations with typical desert shrubs. Occupied habitats occur from lower slopes and valley bottoms to rocky outcrops and alluvial slopes. This 3 to 15 foot tall shrub rarely achieves greater than 10 percent cover (absolute), but the cover provided varies little with soil type, aspect, or grazing pressure. It is generally the only shrub present in the often very broad transition from Ephedra shrublands to introduced annual grasslands.

Plant associations that are noted to occur within the Ephedra shrublands include *Artemisia californica - Senecio flaccidus* scrub, *Eastwoodia elegans - Ephedra californica* scrub, *Ericameria linearifolia - Ephedra californica* scrub, *Ericameria linearifolia - Ericameria nauseosa* scrub, *Ericameria linearifolia - Gutierrezia californica* scrub, *Eriogonum fasciculatum* var. *polifolium - Artemisia californica* scrub, *Eriogonum*

*fasciculatum* var. *polifolium* - *Ephedra californica* scrub, *Eriogonum fasciculatum* var. *polifolium* - *Gutierrezia californica* scrub, *Eriogonum fasciculatum* var. *polifolium* - *Yucca whipplei* scrub, and *Gutierrezia californica* - *Ephedra californica* scrub. Ephedra shrublands occur in the VRCL portion of Las Aquilas Creek in small patches along ridgelines, steep slopes with a northern aspect, lower slopes, ephemeral drainages, and steep, rocky, and thin-soiled south-facing slopes.

Barrens are ridgelines located in the VRCL that have south or (rarely) west-facing very steep slopes that exhibit a precipitous drop-off in vegetative cover. In terms of vegetation, the assembled species diversity at barrens is very low, nearly all species are relatively short-lived annuals, shrubs and trees are absent, and introduced annual grasses become minor components of the species mix. Barrens most commonly interrupt Introduced Annual Grasslands, where the transition was often observed to occur over the space of several feet. Two plant associations were identified within the barrens: *Erodium cicutarium* - *Plantago erecta* and *Holocarpha obconica* - *Vulpia microstachys*.

The saltbush shrubland habitat consists of nearly pure to mixed stands of saltbush (*Atriplex polycarpa*) associations. Occupied habitats range from white clay soils on hills immediately west of Little Panoche Road to rocky outcrops and alluvial slopes experiencing high ground creep rates near ridgelines east of the road. In all observed occurrences on hills, the aspect of greatest saltbush cover is southern. This two to three foot tall shrub also attains dominance within several of the ephemerally flooded washes, where sandier soils are more common. It is always the most common shrub canopy contributor near seasonal springs and seeps that exhibit saline character.

Two plant associations exist on the VRCL: *Atriplex polycarpa* - *Eriogonum fasciculatum* var. *polifolium* and *Atriplex polycarpa* - *Isocoma acradenia* var. *bracteosa*. *Atriplex polycarpa* - *Eriogonum fasciculatum* var. *polifolium* occurs on slopes, appearing as mainly open ground with scattered shrubs. Shrub canopy closure averages 5 to 10 percent, with scattered clumps of 20 percent closure. Canopy density is greatest on south-facing slopes, where *Eriogonum fasciculatum* is often more prevalent, and on slopes that are steep or slippery enough to exclude grazing. The herbaceous layer is largely absent, resembling barrens that are often present on adjacent slopes of similar aspect. Shrub canopies are confined to wash edges due to trampling by cattle, and average cover rarely exceeds 10 percent.

**Silver Creek Ranch Conservation Lands**

The SCRCL (approximately 10,890 acres), which is currently being grazed with livestock, is located southeast of the Project Footprint (Figure 3 Appendix A). The northwestern-most corner of the proposed SCRCL is contiguous with a portion of the VRCL. Elevations on the SCRCL range from 900 to 2,200 feet amsl. Soils on the SCRCL are less complex than those found on the VRCL and are generally characterized as well drained and moderately permeable. SCRCL contains approximately 5,765 acres with slopes between 0 and 11 percent.

SCRCL are dominated by non-native species (approximately 8,400 acres), with the same species found on the Project Footprint and on the other conservation lands distributed sparsely over the landscape. The other major habitats on these conservation lands include ephedra shrubland (approximately 2,260 acres) with similar species noted on the VRCL and riparian/wetland habitat.

The riparian habitats occur along the Panoche and Silver Creeks. The Silver Creek riparian vegetation, where it briefly intersects the SCRCL, indicates a seasonally wet, somewhat saline habitat subject to annual or occasional energetic flows. The riparian corridor has become dominated by invasive tamarisk

(*Tamarix* sp.). Tamarisk has developed semi-open to impassable stands in a 30 to 100 foot wide corridor. The population extends well off-site, both upstream and downstream. In this area, saltgrass (*Distichlis spicata*) appears to be the native species most tolerant of the soil salinity and groundwater drawdown effects of heavy tamarisk infestation, and often forms meadow-like swards between the tamarisk thickets.

Panoche Creek is a gaining reach as it crosses through the SCRCL. The streambed upstream off the site was observed to be completely dry and largely devoid of plants for at least three miles. Within the surveyed area, this arroyo-like habitat quickly transitions to zonal wetlands characterized by gaseous springs, highly reduced soils, and marsh or meadow vegetation. The Panoche Creek riparian zone, which ranges from 100 feet to 500 feet in width, may provide the only reliable, naturally occurring surface water for much of the year. The dominant plants are consistently arrayed, with vegetation classified as emergent *Typha* marsh (*Typha* Herbaceous Alliance) centrally, *Schoenoplectus americanus* mid-marsh (*Schoenoplectus americanus* Herbaceous Alliance) at the outer saturated edge, and *Distichlis spicata* meadow (*Distichlis spicata* Herbaceous Alliance) extending across the moistened to seasonally drying soils at the riparian edge and *Frankenia salina* and *Juncus mexicanus*. Trees are largely absent, as are species adapted to a floating or submerged habitats.

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# 3.0 LANDSCAPE AND SITE-SPECIFIC ASSESSMENT (STAGES 1 AND 2)

## 3.1 Overview of Eagle Biology

This section gives an overview of the biology of both the Golden Eagle and the Bald Eagle.

### *3.1.1 Golden Eagle*

The Golden Eagle is a large raptor with a wingspan between 73–87 inches and an average weight between 6.6–13.5 pounds. The eagle ranges throughout most of the northern Temperate Zone which includes arctic Canada and Alaska south through the western United States to central Mexico. The northern populations of Golden Eagles are short to medium distance diurnal migrants.

Golden Eagles can be found in a broad range of elevations in various habitats which include open and semi-open grasslands, shrub-steppes, forests, tundra, and desert habitats (Kochert et al. 2002). The eagles tend to avoid densely populated and agricultural areas for relatively open rangelands and undisturbed areas. Golden Eagles usually build their nests on cliff faces but will also build in trees, on the ground, or human-made structures such as observation towers, nesting platforms, and electrical transmission towers. Furthermore, Golden Eagle nests are most likely to occur in the vicinity of dense populations of ground squirrels, hares or other favored prey species. Besides hares and ground squirrels, Golden Eagles may take a wide variety of other food items, including larger birds, reptiles, mammals, and carrion. They have been observed hunting by diving from a high soar, but typically hunt by flying low to the ground while following the contours of the land. Golden Eagles have been noted to construct and maintain several alternative nests within their established breeding territories and rotating their use from year to year depending on breeding densities in the vicinity. Mated pairs will maintain or refurbish more than one nest each year, but reuse intervals may be several years or more (ICF 2014, Kochert et al. 2002).

Courtship and nest building in central California generally takes place from December through February. Golden Eagles normally lay only one brood a year that is made up of one to three eggs. The eggs are incubated for a period of between 41 to 45 days. Once hatched, the young stay in the nest for approximately 45 to 81 days between late May and early July (ICF 2014, Kochert et al. 2002).

### *3.1.2 Bald Eagle*

The Bald Eagle is a large raptor with a wingspan between 72-96 inches and an average weight of approximately 14 pounds. The female Bald Eagles are larger than males, and birds of northern states and provinces tend to be larger than those from the southern portions of the breeding range. The characteristic adult plumage consists of a white head and tail with a dark brown body. Juvenile eagles are completely dark brown and do not fully develop the majestic white head and tail until the fifth or sixth year (Buehler 2000, CDFW 2014). This eagle is found throughout North America in riparian areas associated with coasts, rivers, and lakes where it primarily feeds on fish. The Bald Eagle will also take a variety of birds, mammals, and turtles (both live and as carrion) when fish are not readily available.

Bald Eagles in winter may be found throughout most of California at lakes, reservoirs, rivers, and some rangelands and coastal wetlands. The breeding habitats found in California are mainly in mountain and foothill forests and woodlands near reservoirs, lakes, and rivers. Most of the Bald Eagle breeding territories in California are found in the northern section of the state, but the eagles also nest in scattered

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locations in the central and southern Sierra Nevada Mountains and foothills, in several locations from the central coast range to inland southern California (CDFW 2014).

Breeding habitat usually consists of nests in tall trees or on cliffs near water. Nest trees include pines (*Pinus* spp.), spruce (*Picea* spp.), firs (*Abies* spp.), cottonwoods (*Populus* spp.), oaks (*Quercus* spp.), poplars (*Liriodendron* spp.), and beech (*Fagus* spp.). The same nest may be used year after year, or the birds may alternate between two nest sites in successive years (Terres 1995, Buehler 2000).

California's breeding populations display high fidelity to both breeding and wintering sites. Resident breeding pairs overwinter in California and do not disperse far from their nest sites, unless harsh weather drives them to lower elevations. Unlike northern breeding populations of Golden Eagles, Bald Eagles that breed in northwestern Canada and the United States migrate southward in large numbers to California to overwinter; these populations are most prevalent between September and March (ICF 2014). The breeding season for Bald Eagles lasts from January through August in California. Most Bald Eagles are sensitive to human disturbances and typically do not nest if there is evidence of human activity (ICF 2014). Bald Eagles normally lay only one brood a year that is made up of one to three eggs. The eggs are incubated for a period of between 34 to 36 days. Once hatched the young stay in the nest for approximately 56 to 98 days (Buehler 2000, Terres 1995).

## 3.2 History and Summary of Eagle Monitoring in the Panoche Valley

The only species of eagle to be monitored in the Panoche Valley as part of this solar project is the Golden Eagle. There have been no in-depth studies on Bald Eagles in the Panoche Valley due to the lack of habitat, no sightings during any of the over 20,000 hours of site surveys, and only anecdotal observations of the Bald Eagle in the Panoche Valley.

### *3.2.1 Historical Surveys*

Previous surveys within the Project region that noted Golden Eagles within the vicinity of the Project Footprint were from historical data from the National Audubon Society's Annual Christmas Bird Count. There have been 45 Golden Eagles detected during the past 13 Christmas bird counts (1999-2012) in the Panoche Valley (National Audubon Society, 2014). That averages out to be approximately 3.46 per year observed within the count circle which includes all of the Project Footprint and the VFCL and a majority of the VRCL and the SCRCL.

### *3.2.2 Point Counts*

Point count surveys for Golden Eagles were conducted at established point count stations (Cooperrider et al. 1986; Hamel et al. 1996; Ralph et al. 1993; Ralph et al. 1995) every other week between the weeks of September 3, 2013 until January 24, 2014 for a total of 11 survey events. Six point count stations were located within Project Footprint/VFCL (Figure 4 Appendix A) to ensure a minimum spatial coverage of at least 30 percent of the Project Footprint (USFWS 2013). Six point count stations were also located within the VRCL and the SCRCL. Three point count stations were located in the VRCL (Figure 5 Appendix A) and three point count stations in the SCRCL (Figure 6 Appendix A). The coverage for the VRCL and SCRCL was less than 30 percent, but provided adequate observations of Golden Eagle use in these areas for general comparison purposes. Additional information can be located in the Panoche Valley Solar Point Count Survey Study Report for Golden Eagles located in Appendix B of this Plan.

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The survey locations were established by creating point count stations within an 800 meter (2,625 feet) radius observation area. The center point of each plot was geo-referenced using a global positioning system (GPS) unit. The point count surveys consisted of observers recording detections of Golden Eagles from the point count stations for two hours at each point count station (Figures 4, 5, and 6 in Appendix A). Observations were recorded on point count field forms (Pagel et al. 2010; USFWS 2013). The Golden Eagle surveys were conducted between daylight hours (sunrise to sunset) on a bi-weekly basis from September 3, 2013 to January 24, 2014. During the fall migration, when possible, surveys were completed during midday to increase sampling efficiency by temporally stratifying surveys to cover the midday period during migration (CA Energy Commission 2007; USFWS 2013).

The data collected during each point count station survey beyond the typical conditions information (e.g. date, time, temperature, wind speed and direction, and etc.) included the number of Golden Eagles seen, age class, Golden Eagles' activity/behavior, flight paths, estimated flight height and location in plot, and general description of observations.

With the data from the point count surveys, the age classes of the Golden Eagles were broken down into juvenile eagles, immature or sub-adult eagles, adult eagles, or unknown (eagles where age class could not be determined due to distance, visibility, etc.). The activity/behavior data collected noted the prevalent behavior during each one-minute interval as soaring flight (circling broadly with wings outstretched), unidirectional flapping gliding, kiting-hovering, stooping or diving at prey, stooping or diving in an agonistic context with other eagles or other bird species, undulating/territorial flight, perched, or other. The flight path data included Golden Eagles inside, as well as outside the plot. The flights were recorded on the point count data forms for each point count station.

**Project Footprint/Valley Floor Conservation Lands**

The Golden Eagle observations in the Project Footprint/VFCL totaled 43 Golden Eagles, with 15 observations within the point count plot boundaries and 28 observations outside the plot boundaries for the entire survey season. These observations were also categorized by their age class. The Golden Eagles observation on the Project Footprint/VFCL were made up of four juveniles, three inside the point count plot boundaries and one observation outside the plot boundaries. There were two sub-adult Golden Eagles observed within the point count plot boundaries and none outside. The surveys also found 14 adult Golden Eagles observations within the Project Footprint/VFCL areas, with seven adults being seen inside the plot boundaries, and seven adult Golden Eagles observed outside the plot boundaries. Additional information can be located in the Panoche Valley Solar Point Count Survey Study Report for Golden Eagles located in Appendix B of this Plan.

The point count station with the highest number of observations of Golden Eagles, both inside and outside the plot boundaries, was the station located in the northwestern portion of the Project Footprint/VFCL (Figure 4 in Appendix A) with a total of 23 Golden Eagles observations (10 inside/13 outside). Note that the high number of Golden Eagle observations at this point count station was due to numerous Golden Eagles observed utilizing the hills of the VRCL and the hills to the west of the VRCL for perching, foraging, etc. An additional event elevated the number of Golden Eagles observed at this point. During the second survey event (September 17-19, 2013), seven Golden Eagles were observed feeding on a carcass of a dead animal (i.e. cattle) during the entire point count survey period. The point count station with the lowest number of Golden Eagle observations during the survey season was the point count station located in the southeastern portion of the Project Footprint/VFCL (Figure 4 Appendix A) with no Golden Eagles observed during any of the point count surveys.

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Of the 15 Golden Eagles observations within the Project Footprint/VFCL observed within the point count plots, over half of the observations (eight Golden Eagles) were seen within the month of September. As previously stated, during the second survey event (September 17-19, 2013), seven Golden Eagles were observed feeding on a carcass of a dead animal during the entire point count survey period. The next highest number of observations during a month was the events in October with four Golden Eagles. The observation numbers for the other months included two observations in January, one Golden Eagle observation in December, and no observations of Golden Eagles in November within the Project Footprint/VFCL during the point count surveys.

**Valadeao Ranch Conservation Lands**

The Golden Eagle observations in the VRCL totaled 11 Golden Eagles with four observations within the point count plot boundaries and seven observations outside the plot boundaries for the entire survey season. These observations were also categorized by their age class. The Golden Eagle observations on the VRCL were made up of two juveniles, all inside the point count plot boundaries. There were no sub-adult Golden Eagles observed within the point count plot boundaries or outside the plot boundaries. The surveys also found two adult Golden Eagle observations within the VRCL areas, all being seen inside the plot boundaries. Furthermore, there were seven unknown age class observations that were observed outside the plot boundaries. The unknown age class observations were due to the distance between the observer and the Golden Eagles.

The point count station with the highest number of observations of Golden Eagles, both inside and outside the plot boundaries was located in the central portion of the VRCL (V-02) (Figure 5 Appendix A)with a total of seven Golden Eagles observations (two inside/five outside). The point count stations within the VRCL with the lowest number of Golden Eagles observations during the survey season was the point count station located in the southern and northern portions of the VRCL (V-01 and V-03) (Figure 5 Appendix A) with two Golden Eagle observations each during the entire study. Additional information can be located in the Panoche Valley Solar Point Count Survey Study Report for Golden Eagles located in Appendix B of this Plan.

Of the four Golden Eagle observations within the VRCL observed within the point count plots, 75 percent of the observations (three Golden Eagles) were seen within the month of September. The next highest number of observations during a month was the events in January with one Golden Eagle observation. For the months of October, November, and December, no observations of Golden Eagles were made within the VRCL during the point count surveys. Additional information can be located in the Panoche Valley Solar Point Count Survey Study Report for Golden Eagles located in Appendix B of this Plan.

**Silver Creek Ranch Conservation Lands**

The Golden Eagles observations in the SCRCL totaled seven Golden Eagles with four observations within the point count plot boundaries and three observations outside the plot boundaries for the entire survey season (Figure 6 Appendix A). These observations were also categorized by their age class. The Golden Eagle observations on the SCRCL had no juvenile or sub-adult eagles inside or outside the point count plot boundaries. The surveys found four adult Golden Eagle observations within the SCRCL areas with three observations inside the plot boundaries and one observation outside the plot boundaries. Furthermore, there were three unknown age class observations with one observation inside the plot boundaries and two observations outside the plot boundaries. The unknown age class observations were due to the distance between the observer and the Golden Eagles.

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The point count station in the SCRCL with the highest number of observations of Golden Eagles, both inside and outside the plot boundaries was S-03 (Figure 6 in Appendix A) SCRCL with a total of four Golden Eagle observations (2 inside/2 outside). The point count station with the lowest number of Golden Eagle observations during the survey season was located in the western portion of the SCRCL (Figure 6 in Appendix A) with no Golden Eagles observed during all of the point count surveys.

Of the four Golden Eagle observations within the SCRCL observed within the point count plots, 75 percent of the observations (three Golden Eagles) were seen within the month of January. The next highest number of observations during a month was the events in October with one Golden Eagle observation. For the months of September, November, and December, no observations of Golden Eagles were made within the SCRCL during the point count surveys.

Overall, the results of the point count surveys included a total of 61 observations of Golden Eagles. This total includes 23 individual observations of Golden Eagles seen within the point count plot boundaries and 38 observations outside the plot boundaries. Additional information can be located in the Panoche Valley Solar Point Count Survey Study Report for Golden Eagles located in Appendix B of this Plan.

The results of the point count surveys indicated that 93 percent of the Golden Eagles observations made within the Project Footprint and VFCL point count station boundaries were from the western point count stations, which are in close proximity to the hills located within the western portion of the VRCL. Of the 15 total Golden Eagle observations made within the Project Footprint and VFCL during the entire study within point count plots, approximately 47 percent of those observations were seen during a single survey event (September 17-19, 2013), where seven Golden Eagles were observed feeding on a carcass of a dead animal within the proposed Project Footprint. The data gathered during this fall migration/winter survey period indicates that unless there is an attractant (i.e. food) found within the Project Footprint and the VFCL, that Golden Eagles usage of the Project Footprint is nominal. Additional information can be located in the Panoche Valley Solar Point Count Survey Study Report for Golden Eagles located in Appendix B of this Plan.

### *3.2.3 Utilization Distribution Assessment*

The Utilization Distribution Assessment (UDA) for Golden Eagles occurred every other week between the weeks of September 3, 2013 until January 24, 2014 for a total of 11 survey events. The UDA was completed to document the Golden Eagles' spatial distribution of use on the proposed Project Footprint. The observation data was noted on field maps and then the data was converted into GIS formats for analyses. The field maps were created by placing a grid of square cells, each 0.5 x 0.5 kilometer (km), which was framed by a Universal Transverse Mercator (UTM) system across a map of the Project Footprint to record eagle observations in each 0.25 $km^2$ cell.

The Project Footprint/VFCL was divided into non-overlapping observation sectors centered on a designated Observation Point, each with a vantage point. The previously mentioned point count stations were utilized for the UDA Observation Points (Figure 4 Appendix A). These locations afforded an unobstructed viewing of the grid cells to more than one km in all directions. The UDA was not conducted on the VRCL and the SCRCL since they are outside of the Project Footprint.

During the UDA, the data recorded by the observers included Golden Eagle activity/behavior and flight path and location. The prevalent activity/behavior of each Golden Eagle was recorded in one-minute intervals as soaring flight (circling broadly with wings outstretched), unidirectional flapping gliding, kiting-

hovering, stooping or diving at prey, stooping or diving in an agonistic context with other eagles or other bird species, undulating/territorial flight, perched, or other. The flight paths and location data was recorded on the gridded field maps, using topographic features or distance indicators as location references.

The data was analyzed by simply counting the number of flights intersecting each cell. If the data set had been larger, a specific Golden Eagles' distribution of use would have been estimated by using standard kernel analyses (USFWS 2013).

Each survey event was made up of six UDA surveys from designated Observation Points for two hours each. The total hours surveying for Golden Eagles during the UDA study was 132 hours of survey time within the Project Footprint/VFCL (the UDA Study Area).

The results of the UDA surveys included a total of 33 observations of Golden Eagles which includes observations inside the UDA Study Area and outside the UDA Study Area. Of those 33 observations, 16 Golden Eagles observations were recorded within the UDA Study Area with five identified as adult Golden Eagles, three as sub-adult Golden Eagles, four as juvenile Golden Eagles, and four birds were not able to be identified by age class.

The majority of the Golden Eagle observations came from outside the UDA Study Area near the Observation Points P-01 and P-03 (Figure 4 in Appendix A) located in the northwestern and southwestern portions of the UDA Study Area. This is due to numerous sightings of Golden Eagles observed utilizing the hills of the western portion of the VRCL and the hills beyond the western portion of the VRCL for perching, foraging, etc.

During the UDA surveys there were 452 observation minutes of Golden Eagles inside the UDA Study Area and 157 observation minutes of Golden Eagles outside the UDA Study Area for a total of 609 observation minutes for the entire study period. Note that totals for the UDA study included several Golden Eagles that were observed feeding on a carcass of a dead animal (cattle) inside the UDA Study Area in the northwestern portion of the UDA Study Area and remained on the carcass for a majority of the UDA survey event on September 17, 2013. These observations made up 63% (285 observation minutes) of the observation time for Golden Eagles for the UDA Study. In addition, the observation time (120 observation minutes) for a sub-adult eagle that perched on the hillside for the entire UDA survey period in the northwestern portion of the UDA Study Area, noted on January 8, 2014, makes up 90 percent of the observation minutes made during the entire study within the UDA Study Area.

The average observed flight height noted during the study for observations made during UDA surveys, excluding perched Golden Eagles, was approximately 300 feet above ground level. The average flight height for the Golden Eagles observations noted inside the UDA Study Area was similar with an average flight above ground level of approximately 270 feet.

Lastly, due to the small size of the data set (only 16 Golden Eagle flight observations that utilized 57 grid cells within the UDA Study Area) a standard kernel analyses was unable to be utilized. The data was analyzed by calculating the number of flights intersecting an individual grid cell. With exception of the several Golden Eagles observed feeding on a carcass in the northeast corner of the UDA Study area, the cells noted to be utilized by Golden Eagles within the UDA Study Area indicates that the Golden Eagles are not using the northern, southwest, and south central areas of the Project Footprint/VFCL. They also did not frequent the northern portion of the Project Footprint/VFCL. The UDA Study does show, as seen in

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the point count surveys, that the Golden Eagles are utilizing the hills in the VRCL on both the eastern and western sides of the UDA Study Area for perching, foraging, etc. In addition, the study indicated that flight heights noted inside the UDA Study Area averaged approximately 270 feet with exception of the Golden Eagles noted feeding on the carcass during the noted September survey event. This shows that the eagles mostly are flying across or through the Panoche Valley (i.e. Project Footprint/VFCL) to other habitat to forage or perch.

### *3.2.4 Nesting Survey*

Helicopter-based Golden Eagle surveys were conducted in August 2010 during a non-breeding period. The surveys were specifically targeted for Golden Eagle occupancy using individual and nest sightings according to the USFWS Interim Guidelines for Golden Eagle Surveys (Pagel et al. 2010). The survey was performed by two qualified biologists who flew surveys over the Project Footprint and conservation lands. Additionally surveys were performed within a 10-mile radius of the Project Footprint. During the flight, one biologist observed at all times while the other recorded and marked data when appropriate. During the surveys, 15 Golden Eagle nests were observed within the 10-mile radius of the Project Footprint. Four of those nests showed evidence of having young fledged in 2010. No Golden Eagle nests occurred within two miles of the Project Footprint.

To augment the previously noted 2010 nest survey effort, the USFWS recommended that the PVS conduct "Stage 2" aerial surveys of the Project area nesting population during a January-February time frame before leaf-on. The aerial surveys were conducted for Golden Eagles within ten miles of the Project Footprint in January and April 2014, resulting in the documentation of 46 Golden Eagle nests and an estimated 30 Golden Eagle territories, with nine of them active, though none were located within three miles of the limits of the Project Footprint.

As per guidance provided by the USFWS, an initial round of helicopter surveys was performed over a 10-day period during the early breeding season, from January 15 to 24, 2014. The second round of aerial surveys were conducted over a 7-day period from April 2 to 8, 2014, when active nests were expected to contain eggs or young nestlings.

All surveys were conducted by qualified observers in a helicopter operated by a pilot experienced in conducting aerial Golden Eagle nesting surveys. Survey methodology described in USFWS *Interim Golden Eagle Technical Guidance: Inventory and Monitoring Protocols; and Other Recommendations in Support of Eagle Management and Permit Issuance* (Pagel et al. 2010) was followed to the extent possible. The biologists conducted an aerial examination of all appropriate nesting habitats with ten miles of the Project Footprint. During aerial surveys, the observers searched for large stick nests of Golden Eagles and other raptors on cliff faces, rocky outcrops, trees, transmission towers, and other suitable nesting substrates.

A total of 492 nests were documented by Bloom Biological, Inc. (BBI) within the Study Area, including 46 Golden Eagle nests. Nests classified as belonging to species other than Golden Eagles included nests of 226 Common Ravens (*Corvus corax*), 146 Red-tailed Hawks (*Buteo jamaicensis*), 62 Prairie Falcons (*Falco mexicanus*), eight Barn Owls (*Tyto alba*), three Great Horned Owls (*Bubo virginianus*), and one Turkey Vulture (*Cathartes aura*). Additional information can be located in the Panoche Valley Solar Facility - 2014 Final Golden Eagle Nesting Survey Report located in Appendix C of this Plan.

It was estimated that the 46 Golden Eagle nests discovered during this survey effort comprise approximately 30 breeding territories, some of which contain one or more alternate nests. The actual

number of territories could be slightly higher or lower than 30, and the exact number of territories depends, in part, on how alternate nests of a single territory are defined. Golden Eagle nesting density (and territory size) is driven primarily by habitat quality, with higher nesting density in better quality habitat. Given that habitat quality in the Nesting Study Area varies from quite high (in the northwestern quadrant, where most nests were located), to quite low, in extreme eastern portions, it would not be surprising for nests in some areas to be located as close together as one mile, or even rarely 0.5 miles, particularly in the areas of better quality habitat.

In total, nine Golden Eagle nests were classified as active in the 2014 season, each representing a separate territory. Thus, active nesting occurred in almost one-third (9 of about 30) of the territories identified in this survey. Of these nine nests, eggs are presumed to have been laid in at least four. Adults were observed on nests in incubating posture and two un-incubated eggs were observed in (presumed failed) nests in April. Finally, two chicks were observed being tended to by a female Golden Eagle in early April. Of the remaining five Golden Eagle nests that were identified as active in 2014, none were known to contain eggs or nestlings as of the April 8$^{th}$ survey date. A nest was considered active if any of the following three conditions was met: (1) fresh (live or dead) sticks had been added during the current nesting season, (2) the nest was found to contain eggs or young (dead or alive), or (3) an adult was observed on the nest in an incubating (or brooding) posture. Given that Golden Eagles in this region normally lay eggs on or before this date, it is very unlikely that any of these five nests went on to successfully fledge young during the 2014 nesting season.

No Golden Eagle nests were identified within three miles of the Project Footprint, though four nests were located within four miles of the Project Footprint. Two of these four nests were active in 2014, though neither nest was ever found to contain eggs or nestlings. The next closest active Golden Eagle nest to the Project in 2014 was located approximately 5.79 miles north-northwest of the Project Footprint. Additional information can be located in the Panoche Valley Solar Facility - 2014 Final Golden Eagle Nesting Survey Report located in Appendix C of this Plan.

### *3.2.5 Summary and Conclusions*

**Golden Eagle**

With exception of the studies performed for the Panoche Valley Solar Project, Golden Eagle presence in the Panoche Valley has not been well studied, and the effects of other solar projects near the project have not been reported. Based on the point count, UDA, aerial nesting survey information and incidental observations, it is apparent that Golden Eagles forage in and around the Panoche Valley throughout the year. The overall activity levels within the Project Footprint appear low with a majority of the activity taking place on adjacent conservation lands which has elevations ranging from approximately 1,400 feet to 2,100 feet amsl. Because the Project Footprint does not support significant populations of ground squirrels and other diurnal prey species (personal obs.), and because of the present land management practices, the area is likely less attractive to foraging Golden Eagles than the Conservation Lands. Additionally, as found during the point count and the UDA studies, unless there is an attractant (i.e. food, carcass) found within the Project Footprint and the VFCL, the Golden Eagles usage of the site is nominal. The UDA study also indicated that the Golden Eagles are mostly flying across or through the Panoche Valley (i.e. Project Footprint/VFCL) to other habitats to forage or perch. Therefore, the Project Footprint does not appear to be an “important eagle-use area” because the site does not appear to meet the criteria of an eagle nest, foraging area, or communal roost site that eagles rely on for breeding, sheltering,

or feeding, or having landscape features surrounding nest, foraging area, or roost site that are essential for the continued viability of the site for breeding, feeding, or sheltering eagles

In addition, the 2010 aerial nesting study identified no Golden Eagle nests within two miles of the Project Footprint. In 2014, the nesting study identified no Golden Eagle nests within three miles of the Project Footprint. The next closest active Golden Eagle nest to the Project in 2014 was located approximately 5.79 miles north-northwest of the Project Footprint.

Overall, the body of information regarding Golden Eagle use, abundance, and behavior (fall and winter point count and UDA surveys) in the Panoche Valley appears to be documented sufficiently for a PV solar facility to provide a baseline upon which to base the risk assessment for Golden Eagles and indicates that the Project Footprint is not an important eagle-use area for the time frame for which those studies were completed.

**Bald Eagle**

With no historical studies focused on Bald Eagles and the lack of observations during the Golden Eagle point counts, UDA and nesting surveys, and anecdotal observations made during Christmas Bird Counts, it has been determined that there is no risk to the Bald Eagle associated with the Panoche Valley Solar Project. Therefore, no further discussions about Bald Eagles will be addressed in this document.

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# 4.0 RISK ANALYSIS (STAGE 3)

The Panoche Valley Solar Project is a photovoltaic solar project that has been studied for eagle use. Per the USFWS recommendations, the Golden Eagle studies followed the Wind Energy Guidelines in Tier 3, Stage 2 of which includes site-specific surveys and assessments in anticipation of this Eagle Conservation Plan preparation (USFWS 2013). Data from the studies was used to determine any mortality projections for the Panoche Valley Solar Project.

## 4.1 Nesting and Breeding

The Project's risk to nesting and breeding Golden Eagles is low to none. Very little foraging use of the Project Footprint was documented during the studies conducted. This lack of foraging activity is likely due to relatively poor foraging conditions because of present land management practices and sparse prey base. Additionally, the relatively flat terrain of the Project Footprint constrains the thermal updrafts needed to support productive nesting. On the Project Footprint, there are a limited number of potential nest trees, no suitable cliffs, and limited structures present. All nesting surveys have shown that no nesting has taken place within two miles of the Project Footprint. Furthermore, there should be no disturbance from pre-construction, construction, or operation and maintenance activities that might disturb Golden Eagles at the closest nesting site due to the distance which was 3 miles per the 2014 nest survey. Although the Project Footprint development will result in loss of potential foraging habitat, no loss of nesting territories is anticipated based on the distance to the nearest nesting activity and higher relative use observed outside of the Project Footprint.

## 4.2 Fatality Estimates

Typically to assess the level of risk anticipated by a project, actual fatality data is examined from nearby operational projects. However, at the time of the ECP preparation, no fatality studies for Golden Eagles from nearby photovoltaic solar projects were known. A report (*Avian Mortality at Solar Energy Facilities in Southern California: A Preliminary Analysis*) on bird mortality at three solar energy facilities in southern California was published by the National Fish and Wildlife Forensics Laboratory in April 2014. The facilities use different solar technologies, but avian mortality was documented at each site (Kagan et al. 2014). The photovoltaic solar study site that was studied was the Desert Sunlight Solar Farm in Riverside County, California. The study indicated that a majority of the fatalities were waterbirds due to blunt force impact trauma from traumatic impact with the cells. The results also showed that no raptor species fatalities including Bald Eagles or Golden Eagles were recorded at the photovoltaic solar study site even with numerous potentially active Golden Eagle nests found within the a 10-mile radius of the Desert Sunlight Project. Overall, there does not appear to be outlying habitat elements, topographical features, or land use practices that would distinguish the Project from other photovoltaic solar facilities that would provide cause for presuming a mortality risk for eagles. Because there is no evidence to suggest direct take of eagles will occur at a PV solar facility and potential impacts to foraging habitat are being offset at greater than a 2:1 ratio (estimated to be approximately 9:1 at present day planned Conservation Land acreages), no eagle fatalities are expected to result from the construction and operation of the project. Additionally, the habitat to be preserved as Conservation Lands was observed to be used by foraging Golden Eagles.

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## 4.3 Site Categorization Based on Mortality Risk to Eagles

The ECP Guidelines recommend a standardized approach to characterize risk and categorize the likelihood that a project will meet the standards for issuance of a programmatic eagle take permit.

Those categories are listed below.

- Category 1 — High risk to eagles/potential to avoid or mitigate impacts is low.
- Category 2 — High to moderate risk to eagles/opportunity to mitigate impacts.
- Category 3 — Minimal risk to eagles.

PVS is considered a Category 3 project based on the risk analysis described above. PVS is considered minimal risk because the Project Footprint would not be considered an important eagle use area or a fall migration concentration site due to the results of the point count, UDA, and nesting studies; the planned avoidance and minimization measures; compensatory mitigation for habitat loss; and there should be no risk of a direct take during Project construction or operation. Additionally, it appears form recent surveys that no eagle nests will be disturbed by the Project.

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# 5.0 AVOIDANCE AND MINIMIZATION OF RISK, ADVANCED CONSERVATION PRACTICES, AND MITIGATION (STAGE 4)

PVS has adopted numerous avoidance and minimization measures, as well as compensatory mitigation for habitat loss, as part of its permitting and environmental compliance processes for the Project. The overall eagle conservation strategy includes two elements: avoidance and minimization of risk and compensatory mitigation.

## 5.1 Project- and Population-Level Effects

### *5.1.1 Project-Level Effects*

Without a conservation strategy which includes compensatory mitigation for habitat loss, construction and operation and maintenance avoidance measures, the project could result in introducing hazards onto the landscape within the Project Footprint, and create other hazardous conditions for Golden Eagles. As described in the Stage 3 analysis, the information suggests that operations could result in state or federal defined take if the mitigation and the construction and operation and maintenance avoidance measures are not implemented.

### *5.1.2 Population-Level Effects*

The construction of the solar facility within the Project Footprint will not have a significant impact on the overall population of Golden Eagles. The only impacts to Golden Eagles anticipated by the construction of the Project would be the loss of approximately 2,506 acres of potential foraging habitat. The conservation lands that will be set aside as mitigation will include habitats that are utilized by Golden Eagles for foraging as stated in Section 3.0 of this document. These conservation lands are of equal or greater habitat quality and will support an equal or greater population of Golden Eagles and their prey species after the restoration/preservation activities compared to the habitat found within the Project Footprint. Therefore the 24,176 acres of conservation land is suitable for Golden Eagle mitigation and provides adequate habitat to fully compensate for any loss of foraging habitat caused by the Project.

## 5.2 Construction and Operation and Maintenance-Related Avoidance and Minimization Measures

### *5.2.1 General Construction Proposed Avoidance and Minimization Measures*

PVS will implement the following best management practices (BMPs) and avoidance and minimization measures in order to minimize potential impacts on Golden Eagles. Many of these measures are also described in the FEIR for the Panoche Valley Solar Project.

1. Before commencing on-site construction activities, PVS will submit to CDFW and USFWS, the name, qualifications, business address, and contact information of one or more County-approved, qualified biologists. The Permittee shall ensure that each County-approved, qualified biologist is knowledgeable and experienced in the biology, and natural history of the special status species such as the Golden Eagle on the Project. The County-approved, qualified biologist(s) shall be responsible for monitoring construction activities to help minimize and fully mitigate or avoid the take of Golden Eagles and to minimize disturbance of Golden Eagle foraging habitat. The County-

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approved, qualified biologist may appoint biological monitors to perform biological surveys or provide oversight of ground disturbing activities as needed in their place. All biological monitors that work on-site will receive instruction from and report to the County-approved, qualified biologist(s).

2. Prior to surface disturbance or other covered activity, a County-approved, qualified biologist shall conduct a Protected Species (including Golden Eagles) education program (tailgate briefing) for all Project personnel, which familiarizes the PVS employees and contractors with occurrence and distribution of Golden Eagles in areas impacted by the Action; take avoidance measures being implemented during the Project; and BMPs. This program is designed to ensure all personnel who work at the Project are aware of and can identify the Golden Eagles and the measures implemented to protect this species. An employee environmental awareness program will be administered to all employees prior to starting work on the Project.

3. Posters showing pictures of protected species, including Golden Eagles, with information and protocols to be followed will be placed in conspicuous locations (e.g. construction trailers). Verbiage will be in English and in Spanish.

4. A County-approved, qualified biologist or their representative shall be present while ground-disturbing activities are occurring. In addition to conducting preconstruction surveys, the biologist(s) shall aid crews in satisfying take avoidance criteria and implementing mitigation measures; will document (weekly) all pertinent information concerning Action effects on protected species; and shall assist in minimizing the adverse effects of construction activities on protected species.

5. County-approved, qualified biologists and biological monitors are empowered to order cessation of activities if take avoidance and/or mitigation measures are violated and will notify the applicants environmental representative immediately.

6. PVS shall appoint a company representative who will be the contact source for any employee or contractor who inadvertently kills or injures a protected species or who finds a dead, injured, or entrapped protected species. The representative will be identified during the pre-performance educational briefing.

7. All spills of hazardous materials shall be cleaned up immediately in accordance with the Applicant Spill Prevention Control Plan.

8. Pets are prohibited at the Action site with the exception of working dogs. Working dogs that assist ranchers are not considered pets. Any working dog entering the Project Footprint will be required to provide proof of inoculations to prevent disease transmission.

9. Firearms are prohibited within the Project Footprint.

10. All food-related trash, such as wrappers, cans, bottles, bags, and food scraps shall be disposed of daily in containers with secure covers and regularly removed from the Project Footprint.

11. Use of rodenticides on the Project Footprint will be prohibited. The use of herbicides in areas impacted by the Project will be restricted to use within the prescriptions of the Noxious Weed and Invasive Plant Control Plan. Herbicides used for noxious weed control would be applied in

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accordance with BLM-approved procedures and other federal and state regulations. Applications will be applied by licensed applicators in accordance with label directions and other restrictions mandated by U.S. Environmental Protection Agency, County Agricultural Commissioner, regional label prescriptions on use, California Department of Food and Agriculture, and other state and federal legislation.

12. All carcasses of large animals (e.g. deer, pig, livestock, etc.) found within the Project Footprint or along Little Panoche Road adjacent to the Project Footprint and VFCL will be removed to an appropriate landfill within 24 hours to reduce the risk of vehicle collision on scavenging Golden Eagles.

### *5.2.2 Operations and Maintenance Proposed Avoidance and Minimization Measures*

The avoidance and minimization measures described below will be implemented during operations and maintenance of the solar facility throughout its operation in regards to Golden Eagles.

1. All spills of hazardous materials shall be cleaned up immediately in accordance with the Applicant's Spill Prevention Control Plan.

2. Pets are prohibited at the Project Footprint with the exception of working dogs. Working dogs that assist ranchers are not considered pets. Any working dog that will be entering the Action site will have to show proof of inoculations to prevent disease transmission.

3. Firearms are prohibited at the Project Footprint.

4. All food-related trash, such as wrappers, cans, bottles, bags, and food scraps shall be disposed of daily in containers with secure covers and regularly removed from the site.

5. Use of rodenticides on the Project Footprint will be prohibited. The use of herbicides in areas impacted by the Project will be restricted to use within the prescriptions of the Noxious Weed and Invasive Plant Control Plan. Herbicides used for noxious weed control would be applied in accordance with BLM-approved procedures and other federal and state regulations. Applications will be applied by licensed applicators in accordance with label directions and other restrictions mandated by U.S. Environmental Protection Agency, County Agricultural Commissioner, regional label prescriptions on use, California Department of Food and Agriculture, and other state and federal legislation.

6. Any project-related electric distribution and substation structures will be constructed using APLIC-based avian protection guidelines and the Avian Conservation Strategy prepared for the Project. The APLIC-based avian protection guidelines are designed to reduce the operational and avian risks that result from avian interactions with electric utility facilities. The goals of the Avian Conservation Strategy are to develop measures that, when implemented for the Project, will avoid and reduce potential impacts to birds during construction, O&M, and decommissioning of the Project; develop if necessary, effective post-construction monitoring and adaptive management procedures to guide management actions for the life of the Project; and develop a protocol for communication and reporting to the appropriate state and federal agencies.

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7. All carcasses of large animals (e.g. deer, pig, livestock, etc.) found within the Project Footprint or along Little Panoche Road adjacent to the Project Footprint and VFCL will be removed to an appropriate landfill within 24 hours to reduce the risk of vehicle collision on scavenging Golden Eagles.

### *5.2.3 Other Proposed Avoidance and Minimization Measures*

The avoidance and minimization measures described below will be implemented during construction and operations and maintenance of the solar facility throughout its operation in regards to Golden Eagles. These additional measures are due to the requirements in the FEIR.

1. PVS will conduct pre-construction surveys for nesting and breeding birds and implementation of avoidance measures prior to any on-site disturbance (i.e., mobilization, staging, grading or construction) during the breeding season from February 1 and August 15. The qualified biologist must be trained and able to identify Golden Eagles. Surveys for nesting birds shall be conducted within the recognized breeding season in all areas within 500 feet of solar arrays, staging areas, substation sites, and access road locations. Surveys for raptors such as Golden Eagles, shall be conducted for all areas between February 1 and August 15. If nesting Golden Eagles are identified, a 0.5-mile no activity buffer will be implemented. The required survey dates may be modified based on local conditions, as determined by the County-approved, qualified biologist, with the approval of the County of San Benito.

   The prescribed buffers may be adjusted to reflect existing conditions including ambient noise, topography, and disturbance with the approval of the San Benito County as appropriate. The biological monitor(s) shall conduct regular monitoring of the nest to determine success/failure and to ensure that project activities are not conducted within the buffer(s) until the nesting cycle is complete or the nest fails. The biological monitor(s) shall be responsible for documenting the results of the surveys and ongoing monitoring and will provide a copy of the monitoring reports for impact areas to the respective agencies.

   Surveys shall be conducted to include all structural components of the solar arrays and related structures as well as all construction equipment. If Golden Eagles are found to be nesting in facility structures, buffers as described above shall be implemented.

   If Golden Eagle nests are found within these structures and contain eggs or young the biological monitor shall not allow activities within a 500-foot buffer until the young have fledged the nest or the nest fails.

2. To ensure the success of acquired mitigation lands, required for compensation of permanent impacts to vegetative communities and listed or special-status species, PVS shall retain a County-approved, qualified biologist to prepare a Habitat Management (HMP). The HMP will be submitted to the County of San Benito for approval, prior to the issuance of a construction permit.

3. PVS shall develop and implement measures to minimize nuisance impacts and to significantly reduce fugitive dust emissions.

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## 5.3 Advanced Conservation Practices (ACP)

Because there are no conservation measures that have been scientifically shown to reduce eagle disturbance at solar projects, the USFWS does not have any currently approved ACPs for solar energy projects. Therefore, no ACPs are proposed for this Project other than the practices noted above in Section 5.2.

## 5.4 Mitigation

In addition to the avoidance and minimization measures described above, the Project will also implement a conservation package consisting of the permanent preservation and management of three large parcels of land to offset potential impacts totaling approximately 24,176 acres. These lands are the VFCL, VRCL, and SCRCL. These lands will be enhanced and managed for the species through implementation of a Conservation Management Plan. The lands were selected to provide local mitigation, preserve core populations of special status species and create permanent movement corridors with adjacent BLM controlled lands.

With the protection of these conservation lands, PVS shall compensate for permanent impacts to habitat for foraging Golden Eagles with the creation of permanent conservation easements. Conservation easements shall provide habitat preservation, in perpetuity at a ratio of 2:1 for all impacted acreage. The estimated ratio for habitat preservation calculated from the present day acreage of Conservation Lands is greater than 9:1. Preserved habitat shall be of equal or greater quality after any restoration activity compared to the impacted habitat within the Project Footprint. This mitigation may occur on lands used simultaneously as mitigation for impacts to other species.

## 5.5 Effects of the Conservation Strategy

### *5.5.1 Methods*

The population studies which include the point count study, the UDA study, and the aerial nesting surveys were developed and completed for the Panoche Valley Solar Project to determine the possibility and extent of potential impacts of the Project on the resident and migratory populations of Golden Eagles that utilize the Panoche valley. In addition, these studies also insured that the determination of appropriate compensatory mitigation for the anticipated effect on the population provided the necessary benefits of mitigation for the local Golden Eagle population.

### *5.5.2 Project and Population-Level Effects*

Project-level effects are expected to be equal to or less than those estimated within this ECP for the following reasons.

- The Project Footprint does not support significant populations of ground squirrels and other diurnal prey species for the Golden Eagle;
- Aerial nesting study identified no Golden Eagle nests within two miles of the Project Footprint during any of the nesting surveys;

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- The area is likely less attractive to foraging Golden Eagles due to the present land management practices;

- As noted in the point count and the UDA studies, unless there is an attractant (i.e. food, carcass) found within the Project Footprint and the VFCL, that Golden Eagles usage of the site is nominal. The UDA study also indicated that the Golden Eagles mostly are flying across or through the Panoche Valley to other habitat to forage or perch.

The Project will avoid disturbance of any nesting Golden Eagles within 0.5 miles of the Project Footprint during construction and will avoid the introduction of other hazards (e.g., prey attractants) into the project area that could cause effects on eagles. The Project will include all avoidance and minimization measures pertaining to Golden Eagles to reduce the potential for mortality. The Project may still result in occasional indirect effects on individual eagles during operation; however, those effects are not anticipated to rise to the level of take and would be mitigated to ensure there is no net loss to the population.

The combination of avoidance and minimization measure and compensatory mitigation commitments will ensure that the net effect of PVS's operations on the eagle population is, at a minimum, no net loss. Therefore, the overall USFWS goal of maintaining stable or increasing breeding populations of Golden Eagles will be achieved.

### *5.5.3 Cumulative Effects*

Analysis of cumulative effects typically considers the effects of a proposed project in combination with the effects of past, present, and reasonably foreseeable projects. To date, no other solar projects have been built in the vicinity of the Panoche Valley Solar Project and to the knowledge of PVS; no solar facilities are planned for construction in the future. However, if in the future a solar facility is planned in the vicinity of the Panoche Valley Solar Project, that project will be subject to the same regulations, and will be required to ensure that their effects are avoided, minimized, and mitigated, and that there is no net loss to the population. Therefore, the cumulative effects on Golden Eagles, directly or indirectly would be considered low to none.

## 5.6 Summary and Conclusions

PVS will adhere to the avoidance measures and conservation approach described above. The construction and operation and maintenance avoidance and minimization measures are expected to result in avoidance of direct effects to Golden Eagles during construction and long-term operations. Furthermore, the proposed compensatory mitigation will ensure that any impacts to Golden Eagle foraging habitat is mitigated to the approved ratio determined by the appropriate state and federal agencies. With implementation of these measures and particularly the compensatory mitigation, effects will be avoided, minimized, and mitigated, resulting in no net loss to the Golden Eagle population in the vicinity of the Project.

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# 6.0 POST-CONSTRUCTION MONITORING (STAGE 5)

Prior to the issuance of a construction permit; PVS shall retain a County-approved, qualified biologist to prepare a monitoring and avoidance plan in consultation with the CDFW and the USFWS. This plan shall follow the guidelines outlined by USFWS and APLIC. This monitoring plan will require that for two years following the solar facility becoming fully operational, UDA studies for Golden Eagles will occur every other week between the first of September and the last day in January for a total of at least 11 survey events. The UDA will document the Golden Eagles' spatial distribution of use on the Project Footprint/VFCL. The observation data was noted on field maps and then the data was converted into GIS formats for analyses. The field maps will be created by placing a grid of square cells, each 0.5 x 0.5 kilometer (km), which was framed by a Universal Transverse Mercator (UTM) system across a map of the Project Footprint/VFCL to record eagle observations in each 0.25 km2 cell.

The Project Footprint/VFCL was divided into non-overlapping observation sectors centered on a designated Observation Point which will remain through the study, each with a vantage point. The locations will afford an unobstructed viewing of the grid cells to more than one km in all directions. The UDA was not conducted on the VRCL and the SCRCL since they are outside of the Project Footprint.

Each UDA survey event will be made up of six UDA surveys from designated Observation Points for two hours each. The Observation Points will mimic the points utilized in the pre-construction UDA Study included in Appendix B of this plan.

During the UDA, the data recorded by the observers will include Golden Eagle activity/behavior and flight path and location. The prevalent activity/behavior of each Golden Eagle will be recorded in one-minute intervals as soaring flight (circling broadly with wings outstretched), unidirectional flapping gliding, kiting-hovering, stooping or diving at prey, stooping or diving in an agonistic context with other eagles or other bird species, undulating/territorial flight, perched, or other. The flight paths and location data was recorded on the gridded field maps, using topographic features or distance indicators as location references.

The data will be analyzed by simply counting the number of flights intersecting each cell. If the data set is large enough, a specific distribution of use will be estimated by using standard kernel analyses (USFWS 2013).

The County-approved, qualified biologist will submit annual reports to the USFWS, CDFW and San Benito County describing the dates, durations, and results of monitoring and data collection. Original data sheets, photographs, and relevant shape files (if any) will be attached to the reports.

After the first year of data collection the biologist will prepare an overall report that describes the study design and results of the UDA monitoring in the Project Footprint/VFCL. This report will be used to determine whether the utilization of the Project Footprint/VFCL is equal to or greater than the pre-construction results and if monitoring can be terminated due to those results after consultation with the USFWS, CDFW and San Benito County. If the utilization of the Project Footprint/VFCL is than the pre-construction results, the second year of monitoring will be

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completed. At the conclusion of the second year of monitoring the report will be submitted to the agencies to determine whether the monitoring design needs to be changed or additional years of monitoring are deemed necessary.

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# APPENDICES

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# Appendix A
Figures

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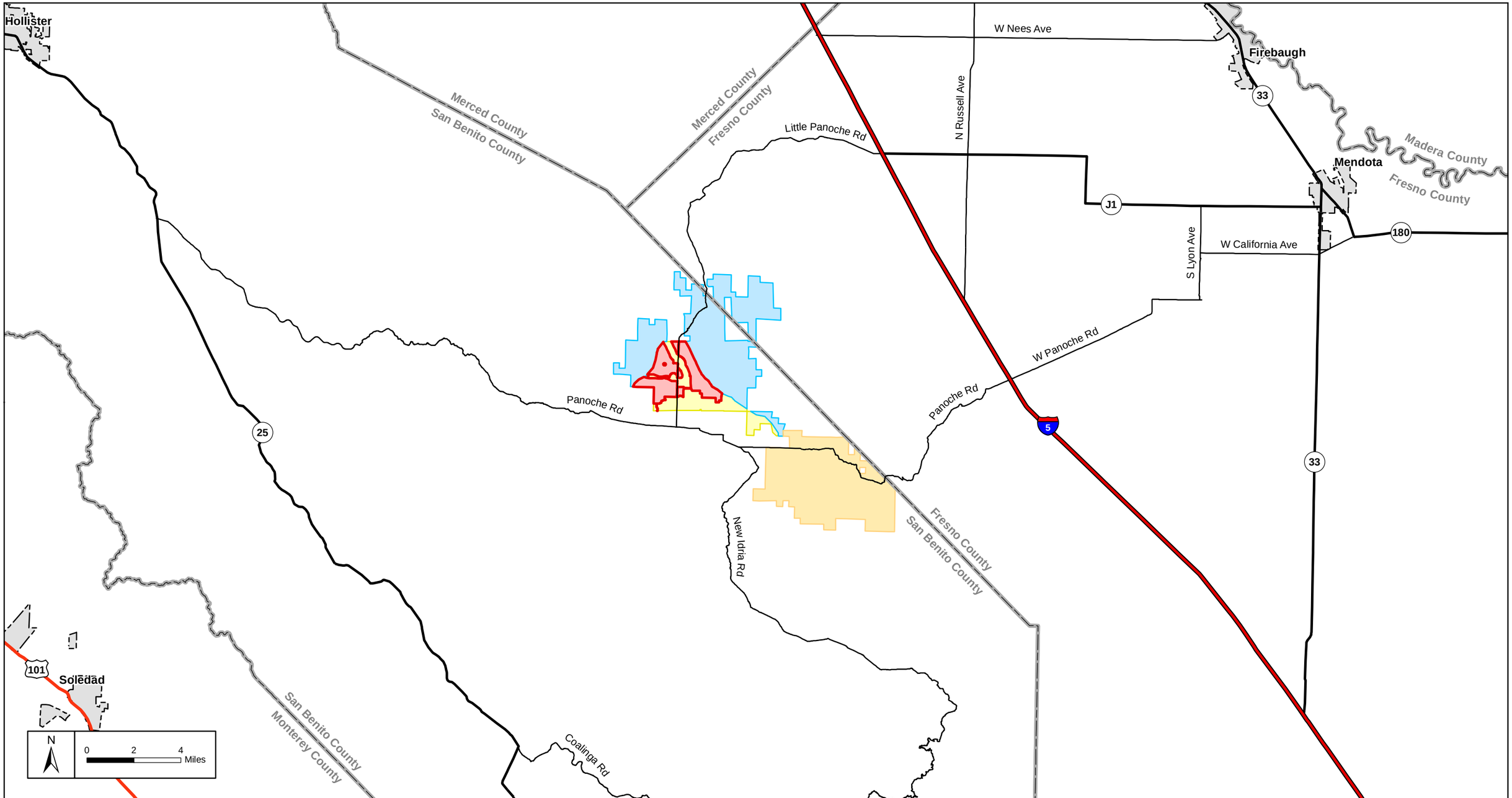


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Energy Renewal
PARTNERS, LLC

**Legend**

- Project Footprint
- Valley Floor Conservation Lands
- Valadeao Ranch Conservation Lands
- Silver Creek Ranch Conservation Lands
- City

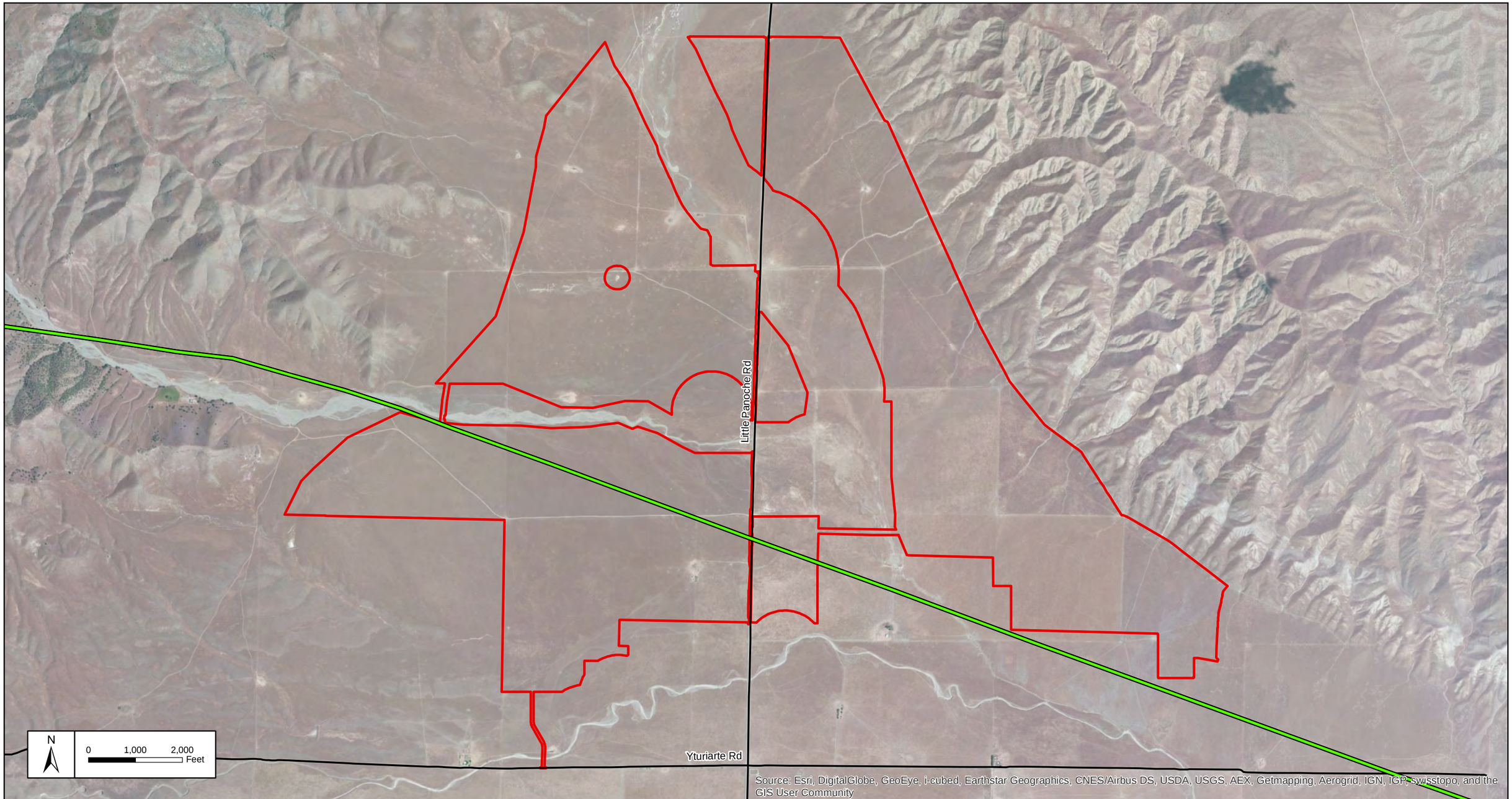
# Panoche Valley Solar Project

## Project Location

FIGURE

1

JH 2014-12-02

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**Legend**

Project Footprint

Existing Transmission Line

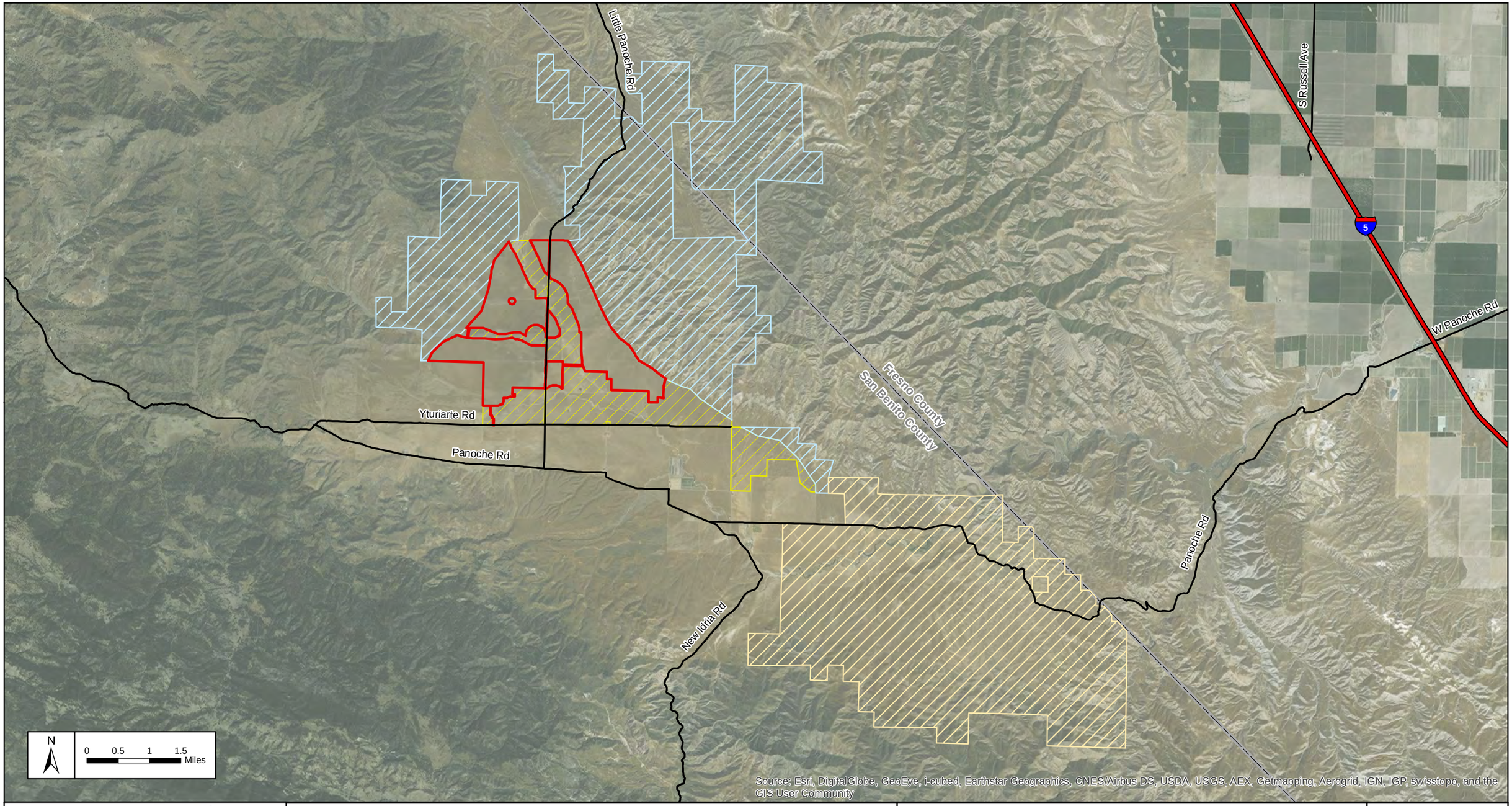
# Panoche Valley Solar Project

## Project Footprint

FIGURE

2

JH 2014-12-02

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**Legend**

- Project Footprint
- Valley Floor Conservation Lands
- Valadeao Ranch Conservation Lands
- Silver Creek Ranch Conservation Lands

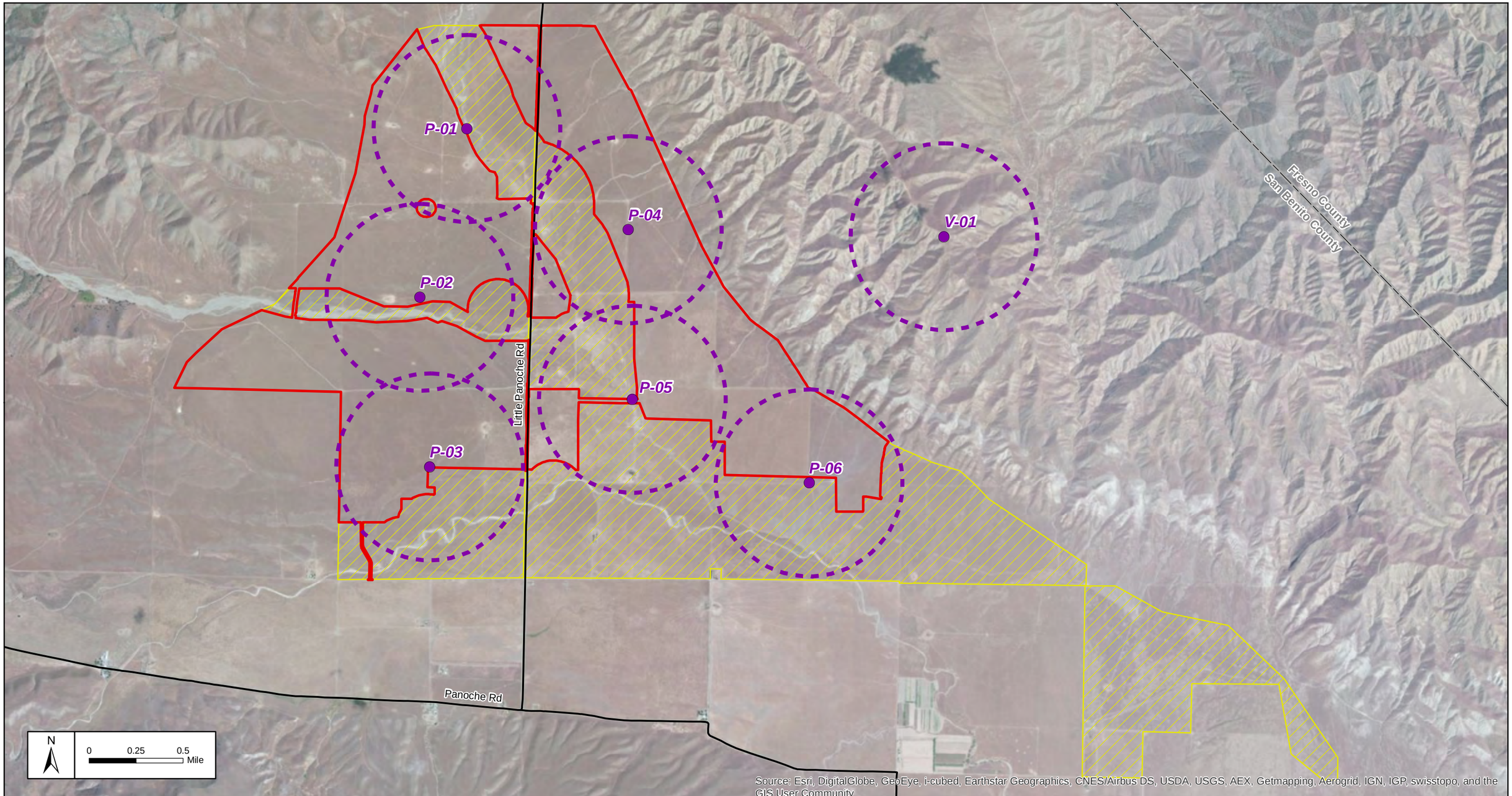
# Panoche Valley Solar Project

## Project Footprint and Conservation Lands

FIGURE

3

JH 2014-12-02

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**Legend**

- Point Count Station
- 800-meter Observation Area
- Project Footprint
- Valley Floor Conservation Lands

# Panoche Valley Solar Project

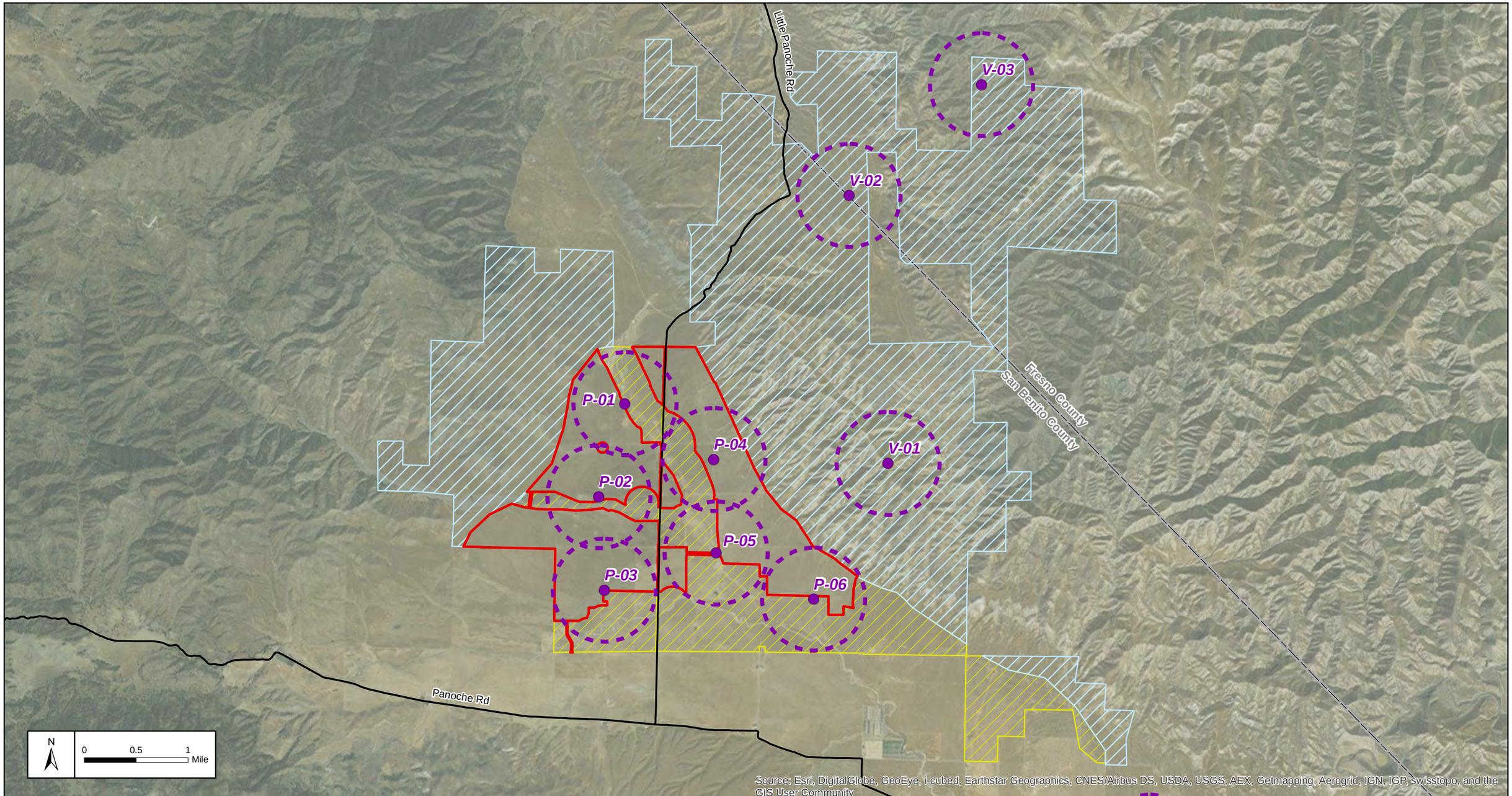
## Point Count Stations

Project Footprint and Valley Floor Conservation Lands

FIGURE

4

JH 2014-12-02

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**Legend**

- Point Count Station
- 800-meter Observation Area
- Project Footprint
- Valadeao Ranch Conservation Lands
- Valley Floor Conservation Lands

# Panoche Valley Solar Project

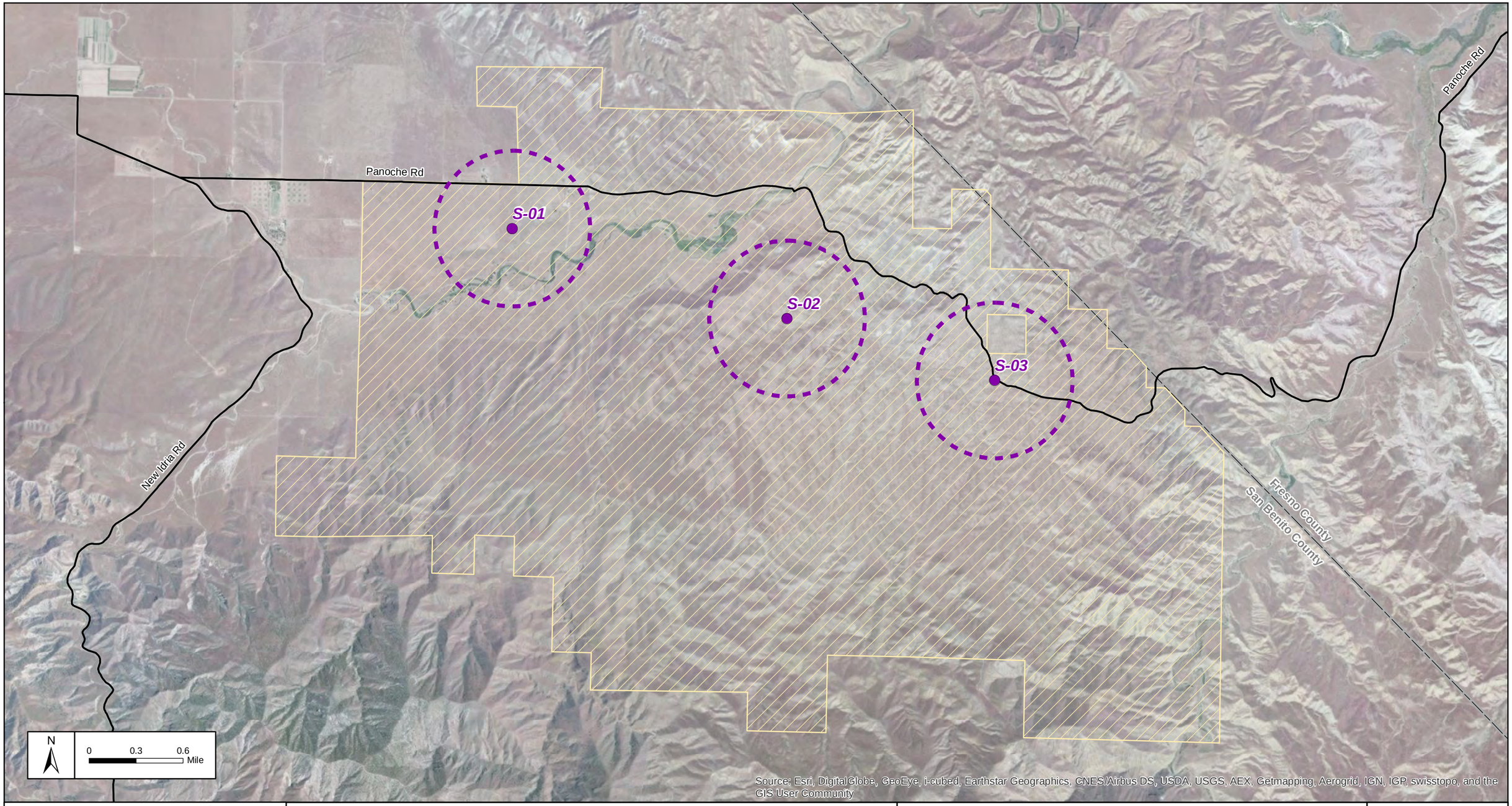
## Point Count Stations

Valadeao Ranch Conservation Lands

FIGURE

5

JH 2014-12-02

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**Legend**

- Point Count Station
- 800-meter Observation Area
- Silver Creek Ranch Conservation Lands

# Panoche Valley Solar Project

## Point Count Stations

Silver Creek Ranch Conservation Lands

FIGURE

6

JH 2014-12-02

**Appendix B**

Panoche Valley Solar Point Count Survey Study Report

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# Panoche Valley Solar Point Count

# Survey Study Report

Panoche Valley Solar Project
San Benito County, California
April 2014

*Image Courtesy of Michael Bumgardner*

Prepared for:
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Prepared by:
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## Abbreviations and Acronyms

| | |
|---|---|
| °F | Degrees Fahrenheit |
| AMSL | Above Mean Sea Level |
| BBCS | Bird and Bat Conservation Strategy |
| CNPS | California Native Plant Species |
| Duke Energy | Duke Energy Renewables |
| ECP | Eagle Conservation Plan |
| FEIR | Final Environmental Impact Report |
| GOEA | Golden eagle |
| GPS | Global positioning system |
| km | kilometer |
| MW | Megawatt |
| Project Footprint | The portion of the Proposed Project that includes the solar arrays and associated roads and equipment, totaling 2,492 acres. |
| Proposed Project | Panoche Valley Solar Project |
| PVS | Panoche Valley Solar, LLC |
| SCRCL | Silver Creek Ranch Conservation Lands |
| UDA | Utilization Distribution Assessment |
| USFWS | United States Fish and Wildlife Service |
| UTM | Universal Transverse Mercator |
| VFCL | Valley Floor Conservation Lands |
| VRCL | Valadeao Ranch Conservation Lands |

# 1.0 Project Introduction and Background

Panoche Valley Solar, LLC (PVS) is proposing to construct the proposed Panoche Valley Solar Project (Proposed Project). PVS is proposing to construct the Proposed Project to operate an up to 399-Megawatt (MW) solar photovoltaic energy generation facility in San Benito County, California (Figure 1). The Proposed Project would be located approximately three-quarters of a mile north of the intersection of Panoche Road and Little Panoche Road, in eastern San Benito County (Figure 2). The Proposed Project site is comprised of approximately 2,492 acres in the Panoche Valley and would also include approximately 24,185 acres of high quality Conservation Lands that are contiguous with the Proposed Project area (Figure 3).

On June 13, 2013, PVS consulted with the United States Fish and Wildlife Service (USFWS)-Ventura office concerning the requirement to prepare an Eagle Conservation Plan (ECP) and a Bird and Bat Conservation Strategy (BBCS) for the Proposed Project. It was determined during this discussion, the data presented in the 2010 Final Environmental Impact Report (FEIR) was dated, insufficient in coverage, and was conducted too late in the season. USFWS recommended a Phase II site-specific golden eagle (GOEA; *Aquila chrysaetos*) study be conducted (USFWS 2013).

This report documents the survey results of GOEA occurrence, frequency, and behavior conducted during the migratory and wintering phase (September through January) within the Proposed Project area and associated conservation lands in the Panoche Valley (Figure 3). The conservation lands include three large parcels of land to offset potential impacts as part of a conservation package consisting of the permanent preservation and management of those parcels. These parcels are called the Valley Floor Conservation Lands, the Valadeao Ranch Conservation Lands, and the Silver Creek Ranch Conservation Lands (Figure 3).

Additionally, aerial surveys conducted in January and March were completed to determine the number and locations of occupied nests and the approximate centers of occupied nesting territories of GOEA within a 10-mile radius centered on the Project Footprint. The results of these studies will be summarized in a separate report. Results of the combined studies will be used to prepare the ECP and the BBCS.

## 2.0 Study Purpose and Need

The Point Count and Utilization Distribution Assessment (UDA) studies were completed to provide baseline data on GOEA occurrence, frequency, and behavior to present results of spatial and temporal site use and potential risk based on time spent within the Proposed Project area.

## 3.0 Study Area

The Study Area includes the Proposed Project which is generally located approximately three-quarters of a mile north of the intersection of Panoche Road and Little Panoche Road, in eastern San Benito County. This location is approximately two miles southwest of the Fresno County Line and the Panoche Hills, and approximately 15 miles west of Interstate 5 and the San Joaquin Valley. The Project Footprint is located within Township 15S, Range 10E, Sections 3-4, 8-11, and 13-16 of the United States Geologic Survey's Cerro Colorado, Llanada, Mercy Hot Springs, and Panoche 7.5-minute topographic quadrangle maps. In addition to the Project Footprint, the Study Area also includes the Conservation Lands associated with the Proposed Project, which are located in both San Benito and Fresno counties within Township 15S, Range 10E, Sections 3-4, 8-10, 13-16, and 25; Township 15S, Range 11E, Section 19; Township 14S, Range 10E, Sections 21-27, and 32-36; Township 14S, Range 11E, Sections 19, and 29-32; Township 15S, Range 10E, Sections 1-8, and 10-14; Section 15S, Township 11E, Sections 6-7, 19-20, and 26-36; and Township 16S, Range 11E, Sections 1-6, and 8-12 (Figure 3).

The Study Area is comprised almost entirely of annual, non-native grasslands used mainly to graze cattle and sheep. The Study Area experiences a Mediterranean climate with dry hot summers and cool wet winters. However, this region does not experience heavy rainfall. Annual precipitation in the general vicinity of the site ranges from eight to ten inches per year. Approximately 85 percent of precipitation falls between October and March. Temperatures average approximately 80 degrees Fahrenheit (˚F) in the summer and 40˚F in the winter, mid-summer temperatures are often over 100˚F, and winter lows can be close to freezing. Nearly all precipitation infiltrates into the site's soils and flows in creeks and drainages when soil capacity has been reached.

The Study Area for this GOEA survey includes the habitats within the following areas:

- Project Footprint
- Conservation Lands associated with the project including the Valley Floor (VFCL), Valadeao Ranch (VRCL), and Silver Creek Ranch (SCRCL)areas

***Project Footprint***

The Project Footprint consists of the area within the fence line of the proposed solar facility and is composed of approximately 2,492 acres of rangeland. Historically, the Project Footprint was used for crop production; however, in the past approximately 40 years, the site has been used for cattle grazing. The site is surrounded by rangeland and bordered by hills of the Gabilan Range to the west and the Panoche Hills to the east. The topography of the site dips gently down to the east-southeast. The site elevation ranges from approximately 1,200 feet above mean sea level (amsl) near the southeast end of the site to approximately 1,400 feet amsl near the west end.

Prominent grass species within the Project Footprint include ripgut brome (*Bromus diandrus*), soft chess (*Bromus hordeaceus*), red brome (*Bromus madritensis*), foxtail barley (*Hordeum murinum* ssp. *leporinum*), and rat-tail fescue (*Vulpia myuros*). Dominant forbs included broad-leaved filaree (*Erodium botrys*), red-stemmed filaree (*Erodium cicutarium*), shining peppergrass (*Lepidium nitidum var. nitidum*), and vinegarweed (*Tricostema lanceolatum*). Fiddleneck (*Amsinckia menziesii*), devils lettuce (*Amsinckia tessellata*), shepherds purse (*Capsella bursa-pastoris*), turkey mullein (*Eremocarpus setigerus*), and bur clover (*Medicago polymorpha*) were also common, especially along ranch roads. Areas which have not been previously disturbed by grazing or historic cultivation also include a variety of native wildflowers such as blow wives (*Achyrachaena mollis*), blue dicks (*Dichelostemma capitaum*), California gold fields (*Lasthenia californica*), yellow daisy tidy-tips (*Layia platyglossa*), and California creamcups (*Platystemon californicus*).

***Valley Floor, Silver Creek Ranch and Valadeao Ranch Conservation Lands***

Project Conservation Lands include 3 areas totaling 24,185 acres that would be preserved in perpetuity for the benefit of the GOEA, as well as many other species of wildlife. An additional 2,523 acres interspersed throughout and adjacent to the Project Footprint would be left undisturbed and designated as the VFCL. In addition to the designation of the VFCL, the Proposed Action will include two large ranches for conservation purposes. These ranches, the VRCL (10,772 acres) and the SCRCL (10,890 acres), are contiguous with the Project site and each other (Figure 3).

Valley Floor Conservation Lands

The VFCL (approximately 2,523 acres) are contiguous with the Project Footprint, and primarily consist of the non-native annual grassland habitat found within the Project Footprint with some seasonal ponds and vernal and ephemeral pools, as well as the seasonally dry Panoche and Los Aquilas Creeks. The VFCL also includes the entire 100-year floodplain within the Proposed Project boundary on the valley floor.

The dominant vegetation in the VFCL includes ripgut brome, soft chess, red brome, foxtail barley, rat-tail fescue, broad-leaved filaree, red-stemmed filaree, shining peppergrass, and vinegarweed. Fiddleneck, devils lettuce, shepherds purse, turkey mullein, and bur clover were also common, especially in disturbed areas. Areas which have not been previously disturbed include a variety of native wildflowers such as blow wives, blue dicks, California gold fields, yellow daisy tidy-tips, and California creamcups.

Valadeao Ranch Conservation Lands

The VRCL (approximately 10,772 acres) are contiguous with the Project Footprint directly to the west, east, and northeast of the site (Figure 3). These lands are also contiguous with the VFCL and Silver Creek Ranch Conservation Lands (SCRCL). The VRCL include several seasonal drainages. Soils on this site are complex and range from sandy to sandy loam to clay loam to badlands. The VRCL contain approximately 2,945 acres with slopes between 0 and 11 percent. Elevations on the VRCL range from approximately

1,400 feet to 2,100 feet above mean sea level (amsl). The property which is currently grazed is dominated by introduced annual grasslands (approximately 6,700 acres), which have a very similar species makeup to the Project Footprint and VFCL. This property also mostly consists of ephedra shrubland (approximately 2,700 acres), barrens, and saltbush shrubland.

Ephedra shrublands within the VRCL range from nearly pure California ephedra (*E. californica*) stands to highly diverse associations with typical desert shrubs. Occupied habitats occur from lower slopes and valley bottoms to rocky outcrops and alluvial slopes. This 3 to 15 foot tall shrub rarely achieves greater than 10 percent cover (absolute), but the cover provided varies little with soil type, aspect, or grazing pressure. It is generally the only shrub present in the often very broad transition from Ephedra shrublands to Introduced Annual Grasslands.

Plant associations that are noted to occur within the Ephedra shrublands include *Artemisia californica - Senecio flaccidus* scrub, *Eastwoodia elegans - Ephedra californica* scrub, *Ericameria linearifolia - Ephedra californica* scrub, *Ericameria linearifolia - Ericameria nauseosa* scrub, *Ericameria linearifolia - Gutierrezia californica* scrub, *Eriogonum fasciculatum* var. *polifolium - Artemisia californica* scrub, *Eriogonum fasciculatum* var. *polifolium - Ephedra californica* scrub, *Eriogonum fasciculatum* var. *polifolium - Gutierrezia californica* scrub, *Eriogonum fasciculatum* var. *polifolium - Yucca whipplei* scrub, and *Gutierrezia californica - Ephedra californica* scrub. Ephedra Shrublands occur in the VRCL portion of Las Aquilas Creek in small patches along ridgelines, steep slopes with a northern aspect, lower slopes, ephemeral drainages, and steep, rocky, and thin-soiled south-facing slopes.

Barrens are ridgelines and south or (rarely) west-facing very steep slopes that exhibit a precipitous drop-off in vegetative cover. In terms of vegetation, the assembled species diversity is very low, nearly all species are relatively short-lived annuals, shrubs and trees are absent, and introduced annual grasses become minor components of the species mix. Barrens most commonly interrupt Introduced Annual Grasslands, where the transition was often observed to occur over the space of several feet. Two plant associations were identified within the barrens: *Erodium cicutarium - Plantago erecta* and *Holocarpha obconica - Vulpia macrostachys*.

The saltbush shrubland habitat consists of nearly pure to mixed stands of saltbush (*Atriplex polycarpa*) associations. Occupied habitats range from white clay soils on hills immediately west of Little Panoche Road to rocky outcrops and alluvial slopes experiencing high ground creep rates near ridgelines east of the road. In all observed occurrences on hills, the aspect of greatest *Atriplex polycarpa* cover is southern. This two to three foot tall shrub also attains dominance within several of the ephemerally flooded washes, where sandier soils are more common. It is always the most common shrub canopy contributor near seasonal springs and seeps that exhibit saline character.

Two plant associations exist on the VRCL: *Atriplex polycarpa - Eriogonum fasciculatum* var. *polifolium* and *Atriplex polycarpa - Isocoma acradenia* var. *bracteosa*. *Atriplex polycarpa - Eriogonum fasciculatum* var. *polifolium* occurs on slopes, appearing as mainly open ground with scattered shrubs. Shrub canopy

closure averages 5 to 10 percent, with scattered clumps of 20 percent closure. Canopy density is greatest on south-facing slopes, where *Eriogonum fasciculatum* is often more prevalent, and on slopes that are steep or slippery enough to exclude grazing. The herbaceous layer is largely absent, resembling barrens that are often present on adjacent slopes of similar aspect. Shrub canopies are confined to wash edges due to trampling by cattle, and average cover rarely exceeds 10 percent.

Silver Creek Ranch Conservation Lands

The SCRCL (approximately 10,890 acres), which is currently being with grazed with livestock, is located southeast of the Project Footprint (Figure 3). The northwestern-most corner of the proposed SCRCL is contiguous with a portion of the VRCL. Elevations on the SCRCL range from 900 to 2,200 feet amsl. Soils on the SCRCL are less complex than those found on the VRCL and are generally characterized as well drained and moderately permeable. SCRCL contains approximately 5,765 acres with slopes between 0 and 11 percent.

SCRCL are dominated by non-native species (approximately 8,400 acres), with the same species found on the Project Footprint and on the other conservation lands, distributed sparsely over the landscape. The other major habitats on this conservation lands includes ephedra shrubland (approximately 2,260 acres) with similar species noted on the VRCL and riparian/wetland habitat.

The riparian habitats occur along the Panoche and Silver Creeks. The Silver Creek riparian vegetation, where it briefly intersects the SCRCL, indicates a seasonally wet, somewhat saline habitat subject to annual or occasional energetic flows. The riparian corridor has become dominated by invasive tamarisk (*Tamarix* sp.). Tamarisk has developed semi-open to impassable stands in a 30 to 100 foot wide corridor. The population extends well off-site, both upstream and downstream. In this area, saltgrass (*Distichlis spicata*) appears to be the native species most tolerant of the soil salination and groundwater drawdown effects of heavy tamarisk infestation, and often forms meadow-like swards between the tamarisk thickets.

Panoche Creek is a gaining reach as it crosses through the SCRCL. The streambed upstream off the site for at least three miles was observed to be completely dry and largely devoid of plants. Within the surveyed area, this arroyo-like habitat quickly transitions to zonal wetlands characterized by gaseous springs, highly reduced soils, and marsh or meadow vegetation. The Panoche Creek riparian zone, which ranges from 100 feet to 500 feet in width, may provide the only reliable, naturally occurring surface water for much of the year. The dominant plants are consistently arrayed, with vegetation classified as emergent *Typha* marsh (*Typha* Herbaceous Alliance) centrally, *Schoenoplectus americanus* mid-marsh (*Schoenoplectus americanus* Herbaceous Alliance) at the outer saturated edge, and *Distichlis spicata* meadow (*Distichlis spicata* Herbaceous Alliance) extending across the moistened to seasonally drying soils at the riparian edge and *Frankenia salina* and *Juncus mexicanus*. Trees are largely absent, as are species adapted to a floating or submerged habitat.

# 4.0 Methodology

Per the USFWS recommendations, the GOEA studies followed the Wind Energy Guidelines in Tier 3, Stage 2 of which includes site-specific surveys and assessments in anticipation of ECP preparation (USFWS 2013). These site specific surveys included:

- Point Count Surveys (i.e., fixed-radius circular plot surveys) within the project footprint and Conservation Lands (conducted summer, fall, and winter of 2013/2014);
- Utilization Distribution Assessment (UDA) within the project footprint and VFCL (conducted summer, fall, and winter of 2013/2014); and
- Aerial survey of Project-area nesting population, location, and number of occupied eagle nests within a 10 mile radius of the Proposed Project center (results provided in separate report).

## 4.1 Point Count Surveys

The surveys for GOEA resources were conducted through the use of point counts that were conducted at established point count stations (Cooperrider et al. 1986; Hamel et al. 1996; Ralph et al. 1993; Ralph et al. 1995). Six point count stations were located within Project Footprint and VFCL (Figure 4) to ensure a minimum spatial coverage of at least 30 percent of the Project Footprint (USFWS 2013). Six point count stations were also located within the VRCL and the SCRCL (Figures 5 and 6). Three point count stations were located in the VRCL (Figure 5) and three point count stations in the SCRCL (Figure 6). The coverage for the VRCL and SCRCL is less than 30 percent, but provides adequate observations of GOEA use in these areas.

The survey locations were established by creating point count stations within an 800 meter (2,625 feet) radius observation area. The center point of each plot was geo-referenced using a global positioning system (GPS). The boundary of each point count plot was identified via distinct natural or any anthropogenic features at several points for distance reference.

The point count surveys consisted of observers recording GOEA detections from the point count stations for two hours at each point count station (Figures 4, 5, and 6) and recorded on point count field forms (Appendix A) (Pagel et al. 2010; USFWS 2013). The GOEA surveys were conducted between daylight hours (sunrise to sunset) on a bi-weekly basis from September 3, 2013 to January 24, 2014. During the fall migration, when possible, surveys were completed during midday to increase sampling efficiency by temporally stratifying surveys to cover the midday period during migration (CA Energy Commission 2007; USFWS 2013).

During the point count surveys, the observers, which were trained and their skills tested for GOEA observations (e.g. species, age class, activity), stayed with their vehicle to remain inconspicuous, which decreased the possibility that an individual eagle would avoid observers, which could reduce the

likelihood of detection. The observers performed systematic scans of the point count plot using binoculars alternated with unaided eye scans to detect GOEA.

The data collected during each point count station survey beyond the typical conditions information (e.g. date, time, temperature, wind speed and direction, and etc.) included the number of GOEA seen, age class, GOEA activity/behavior, flight paths, estimated flight height and location in plot, and general description of observations.

The age class of the GOEA were broken down into juvenile eagles (first year), immature or subadult eagles (second to fourth year), adult eagles (fifth year or greater), or unknown (eagles where age class could not be determined due to distance, etc.). The activity/behavior data collected noted the prevalent behavior during each one-minute interval as soaring flight (circling broadly with wings outstretched); unidirectional flapping gliding; kiting-hovering; stooping or diving at prey; stooping or diving in an agonistic context with other eagles or other bird species; undulating/territorial flight; perched; or other. The flight path data included GOEA inside, as well as outside the plot. The flights were recorded on the point count data forms for each point count station (Appendix B).

In addition to the GOEA point count surveys and the UDA data, any miscellaneous observations information gathered during the 2013 PVS giant kangaroo rat and blunt- nosed leopard lizard surveys, conducted in March through September, 2013, was also used to supplement the point count/UDA data (Appendix C).

## 4.2 Utilization Distribution Assessment (UDA)

In addition to the point count surveys, a UDA for GOEA was completed during the survey season. The UDA was completed to document the GOEA spatial distribution of use on the Proposed Project Footprint. The observation data was noted on field maps (Appendix B) and then convert the data into GIS formats for analyses. The field maps were created by placing a grid of square cells, each 0.5 x 0.5 kilometer (km), which was framed by a Universal Transverse Mercator (UTM) system across a map of the PVS Project Footprint to record eagle observations in each 0.25 $km^2$ cell (Figure 7).

The Project Footprint/VFCL was divided into non-overlapping observation sectors centered on a designated Observation Point, each with a vantage point. The point count stations were utilized for the UDA Observation Points (Figure 7). These locations afforded an unobstructed viewing of the grid cells to more than one km in all directions. The UDA observation periods were conducted for two hours and were added to each point count survey period for the Project Footprint/VFCL. The UDA was not conducted on the VRCL and the SCRCL since they are outside of the Project Footprint.

During the UDA, when necessary, the observers worked together with the use of hand-held radios from separate vantage points to pinpoint the location(s) of GOEA through triangulation. This communication between observers also eliminated the duplication of GOEA sightings. The data recorded by the

observers during the UDA included GOEA activity/behavior and flight path and location. The prevalent activity/behavior of each GOEA was recorded in one-minute interval as soaring flight (circling broadly with wings outstretched); unidirectional flapping gliding; kiting-hovering; stooping or diving at prey; stooping or diving in an agonistic context with other eagles or other bird species; undulating/territorial flight; perched; or other. The flight paths and location data was recorded on the gridded field maps (Appendix B), using topographic features or distance indicators as location references.

The data was analyzed by simply counting the number of flights intersecting each cell. If the data set had been larger, a specific GOEAs distribution of use would have been estimated by using standard kernel analyses (USFWS 2013).

# 5.0 Discussion, Analysis and Results

This discussion, analysis, and results section presents a compilation of the data that was gathered during the surveys point count and UDA surveys for GOEA. As stated previously, the surveys for GOEA resources were conducted through use of point counts and UDA surveys at 12 established stations within the PVS Project Footprint; Conservation lands associated with the Project include the Valley Floor, Valadeao Ranch, and Silver Creek Ranch areas.

Survey events occurred every other week between the weeks of September 3, 2013 until January 24, 2014, for a total of 11 survey events. Each survey event was made up of 12 point counts surveys that lasted 2 hours each and 6 UDA surveys which were also 2 hours each. The total hours surveying for GOEA during each survey event was 36 hours. This gives an overall total of 396 hours of survey time within the Project area. The overall sightings of GOEA during the surveys, excluding the aerial surveys, was 94. Weather was generally conducive to GOEA surveys; temperatures ranged between 20-97˚F, and winds ranged between 0 and 19.5 miles per hour (mph), though were typically less than 8 mph, nothing but a trace of rain throughout the surveys, and visibility that ranged from 80% to 100% (Appendix D).

## 5.1 Point Count Surveys

As stated previously, six point count stations (P-01 to P-06) were located within Project Footprint and VFCL (Figure 4), and six point count stations were located within Valadeao Ranch and Silver Creek Ranch Conservation Lands (Figures 5 and 6). Three point count stations were located in the VRCL (Figure 5) and three point count stations in the SCRCL (Figure 6).

The results of the point count surveys included a total of 61 observations of GOEA. This total includes 23 individual observations of GOEA seen within the point count plot boundaries and 38 observations outside the plot boundaries (Tables 1 and 2).

**Table 1. Total GOEA by Survey Event**

| Survey Event | Total GOEA Observed (inside and out of boundaries) | Observation Location (Inside Point Count/Outside) | Juvenile GOEA (Inside Point Count/Outside) | Subadult GOEA (Inside Point Count/Outside) | Adult (Inside Point Count/Outside) | Unknown Age (Inside Point Count/Outside) |
|---|---|---|---|---|---|---|
| 1st (September 3 -5, 2013 ) | 10 | 2/8 | 0/0 | 0/0 | 2/0 | 0/8 |
| 2nd (September 17-19, 2013) | 21[1] | 9/12 | 2/0 | 1/0 | 3/2 | 2/10 |
| 3rd October 2-4, 2013 | 1 | 1/0 | 0/0 | 0/0 | 1/0 | 0/0 |
| 4th October 15-17, 2013 | 5 | 3/2 | 0/0 | 0/0 | 3/2 | 0/0 |
| 5th October 28-30, 2013 | 4 | 1/3 | 0/1 | 0/0 | 1/1 | 0/1 |
| 6th November 11-13, 2013 | 7 | 0/7 | 0/0 | 0/0 | 0/1 | 0/6 |
| 7th November 25-27, 2013 | 3 | 0/3 | 0/0 | 0/0 | 0/0 | 0/3 |
| 8th December 9-11, 2013 | 2 | 1/1 | 0/0 | 0/0 | 0/0 | 1/1 |
| 9th December 21-23, 2013 | 2 | 0/2 | 0/0 | 0/0 | 0/2 | 0/0 |
| 10th January 7-9, 2014 | 5 | 5/0 | 2/0 | 1/0 | 1/0 | 1/0 |
| 11th January 22-24, 2014 | 1 | 1/0 | 0/0 | 0/0 | 1/0 | 0/0 |

[1] - Data includes several GOEA (approx. 7 GOEA) that were feeding on a carcass of a dead cow inside the project boundary and GOEA stayed at carcass during point count and UDA.

**Table 2. GOEA by Point Count Station**

| | Project Footprint/Valley Floor CL | | | | | | Valadeao Ranch CL | | | Silver Creek Ranch CL | | | Age Class Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Age Class** | **P-01** | **P-02** | **P-03** | **P-04** | **P-05** | **P-06** | **V-01** | **V-02** | **V-03** | **S-01** | **S-02** | **S-03** | |
| Juvenile | 2/1[1] | 0/0 | 0/0 | 1/0 | 0/0 | 0/0 | 0/0 | 2/0 | 0/0 | 0/0 | 0/0 | 0/0 | 6 |
| Sub-Adult | 1/0 | 0/0 | 1/0 | 0/0 | 0/0 | 0/0 | 0/0 | 0/0 | 0/0 | 0/0 | 0/0 | 0/0 | 2 |
| Adult | 5/2 | 2/2 | 0/2 | 0/0 | 0/1 | 0/0 | 2/0 | 0/0 | 0/0 | 0/0 | 1/0 | 2/1 | 20 |
| Unknown | 2/10 | 0/3 | 1/0 | 0/0 | 0/7 | 0/0 | 0/0 | 0/5 | 0/2 | 0/0 | 1/1 | 0/1 | 33 |
| Total – Inside/Out | 10/13[2] | 2/5 | 2/2 | 1/0 | 0/8 | 0/0 | 2/0 | 2/5 | 0/2 | 0/0 | 2/1 | 2/2 | |
| **Total** | 23 | 7 | 4 | 1 | 8 | 0 | 2 | 7 | 2 | 0 | 3 | 4 | 61 |

[1] - Numbers of GOEA observed inside point count plot/outside point count plot
[2] - Data includes several GOEA that were feeding on a carcass of what appeared to be a dead animal inside the P-01 boundaries.

Project Footprint/Valley Floor Conservation Lands

The GOEA observations in the Project Footprint/VFCL totaled 43 GOEA, with 15 observations within the point count plot boundaries and 28 observations outside the plot boundaries for the entire survey season. These observations were also categorized by their age class (Table 2). The GOEA observation on the Project Footprint/Valley Floor Conservation Lands were made up of four juveniles, three inside the point count plot boundaries and one observation outside the plot boundaries. There were two subadult GOEA observed within the point count plot boundaries and none outside. The surveys also found 14 adult GOEA observations within the Project Footprint/Valley Floor Conservation Lands areas, with 7 adults being seen inside the plot boundaries, and 7 adult GOEA observed outside the plot boundaries. Furthermore, there were 23 GOEA observations where the age class could not be

determined and were categorized as unknown (Table 2). A majority of the unknown age class observations were due to the distance between the observer and the GOEA.

The point count station with the highest number of observations of GOEA, both inside and outside the plot boundaries, was P-01 (Figure 4) with a total of 23 GOEA observations (10 inside/13 outside) (Table 2). Note that the reasons for the high number of GOEA observations at this point count station was due to numerous GOEA observed utilizing the hills of the VRCL and the hills to the west of the VRCL for perching, foraging, etc. An additional event elevated the number of GOEA observed at this point. During the second survey event (September 17-19, 2013), 7 GOEA were observed feeding on a carcass of a dead animal (i.e. cattle) during the entire point count survey period (Table 1). The point count station with the lowest number of GOEA observations during the survey season was P-06 (Figure 4) with no GOEA observed during all of the point count surveys (Table 2).

Of the 15 GOEA observations within the Project Footprint/Valley Floor Conservation Lands observed within the point count plots, over half of the observations (8 GOEA) were seen within the month of September (Table 3). As previously stated, during the second survey event (September 17-19, 2013), 7 GOEA were observed feeding on a carcass of a dead animal during the entire point count survey period. The next highest number of observations during a month was the events in October with four GOEA (Table 3). The observation numbers for the other months included two observations in January, one GOEA observation in December, and no observations of GOEA in November within the Project Footprint/Valley Floor Conservation Lands during the point count surveys (Table 3).

**Table 3.Survey Event Results for Project Footprint/Valley Floor Conservation Lands**

| Survey Event | P-01 | P-02 | P-03 | P-04 | P-05 | P-06 | Total |
|---|---|---|---|---|---|---|---|
| 1st (September 3 -5, 2013 ) | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 2nd (September 17-19, 2013) | 7[1] | 0 | 1 | 0 | 0 | 0 | **8** |
| 3rd (October 2-4, 2013) | 1 | 0 | 0 | 0 | 0 | 0 | **1** |
| 4th (October 15-17, 2013) | 1 | 2 | 0 | 0 | 0 | 0 | **3** |
| 5th (October 28-30, 2013) | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 6th (November 11-13, 2013) | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 7th (November 25-27, 2013) | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 8th (December 9-11, 2013) | 0 | 0 | 1 | 0 | 0 | 0 | **1** |
| 9th (December 21-23, 2013) | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| 10th (January 7-9, 2014) | 1 | 0 | 0 | 1 | 0 | 0 | **2** |
| 11th (January 22-24, 2014) | 0 | 0 | 0 | 0 | 0 | 0 | **0** |
| **Total** | **10** | **2** | **2** | **1** | **0** | **0** | **15** |

[1] - Data includes several GOEA that were feeding on a carcass of a dead animal inside the plot boundary.

Valadeao Ranch Conservation Lands

The GOEA observations in the VRCL totaled 11 GOEA with 4 observations within the point count plot boundaries and 7 observations outside the plot boundaries for the entire survey season (Table 2). These observations were also categorized by their age class. The GOEA observations on the Valadeao Ranch Conservation Lands were made up of 2 juveniles, all inside the point count plot boundaries. There were no subadult GOEA observed within the point count plot boundaries or outside the plot boundaries. The surveys also found 2 adult GOEA observations within the Valadeao Ranch Conservation Lands areas with all being seen inside the plot boundaries. Furthermore, there were 7 unknown age class observations that were observed outside the plot boundaries. The unknown age class observations were due to the distance between the observer and the GOEA.

The point count station with the highest number of observations of GOEA, both inside and outside the plot boundaries was V-02 (Figure 5) with a total of 7 GOEA observations (2 inside/5 outside) (Table 2). The point count stations with the lowest number of GOEA observations during the survey season was V-01 and V-03 (Figure 5) with 2 GOEA observations each (Table 2). V-01 had 2 GOEA observations inside the plot boundaries, and V-03 had 2 observed outside the plot boundaries (Table 2).

Of the 4 GOEA observations within the VRCL observed within the point count plots, 75% of the observations (3 GOEA) were seen within the month of September (Table 4). The next highest number of observations during a month was the events in January with 1 GOEA observation. For the months of October, November, and December, no observations of GOEA were made within the VRCL during the point count surveys (Table 4).

**Table 4. Survey Event Results for Valadeao Ranch/Silver Creek Ranch Conservation Lands**

| Survey Event | V-01 | V-02 | V-03 | S-01 | S-02 | S-03 | Total |
|---|---|---|---|---|---|---|---|
| 1st (September 3 -5, 2013 ) | 2 | 0 | 0 | 0 | 0 | 0 | 2 |
| 2nd (September 17-19, 2013) | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| 3rd (October 2-4, 2013) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 4th (October 15-17, 2013) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 5th (October 28-30, 2013) | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| 6th (November 11-13, 2013) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 7th (November 25-27, 2013) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 8th (December 9-11, 2013) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 9th (December 21-23, 2013) | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 10th (January 7-9, 2014) | 0 | 1 | 0 | 0 | 2 | 0 | 3 |
| 11th (January 22-24, 2014) | 0 | 0 | 0 | 0 | 0 | 1 | 1 |
| **Total** | **2** | **2** | **0** | **0** | **2** | **2** | **8** |

Silver Creek Ranch Conservation Lands

The GOEA observations in the SCRCL totaled 7 GOEA with four observations within the point count plot boundaries (Figure 6) and 3 observations outside the plot boundaries for the entire survey season. These observations were also categorized by their age class (Table 2). The GOEA observations on the SCRCL had no juvenile or subadult eagles inside or outside the point count plot boundaries. The surveys found 4 adult GOEA observations within the SCRCL areas with 3 observations inside the plot boundaries and one observation outside the plot boundaries. Furthermore, there were 3 unknown age class observations with 1 observation inside the plot boundaries and 2 observations outside the plot boundaries (Table 2). The unknown age class observations were due to the distance between the observer and the GOEA.

The point count station in the SCRCL with the highest number of observations of GOEA, both inside and outside the plot boundaries was S-03 (Figure 6) with a total of 4 GOEA observations (2 inside/2 outside) (Table 2). The point count stations with the lowest number of GOEA observations during the survey season was V-01 and V-03 (Figure 6) with 2 GOEA observations each. V-01 had 2 GOEA observations inside the plot boundaries and V-03 had 2 observed outside the plot boundaries (Table 2). The point count station with the lowest number of GOEA observations during the survey season was S-01 (Figure 2) with no GOEA observed during all of the point count surveys.

Of the 4 GOEA observations within the SCRCL observed within the point count plots, 75% of the observations (three GOEA) were seen within the month of January (Table 4). The next highest number of observations during a month was the events in October with 1 GOEA observation. For the months of September, November, and December, no observations of GOEA were made within the SCRCL during the point count surveys (Table 4).

## 5.2 Utilization Distribution Assessment (UDA)

Like the Point Count Survey events, the UDA Survey events occurred every other week between the weeks of September 3, 2013 until January 24, 2014 for a total of 11 survey events. Each survey event was made up of 6 UDA surveys from designated Observation Points (Figure 7) for 2 hours each. The total hours surveying for GOEA during the UDA study was 132 hours of survey time within the Project Footprint/VFCL.

The results of the UDA surveys included a total of 33 observations of GOEA (Table 5) which includes observations inside the Project Footprint/ VFCL (the UDA Study Area) and outside the UDA Study Area. Of those 33 observations, 16 GOEA observations were recorded within the UDA Study Area (Table 5) with 5 identified as adult GOEA, 3 as subadult GOEA, 4 as juvenile GOEA, and 4 birds were not able to be identified by age class (Table 6).

**Table 5. Total UDA Observations**

| Date of Observation | UDA Observation Point | Observation Location - In or Out of UDA Study Area | Age Class | Flight Height (feet) | Observation Minutes |
|---|---|---|---|---|---|
| 9/4/2013 | P-06 | In | SA | 150 | 5 |
| 9/17/2013[1] | P-01 | In | UK | 0[2] | 10 |
| 9/17/2013 | P-01 | In | UK | 0 | 120 |
| 9/17/2013 | P-01 | In | AD | 0 | 80 |
| 9/17/2013 | P-01 | Out | UKN | 200-300 | 16 |
| 9/17/2013 | P-01 | Out | UKN | 200-300 | 16 |
| 9/17/2013 | P-01 | Out | UKN | 200-300 | 16 |
| 9/17/2013 | P-01 | In | JUV | 0 | 52 |
| 9/17/2013 | P-01 | Out | UKN | 350 | 11 |
| 9/17/2013 | P-01 | In | UKN | 0 | 15 |
| 9/17/2013 | P-01 | In | UKN | 0 | 8 |
| 9/17/2013 | P-02 | In | JUV | NR | 6 |
| 9/18/2013 | P-05 | In | AD | 120 | 4 |
| 9/18/2013 | P-06 | Out | UKN | 100 | 13 |
| 10/3/2013 | P-03 | In | AD | 150-300 | 2 |
| 10/3/2013 | P-03 | Out | JUV | 150-300 | 2 |
| 10/3/2013 | P-03 | Out | AD | 150-300 | 2 |
| 10/3/2013 | P-05 | Out | JUV | 800 | 2 |
| 10/16/2013 | P-03 | Out | AD | 50-200 | 6 |
| 10/16/2013 | P-03 | Out | AD | 50-200 | 6 |
| 10/16/2013 | P-03 | Out | UKN | 150-200 | 3 |
| 10/16/2013 | P-03 | Out | UKN | 150-200 | 3 |
| 10/16/2013 | P-04 | In | JUV | 400 - 800 | 7 |
| 10/28/2013 | P-01 | Out | UKN | 250 | 1 |
| 10/30/2013 | P-02 | In | SA | 200 - 1,000 | 13 |
| 11/12/2013 | P-06 | In | AD | 150 | 3 |
| 11/12/2013 | P-06 | In | AD | 100 | 3 |
| 12/9/2013 | P-02 | Out | UK | 1100 | 6 |
| 12/21/2013 | P-04 | Out | JUV | NR | 19 |
| 12/21/2013 | P-04 | Out | JUV | NR | 30 |
| 12/21/2013 | P-04 | Out | AD | NR | 5 |
| 1/8/2014 | P-01 | In | SA | 0 | 120 |
| 1/22/2014 | P-02 | In | JUV | 200 | 4 |

AD – Adult, SA – Subadult, JUV – Juvenile, UKN – Unknown age, NG – Not Recorded

[1] - Data includes several GOEA that were feeding on a carcass of what appeared to be a dead animal inside the P-01 boundaries on September 17, 2013.

[2] – 0 feet flight height indicates perched on ground or rock.

**Table 6. UDA Survey Overview by Age Class/Survey Point within Study Area**

| Age Class | P-01 | P-02 | P-03 | P-04 | P-05 | P-06 | Totals by Age Class |
|---|---|---|---|---|---|---|---|
| Juvenile | 1 | 2 | 0 | 1 | 0 | 0 | 4 |
| Sub-Adult | 1 | 1 | 0 | 0 | 0 | 1 | 3 |
| Adult | 1 | 0 | 1 | 0 | 1 | 2 | 5 |
| Unknown | 4 | 0 | 0 | 0 | 0 | 0 | 4 |
| Total per Observation Station | 7[1] | 3 | 1 | 1 | 1 | 3 | |

[1] - Data includes several GOEA that were feeding on a carcass of what appeared to be a dead cow inside the P-01 boundaries.

Table 5 indicates the majority of the GOEA observations came from outside the UDA Study Area near Observation Points P-01 and P-03 (Figure 7). This is due to numerous sightings of GOEA observed utilizing the hills of the western portion of the VRCL and the hills beyond the western portion of the VRCL for perching, foraging, etc.

During the UDA surveys there were 452 observation minutes of GOEA inside the UDA Study Area and 157 observation minutes of GOEA outside the UDA Study Area for a total of 609 observation minutes for the entire study period. Note that totals for the UDA study included several GOEA that were observed feeding on a carcass of a dead animal (cattle) inside the UDA Study Area near P-01 within Grid Cell 79 (Figure 7) and remained on the carcass a majority of the UDA survey event on September 17, 2013. These observations made up 63% (285 observation minutes) of the observation time for GOEA for the UDA Study. In addition, the observation time (120 observation minutes) for a subadult eagle noted on January 8, 2014, that perched on the hillside for the entire UDA survey period near P-01, make up 90% of the observation minutes made during the entire study within the UDA Study Area.

The average observed flight height noted during the study, excluding perched GOEA, for all observations of GOEA made during the UDA surveys, was approximately 300 feet above ground level. The average flight height for the GOEA observations noted inside the UDA Study Area was similar with an average flight above ground level of approximately 270 feet (Table 5).

Lastly, due to the small size of the data set, only 16 GOEA flight observations that utilized 57 grid cells within the UDA Study Area (Figure 8), a standard kernel analyses was unable to be utilized. The data was analyzed by calculating the number of flights intersecting an individual grid cell (Figure 8). With exception of the several GOEA observed feeding on a carcass in Grid Cell 79, the cells noted to be utilized by GOEA within the Study Area indicates that the GOEA are not using the southwest and south central areas of the Project Footprint and VFCL. They did not frequent the northern portion of the Project Footprint/VFCL, as well. However, Figure 8 does show that the GOEA are utilizing the hills in the VRCL on both the eastern and western sides of the Study Area for perching, foraging, etc. This area's usage was also noted during the point count surveys.

## 6.0 Conclusion

This report provides the findings of the 2013/2014 Phase II site-specific surveys (USFWS 2013) for GOEA for the Panoche Valley Solar Project. Point Count and UDA studies were completed to provide baseline data on GOEA occurrence, frequency, and behavior to present results of spatial and temporal site use and potential risk based on time spent within the Proposed Project area, which will assist in the preparation of the BBCS and the ECP.

The results of the point count surveys indicated that 93% of the GOEA observations made within the Project Footprint and VFCL point count station boundaries were from the western point count stations, which are in close proximity to the hills located within the western portion of the VRCL (Figure 4). Of the total 15 GOEA observations made during the entire study within point count plots, approximately 47% of those observations were seen during a single survey event (September 17-19, 2013), where 7 GOEA were observed feeding on a carcass of a dead animal within the proposed Project Footprint. This indicates that unless there is an attractant (i.e. food) found within the Project Footprint and the VFCL, that GOEA usage is nominal.

With exception of the several GOEA observed feeding on a carcass in the northeast corner of the UDA Study area, the cells noted to be utilized by GOEA within the UDA Study Area indicates that the GOEA are not using the northern, southwest, and south central areas of the Project Footprint and VFCL. The UDA Study does show, as seen in the point count surveys, that the GOEA are utilizing the hills in the VRCL on both the eastern and western sides of the Study Area for perching, foraging, etc. In addition, the study indicated that flight heights noted inside the UDA Study Area averaged approximately 270 feet with exception of the GOEA noted feeding on the carcass during a September survey event. This shows that the eagles mostly are flying across or through the Panoche Valley (i.e. Project Footprint and VFCL) to other habitat to forage or perch.

## 7.0 References

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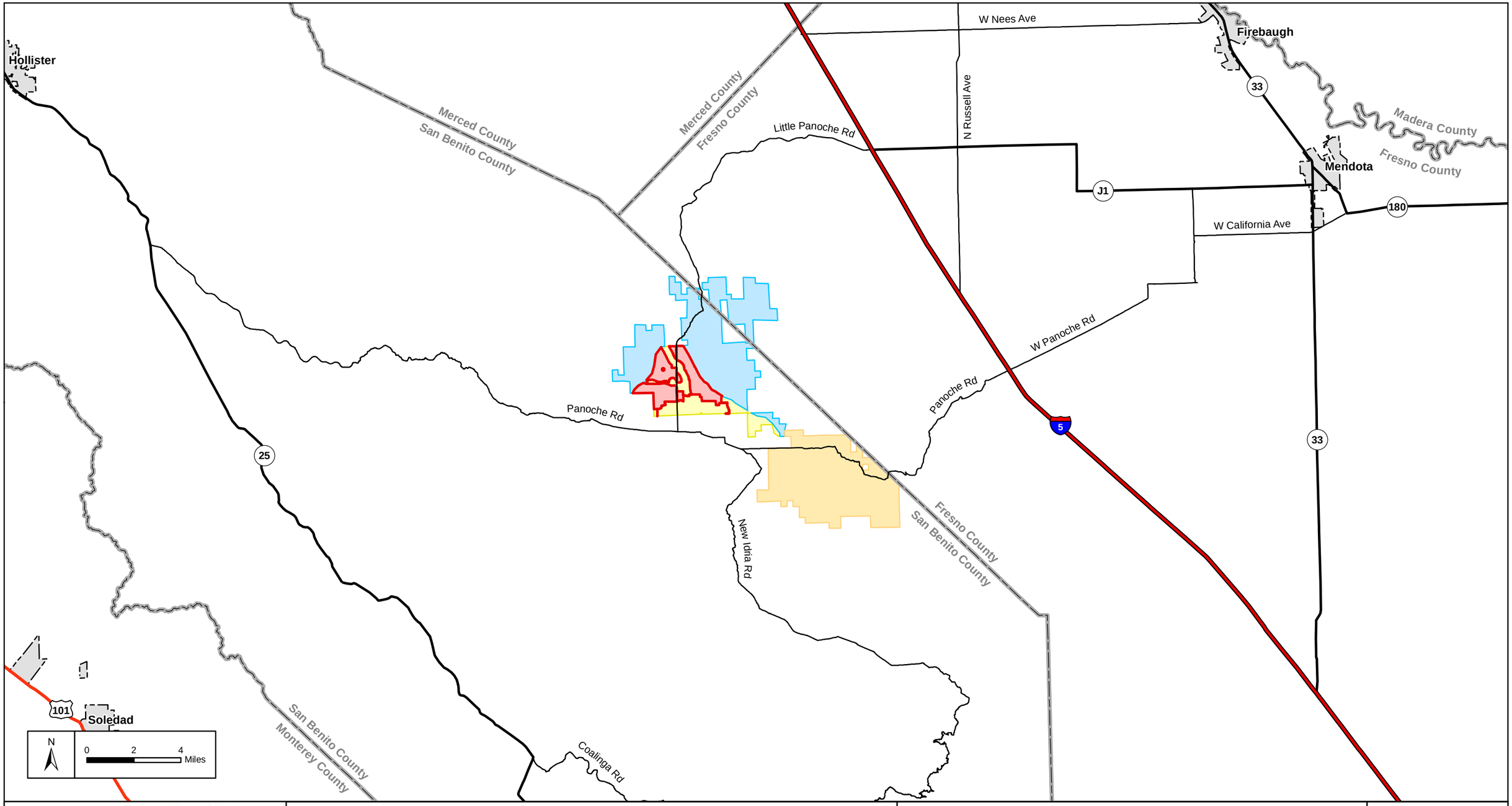
# FIGURES

**Figure 1: Project Location Map**

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**Legend**

- Project Footprint
- Valley Floor Conservation Lands
- Valadeao Ranch Conservation Lands
- Silver Creek Ranch Conservation Lands
- City

# Panoche Valley Solar Project

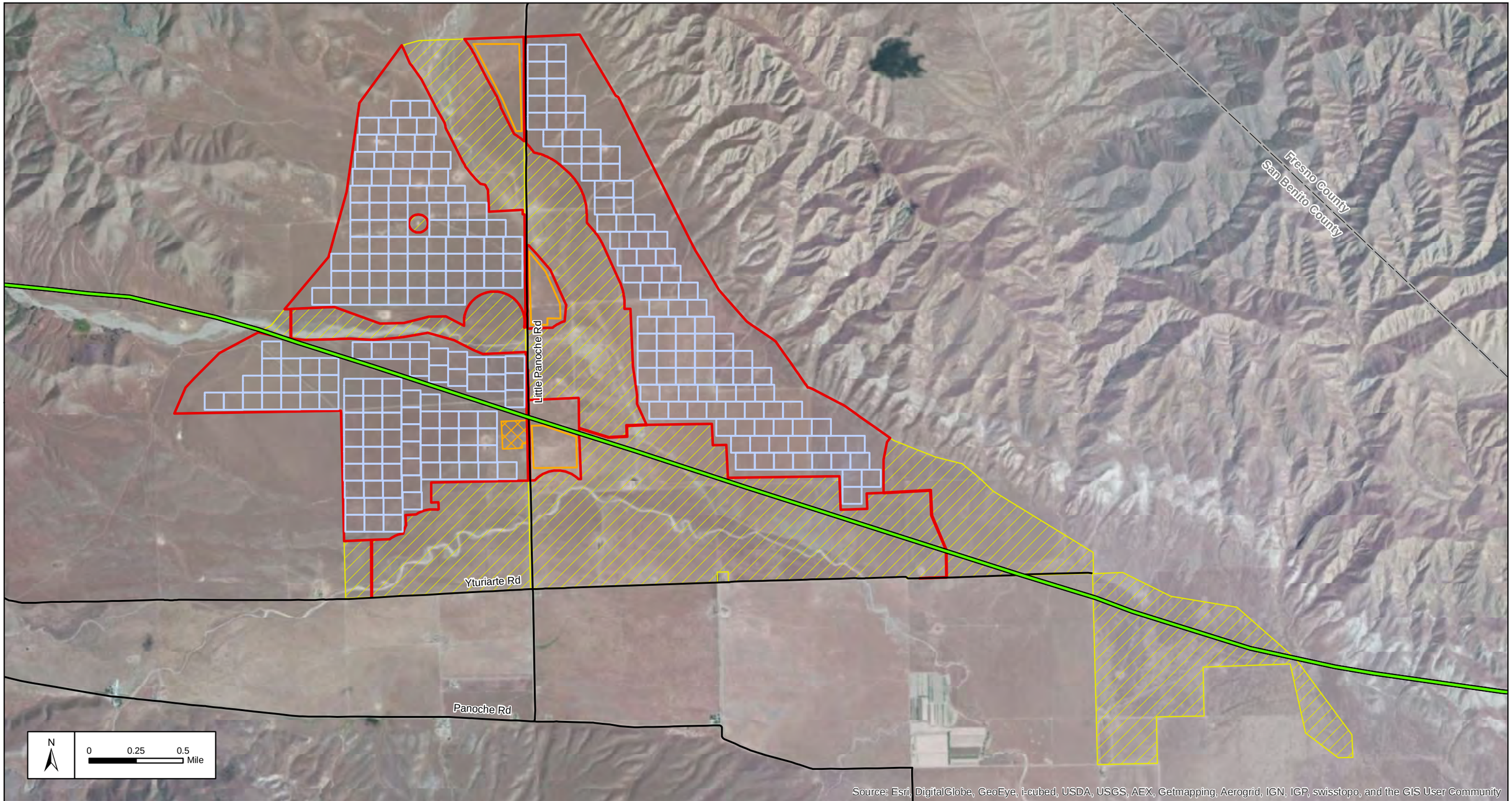
## Project Location

FIGURE

1

JH 2014-03-18

**Figure 2: Project Layout**

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**Legend**

- Project Footprint
- Valley Floor Conservation Lands
- Proposed Panel Block
- Existing Transmission Line
- Project Substation
- Laydown Yard

# Panoche Valley Solar Project

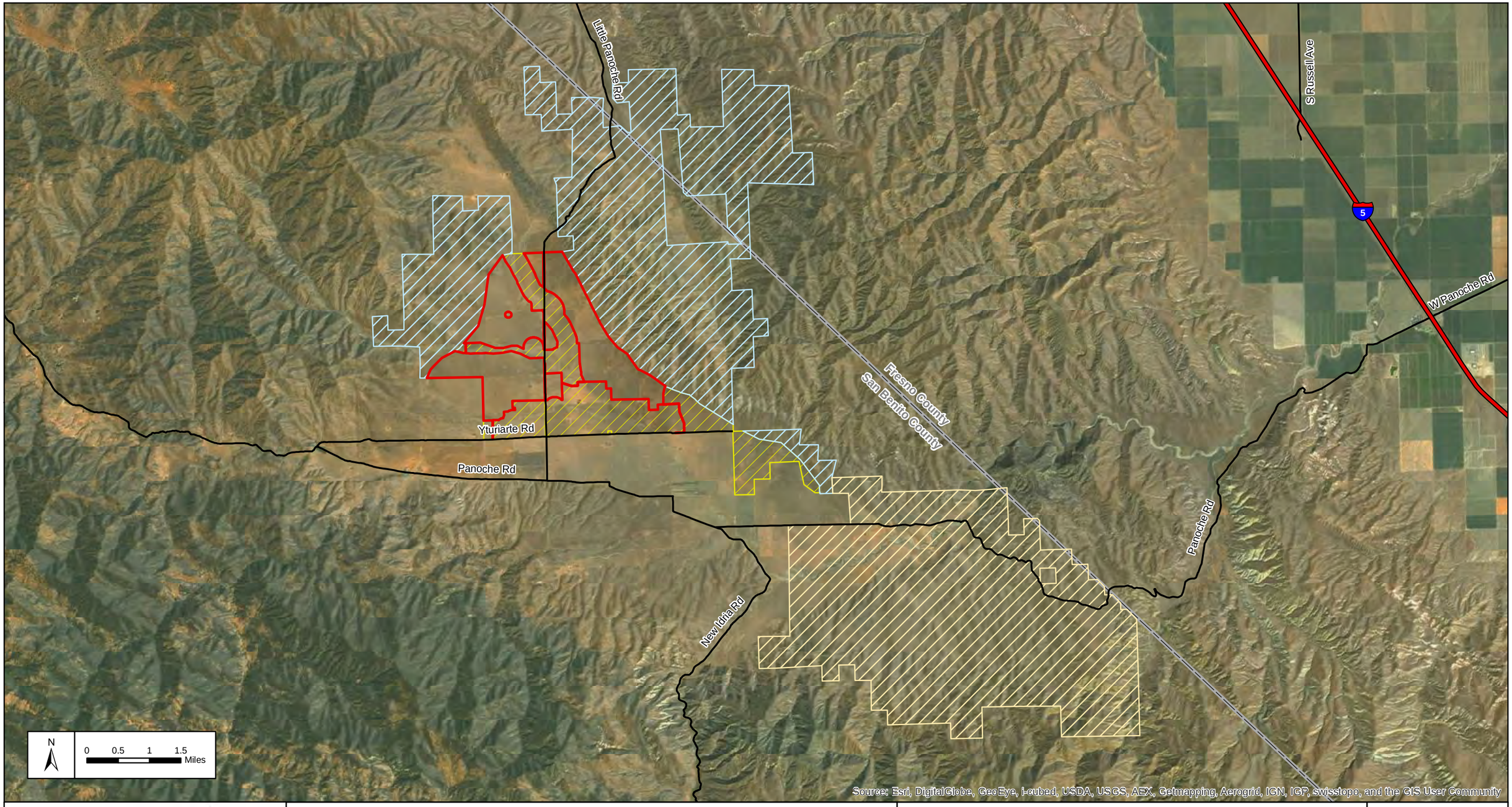
## Proposed Layout

FIGURE

2

JH 2014-03-17

**Figure 3: Project Footprint and Conservation Lands**

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- Valley Floor Conservation Lands
- Valadeao Ranch Conservation Lands
- Silver Creek Ranch Conservation Lands

# Panoche Valley Solar Project

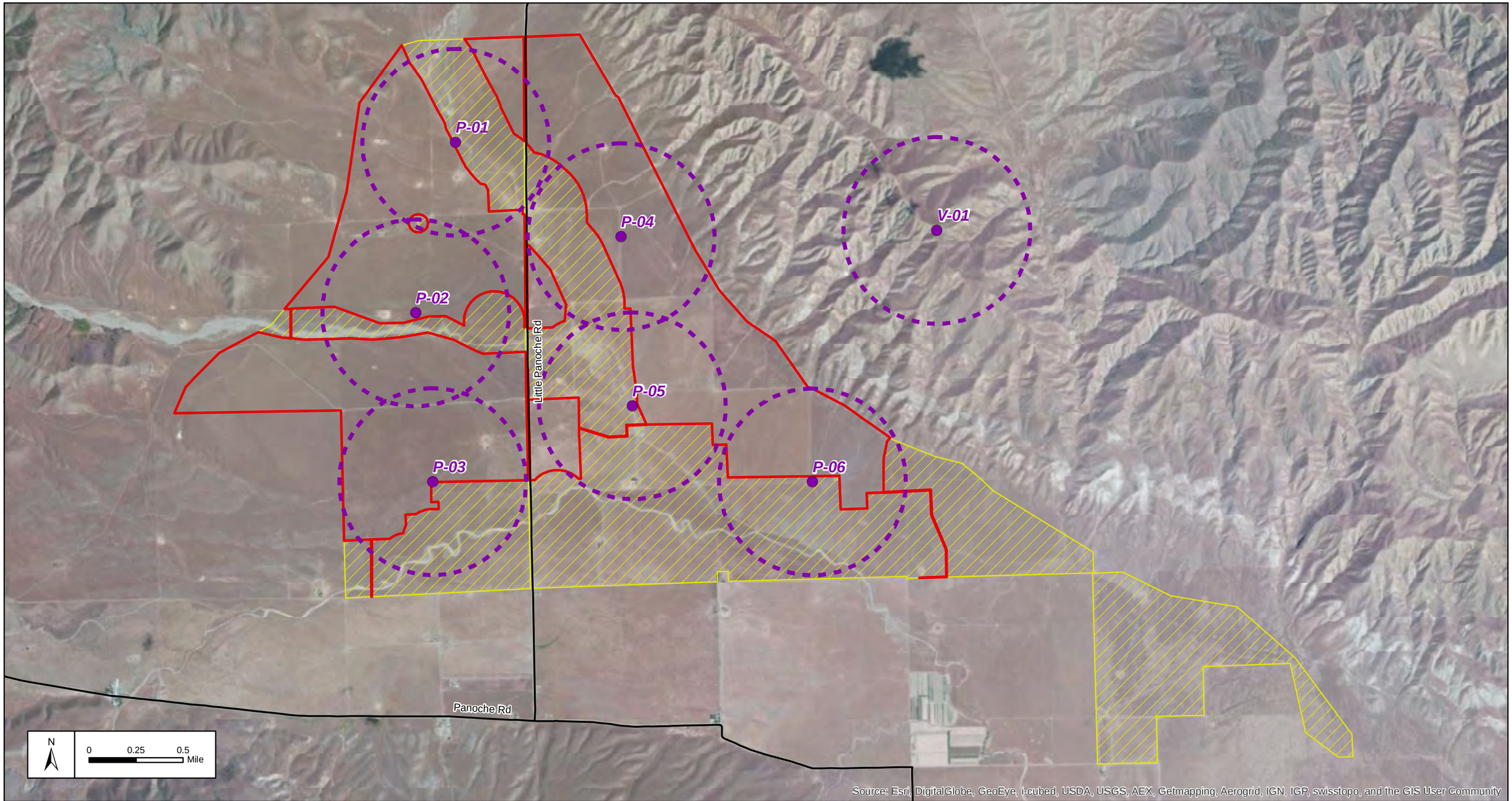
## Project Footprint and Conservation Lands

FIGURE

3

JH 2014-03-18

**Figure 4: Project Footprint and Valley Floor Conservation Lands Point Count Stations**

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**Legend**

- Point Count Station
- 800-meter Observation Area
- Project Footprint
- Valley Floor Conservation Lands

# Panoche Valley Solar Project

## Point Count Stations

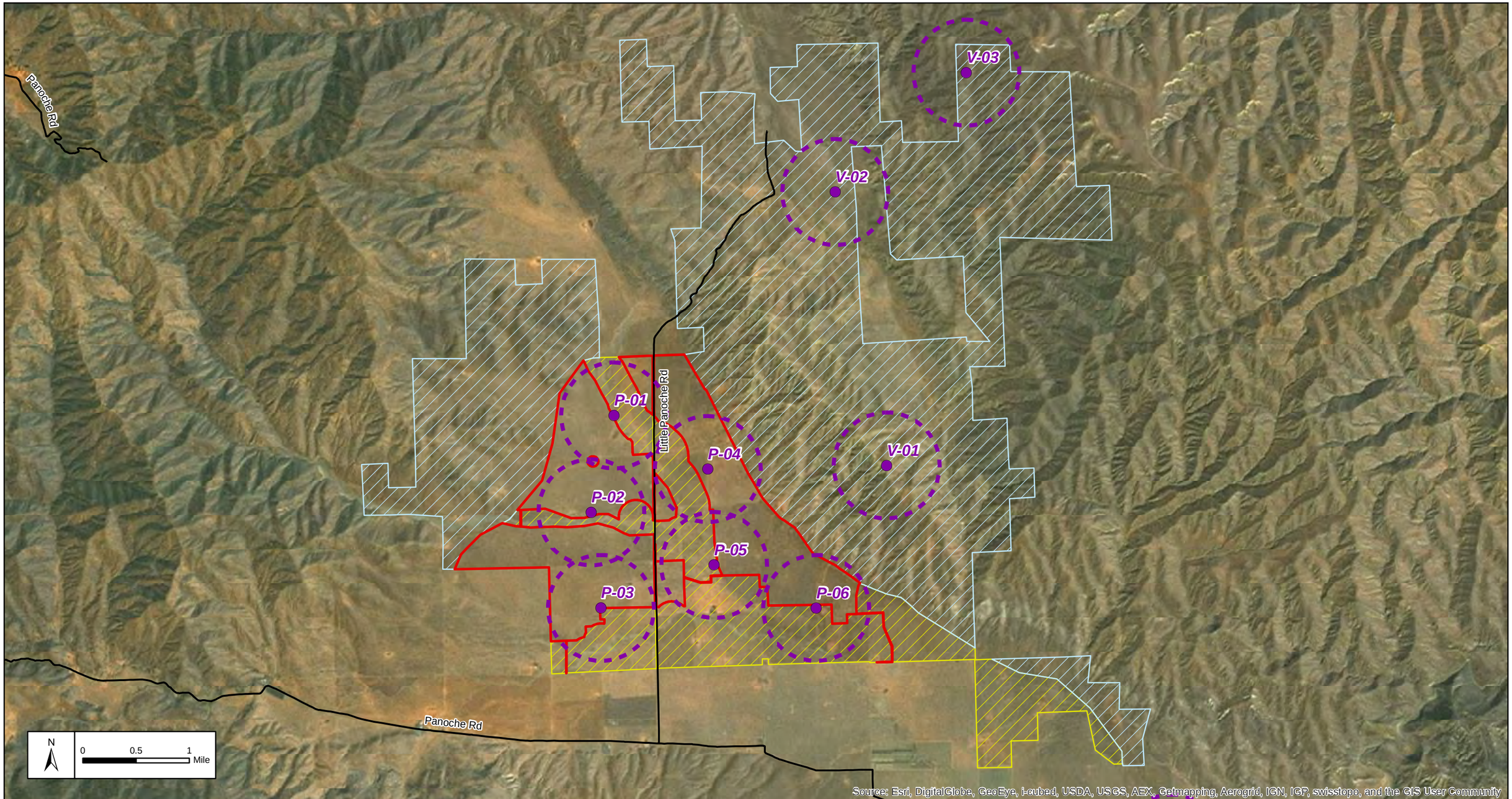
Project Footprint and Valley Floor Conservation Lands

FIGURE

4

JH 2014-03-17

**Figure 5: Valadeao Ranch Conservation Lands Point Count Stations**

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**Legend**

- Point Count Station
- 800-meter Observation Area
- Project Footprint
- Valadeao Ranch Conservation Lands
- Valley Floor Conservation Lands

# Panoche Valley Solar Project

## Point Count Stations

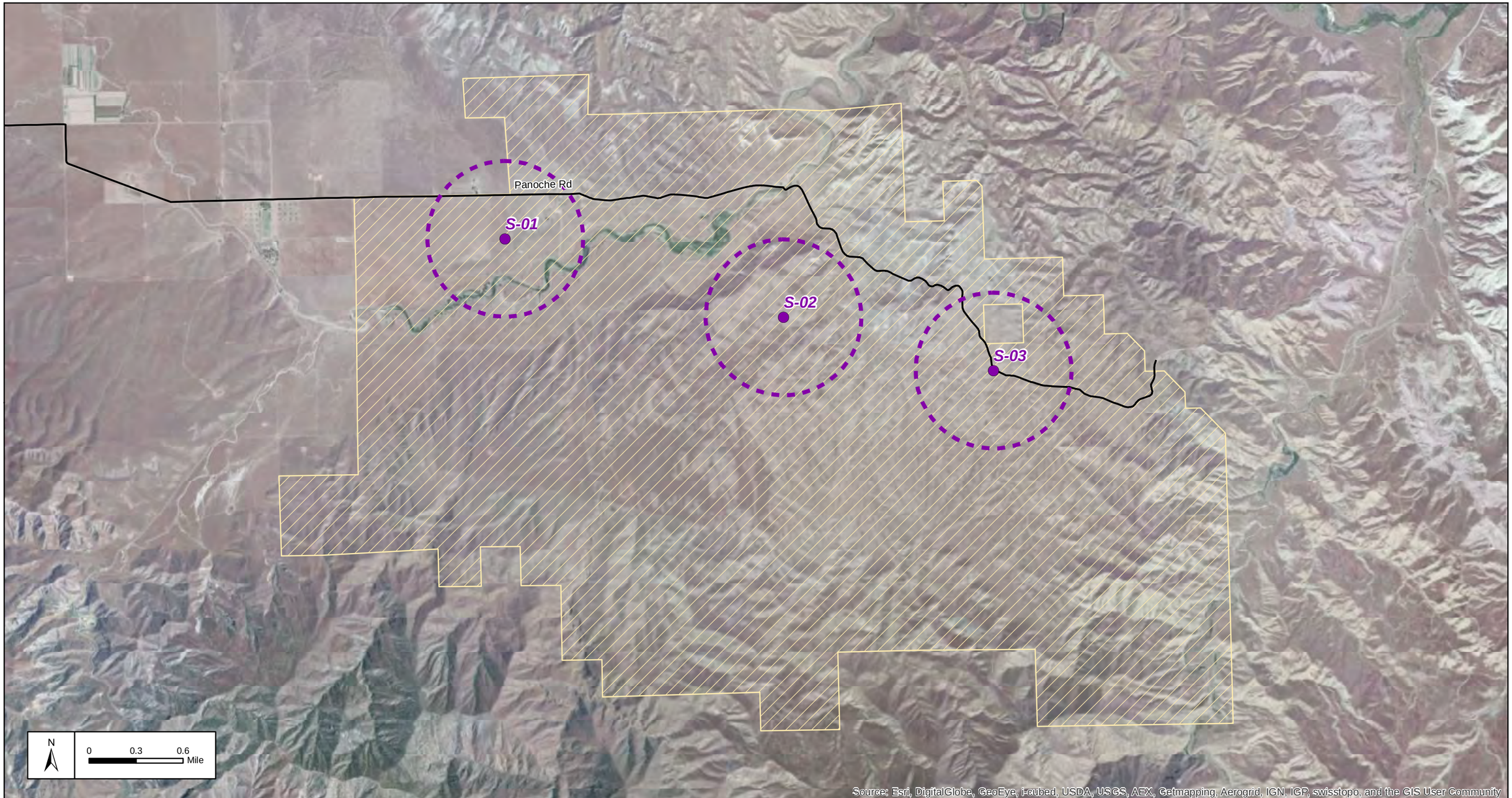
Valadeao Ranch Conservation Lands

FIGURE

5

JH 2014-03-17

**Figure 6: Silver Creek Ranch Conservation Lands Point Count Stations**

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**Legend**

- Point Count Station
- 800-meter Observation Area
- Silver Creek Ranch Conservation Lands

# Panoche Valley Solar Project

## Point Count Stations

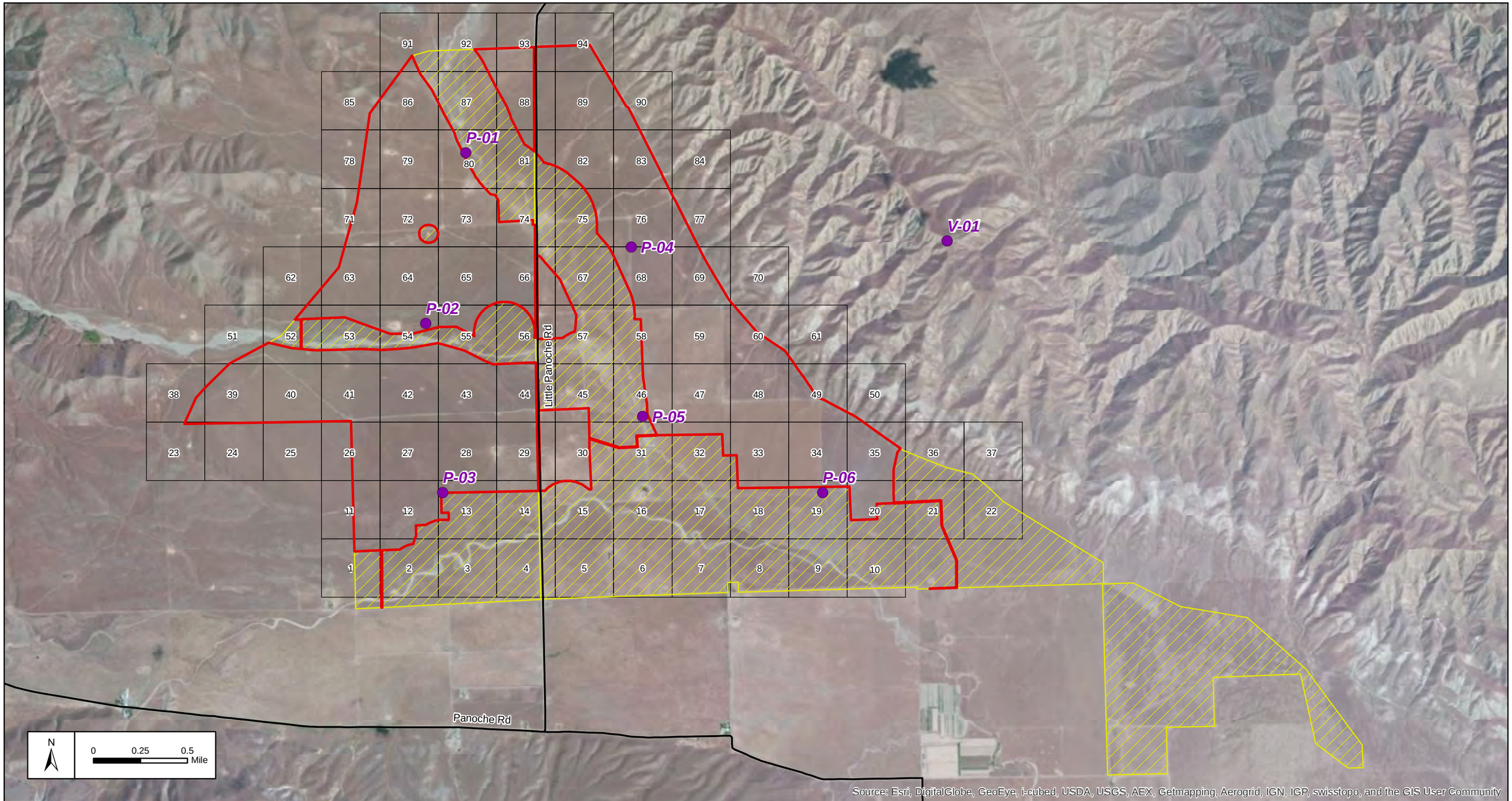
Silver Creek Ranch Conservation Lands

FIGURE

6

JH 2014-03-17

**Figure 7: Utilization Distribution Assessment Observation Points**

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**Legend**

- UDA Observation Point
- Project Footprint
- Valley Floor Conservation Lands
- 0.5 x 0.5 Kilometer Grid Cell

# Panoche Valley Solar Project

## UDA Observation Points

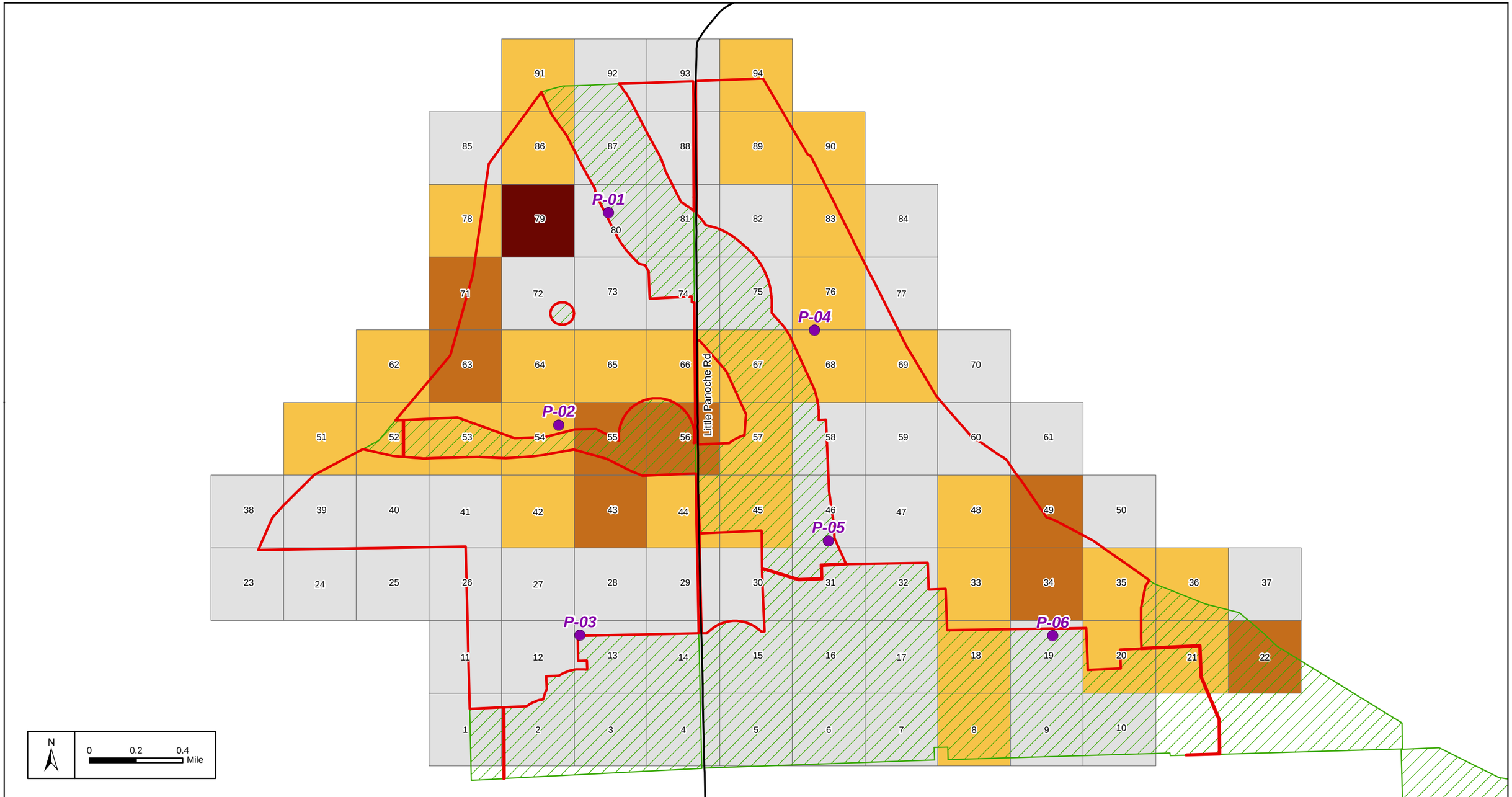
Project Footprint and Valley Floor Conservation Lands

FIGURE

7

JH 2014-03-17

**Figure 8: Utilization Distribution Assessment Study Results**

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**Legend**

- UDA Observation Point
- Project Footprint
- Valley Floor Conservation Lands

**Number of Times a Grid Cell was Utilized by GOEA**

- 0
- 1
- 2 - 3
- 4 - 7

# Panoche Valley Solar Project

## UDA Study Results

FIGURE

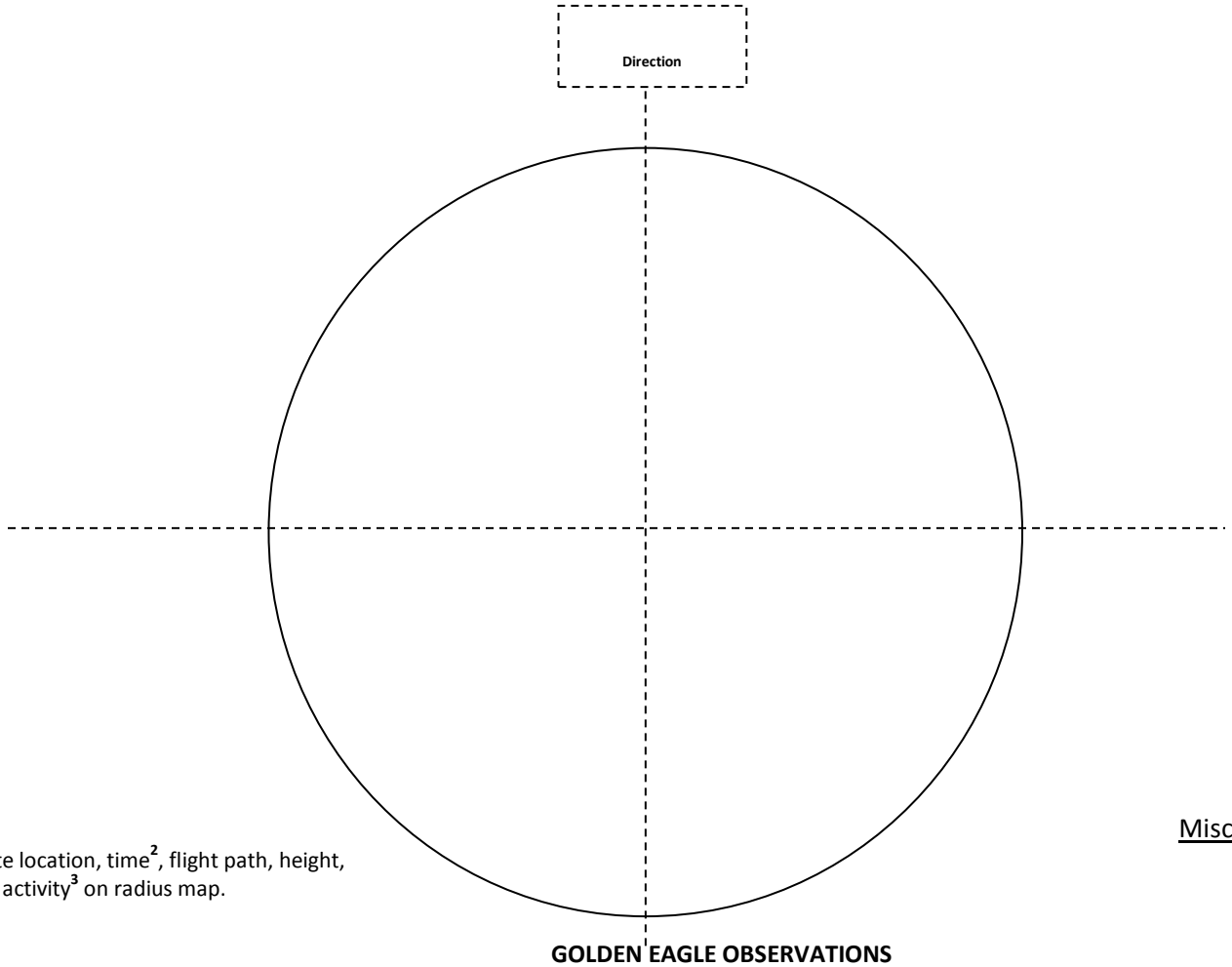
8

JH 2014-03-17

# APPENDICES

# APPENDIX A
# FIELD FORMS

| Panoche Valley Solar Golden Eagle 800 Meter Point Count Survey | | |
|---|---|---|
| Point Count Station Number | Start Time | Temp Start °F |
| Date (mm/dd/yy) | End Time | Temp End °F |
| Observer(s) | Precip. (amt. last 24hr) | Visibility (% clear)[1] |
| Wind (mph/direction) | Cloud Cover (% cloudy) | |




Indicate location, time[2], flight path, height, and activity[3] on radius map.

Misc. Obs

**GOLDEN EAGLE OBSERVATIONS**

| GOEA # | Age Class[4] | Obs Time Start/End | Eagle Minutes | Description of Observation/Comments |
|---|---|---|---|---|
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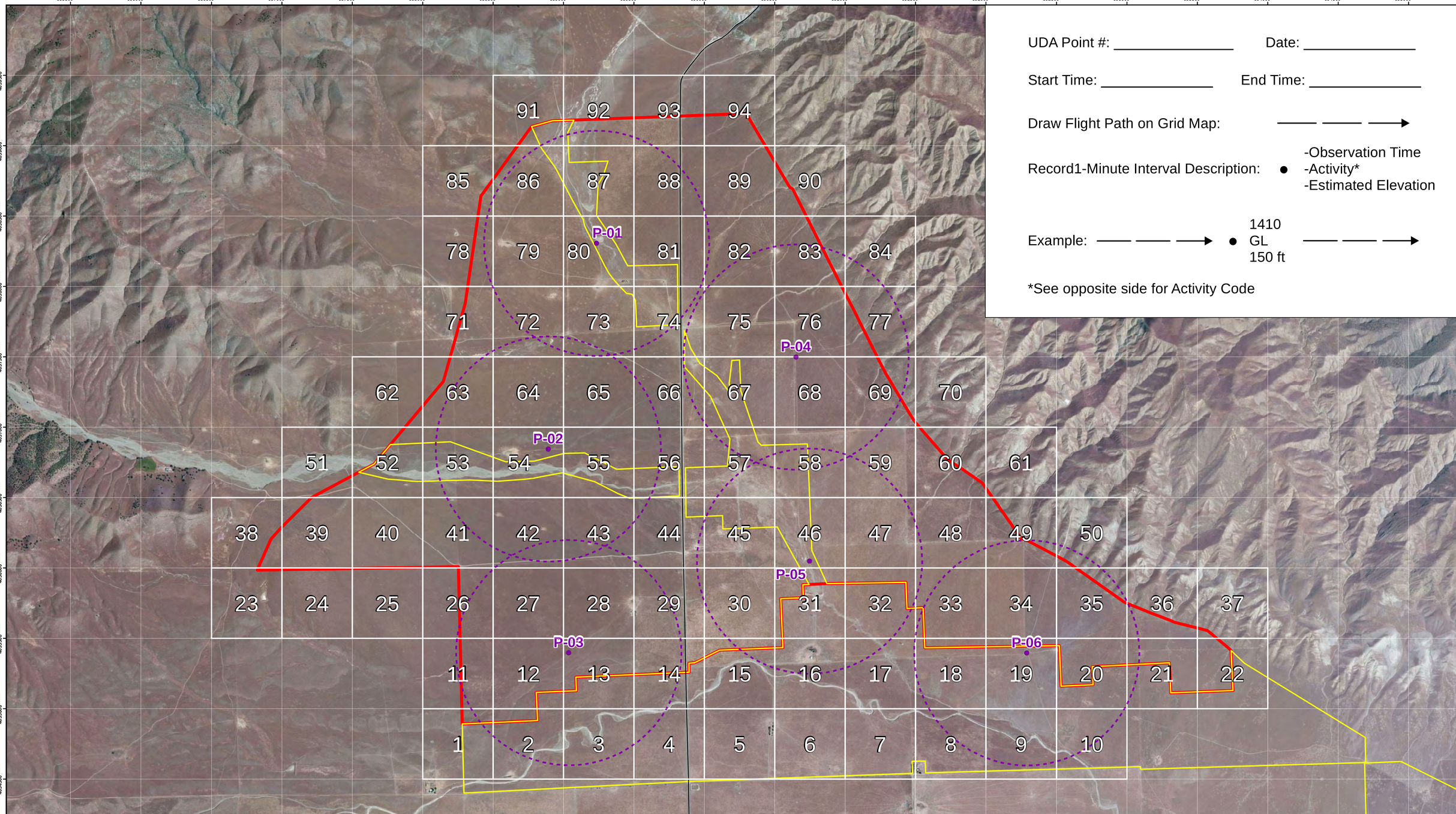
[1]Percent clear within 800 meter and 200 meter vertical
[2]Prevalent behavior noted at one minute intervals
[3]Activity - PE (Perched), SO (Linear Soaring/Gliding), CS (Circle soaring), FL (Flapping), HU (Hunting), HO (Hovering/Kiting), and OT (Other).
[4]Age Class – JUV (Juvenile), SA (Sub-adult), and AD (Adult)




UDA Point #: _____ Date: _____

Start Time: _____ End Time: _____

Draw Flight Path on Grid Map: ——— ——— ———▶

Record1-Minute Interval Description: ● -Observation Time -Activity* -Estimated Elevation

Example: ——— ——— ———▶ ● 1410 GL 150 ft ——— ——— ———▶

*See opposite side for Activity Code

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BR
9/11/2013

**Legend**

- Approximate Project Boundary
- Valley Floor Conservation Lands
- Survey Point Location
- 800 meter Observation Area

# Duke Energy Renewables
# Panoche Valley Solar Project

## Golden Eagle Utilization Distribution Assessment (UDA) Grid Map

N

0 1,000 2,000
Feet

| Panoche Valley Solar Golden Eagle Utilization Distribution Assessment (UDA) | | | |
|---|---|---|---|
| **UDA Point Number** | **Start Time:** | **Temp Start: °F** | **Wind (mph/direction)** |
| **Date (mm/dd/yy)** | **End Time:** | **Temp End: °F** | **Observer(s)** |

**GOLDEN EAGLE OBSERVATIONS**

| GOEA # | Age Class[1] | Obs Time Start/End | Eagle Minutes | Description of Observation[2]/Comments[3] |
|---|---|---|---|---|
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Indicate location, time, flight path, estimated height, and activity[2] on grid map (opposite side).

KEY

[1]Age Class – JUV (Juvenile), SA (Sub-adult), and AD (Adult)

[2]Includes prevalent behavior/activity noted at one minute intervals. Activity description includes - PE (Perched), SO (Linear Soaring/Gliding), CS (Circle Soaring), FL (Flapping), HU (Hunting), HO (Hovering/Kiting), and OT (Other).

[3]Include grid numbers utilized from attached grid map

# APPENDIX B
# COMPLETED FIELD FORMS
# ELECTRONIC FORMAT

# APPENDIX C
# MISCELLANEOUS GOLDEN EAGLE OBSERVATIONS

## Miscellaneous Golden Eagle Observations during other Surveys

| Date | GOEA Observations |
|---|---|
| 5/13/2013 | 1 |
| 5/25/2013 | 1 |
| 5/26/2013 | 2 |
| 5/28/2013 | 1 |
| 5/29/2013 | 1 |
| 6/17/2013 | 1 |
| 6/22/2013 | 1 |
| 7/6/2013 | 1 |
| 7/8/2013 | 1 |
| 8/4/2013 | 1 |
| 8/9/2013 | 2 |
| 8/29/2013 | 1 |
| 9/5/2013 | 3 |
| 9/7/2013 | 2 |

# APPENDIX D
# WEATHER DATA

| Survey Date | Weather Conditions |
|---|---|
| September 3, 2013 | Temp 83-95° Fahrenheit (F)<br>Wind 6.5-10.4 miles per hour (mph) N<br>Cloud Cover 25%<br>Precipitation 0 inches (in)<br>Visibility 100% |
| September 4, 2013 | Temp 66-97°F<br>Wind 1.5-6.6 mph N<br>Cloud Cover 0%<br>Precipitation 0 in.<br>Visibility 100% |
| September 5, 2013 | Temp 70-96°F<br>Wind 6.1 – 7.4 mph E<br>Cloud Cover 100%<br>Precipitation 0 in.<br>Visibility 95% |
| September 17, 2013 | Temp 61-72.3°F<br>Wind 15.4 mph W<br>Cloud Cover 0%<br>Precipitation 0 in.<br>Visibility 100% |
| September 18, 2013 | Temp 64-79°F<br>Wind 7.9-13.2 mph NNW<br>Cloud Cover 0%<br>Precipitation 0 in.<br>Visibility 100% |
| September 19, 2013 | Temp 64-93.5°F<br>Wind 0.6 mph N<br>Cloud Cover 0%<br>Precipitation 0 in.<br>Visibility 100% |
| October 2, 2013 | Temp 59-70°F<br>Wind 3.2 mph SW<br>Cloud Cover 10%<br>Precipitation 0 in.<br>Visibility 100% |
| October 3, 2013 | Temp 52-66°F<br>Wind 1-12.7 mph S<br>Cloud Cover 0%<br>Precipitation 0 in. |

| Survey Date | Weather Conditions |
|---|---|
| | Visibility 100% |
| October 4, 2013 | Temp 53-68°F<br>Wind 1.4 mph E<br>Cloud Cover 0%<br>Precipitation 0 in.<br>Visibility 100% |
| October 15, 2013 | Temp 52-84°F<br>Wind 1.1 – 5.9 mph S<br>Cloud Cover 0%<br>Precipitation 0 in.<br>Visibility 100% |
| October 16, 2013 | Temp 51.5-85°F<br>Wind 0-5 mph S<br>Cloud Cover 0%<br>Precipitation 0 in.<br>Visibility 100% |
| October 17, 1913 | Temp 77-90°F<br>Wind 1.1-5 mph S<br>Cloud Cover 0%<br>Precipitation 0 in.<br>Visibility 100% |
| October 28, 2013 | Temp 48-62°F<br>Wind 8.9-19.5 mph W<br>Cloud Cover 35%<br>Precipitation Trace<br>Visibility 100% |
| October 29, 2013 | Temp 53.4-75°F<br>Wind 3.6-6 mph NW<br>Cloud Cover 98%<br>Precipitation 0 in.<br>Visibility 90% |
| October 30, 2013 | Temp 42-67°F<br>Wind 0.9 -7 mph S<br>Cloud Cover 10%<br>Precipitation 0 in.<br>Visibility 100% |
| November 12, 2013 | Temp 58-64.4°F |

| Survey Date | Weather Conditions |
|---|---|
| | Wind 1-6 mph N<br>Cloud Cover 80%<br>Precipitation Trace<br>Visibility 100% |
| November 13, 2013 | Temp 49-74.6°F<br>Wind 2-8.1 mph N<br>Cloud Cover 5%<br>Precipitation Trace<br>Visibility 100% |
| November 14, 2013 | Temp 52-76°F<br>Wind 1 -5 mph NW<br>Cloud Cover 15%<br>Precipitation 0 in.<br>Visibility 100% |
| November 25, 2013 | Temp 32-73°F<br>Wind 0.8-3.6 mph SE<br>Cloud Cover 0%<br>Precipitation 0 in.<br>Visibility 80% |
| November 26, 2013 | Temp 46-66°F<br>Wind 1-4 E<br>Cloud Cover 90%<br>Precipitation 0 in.<br>Visibility 100% |
| November 27, 2013 | Temp 41-64°F<br>Wind 1 mph W<br>Cloud Cover 35%<br>Precipitation 0 in.<br>Visibility 100% |
| December 9, 2013 | Temp 20-50.3°F<br>Wind 1-1.7 mph SE<br>Cloud Cover 0%<br>Precipitation 0 in<br>Visibility 100% |
| December 10, 2013 | Temp 27-51.6°F<br>Wind 1-5 mph NE<br>Cloud Cover 0% |

| Survey Date | Weather Conditions |
|---|---|
| | Precipitation 0 in<br>Visibility 100% |
| December 11, 2013 | Temp 31.4-53°F<br>Wind 0.9-2.7 mph W<br>Cloud Cover 0%<br>Precipitation 0 in<br>Visibility 100% |
| December 21, 2013 | Temp 33-40°F<br>Wind 2.5- 7.5 mph W<br>Cloud Cover 0%<br>Precipitation 0 in<br>Visibility 100% |
| December 22, 2013 | Temp 30-49°F<br>Wind 0.6-8.2 mph N<br>Cloud Cover 0%<br>Precipitation 0 in<br>Visibility 100% |
| December 23, 2013 | Temp 43-60°F<br>Wind 0.6-2 mph W<br>Cloud Cover 0%<br>Precipitation 0 in<br>Visibility 100% |
| January 7, 2014 | Temp 39-69°F<br>Wind 1-5 mph E<br>Cloud Cover 75%<br>Precipitation 0 in.<br>Visibility 100% |
| January 8, 2014 | Temp 36-71°F<br>Wind 0-5 mph S<br>Cloud Cover 50%<br>Precipitation 0 in.<br>Visibility 100% |
| January 9, 2014 | Temp 41-47°F<br>Wind 0-5 mph N<br>Cloud Cover 50%<br>Precipitation 0 in.<br>Visibility 100% |

| Survey Date | Weather Conditions |
|---|---|
| January 22, 2014 | Temp 38-66°F<br>Wind 1-4 mph N<br>Cloud Cover 40%<br>Precipitation 0 in.<br>Visibility 100% |
| January 23, 2014 | Temp 47-68°F<br>Wind 3-6 mph NW<br>Cloud Cover 5%<br>Precipitation 0 in.<br>Visibility 100% |
| January 24, 2014 | Temp 48-65°F<br>Wind 0-10 mph S<br>Cloud Cover 90%<br>Precipitation 0 in.<br>Visibility 100% |

# APPENDIX E
# PHOTOGRAPHS

Photo 1. General habitat view of Valley Floor Conservation Lands (VFCL) and Project Site near P-01 looking southwest.

Photo 2. General habitat view of Project Footprint in vicinity of P-03 looking northeast toward P-04 and P-05.

Photo 3. General habitat view of Project Footprint in vicinity of P-03 looking southwest.

Photo 4. General view from Little Panoche Road toward P-05 with the Valadeao Ranch in background looking east/northeast.

Photo 5. General view of Project Footprint and VFCL looking west toward P-02 and the western Valadeao Ranch property.

Photo 6. General view of Project Footprint and VFCL looking southwest from V-01 on the eastern Valadeao Ranch property.

Photo 7. General habitat view of eastern Valadeao Ranch property looking northeast from V-01.

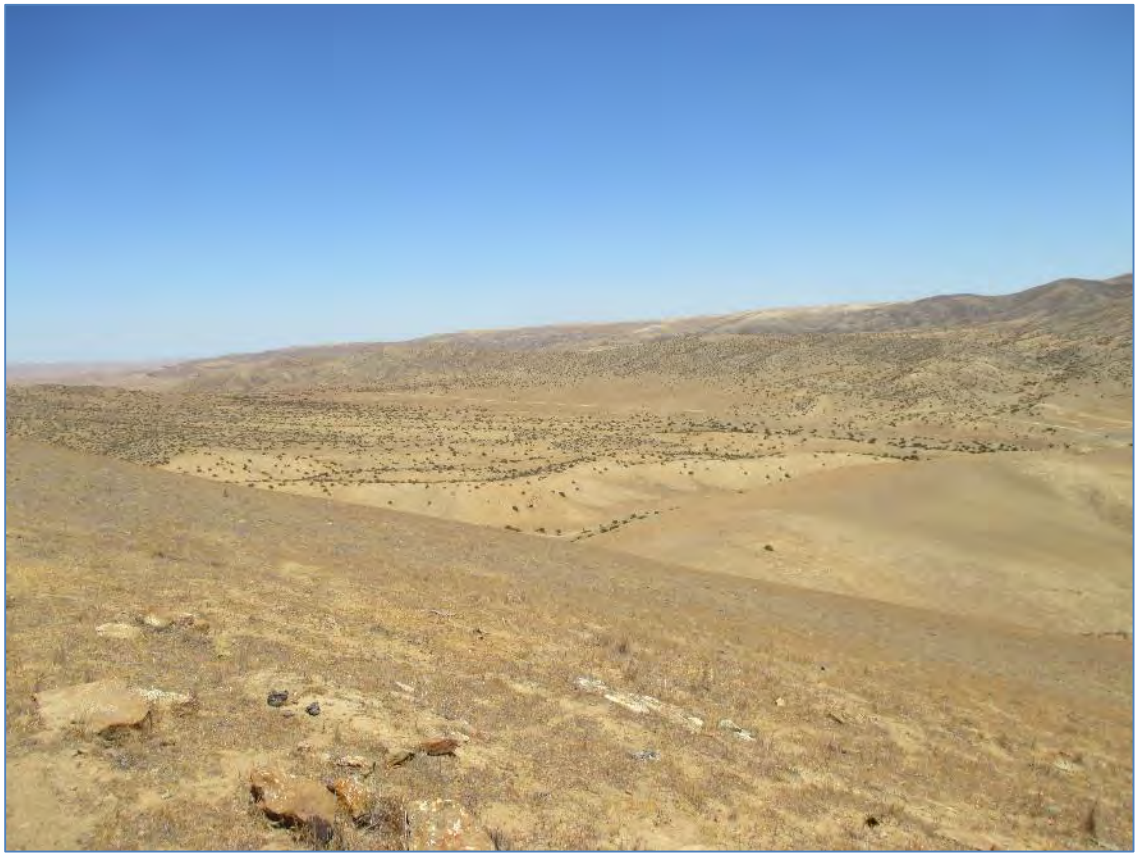

Photo 8. General habitat view of eastern Valadeao Ranch property looking north/northeast from V-01.

Photo 9. General habitat view of eastern Valadeao Ranch property looking east near V-02.

Photo 10. General habitat view of eastern Valadeao Ranch property near V-02.

Photo 11. General habitat view of the Silver Creek Ranch property looking northwest back towards S-01.

Photo 12. General habitat view of the Silver Creek Ranch property near S-02.

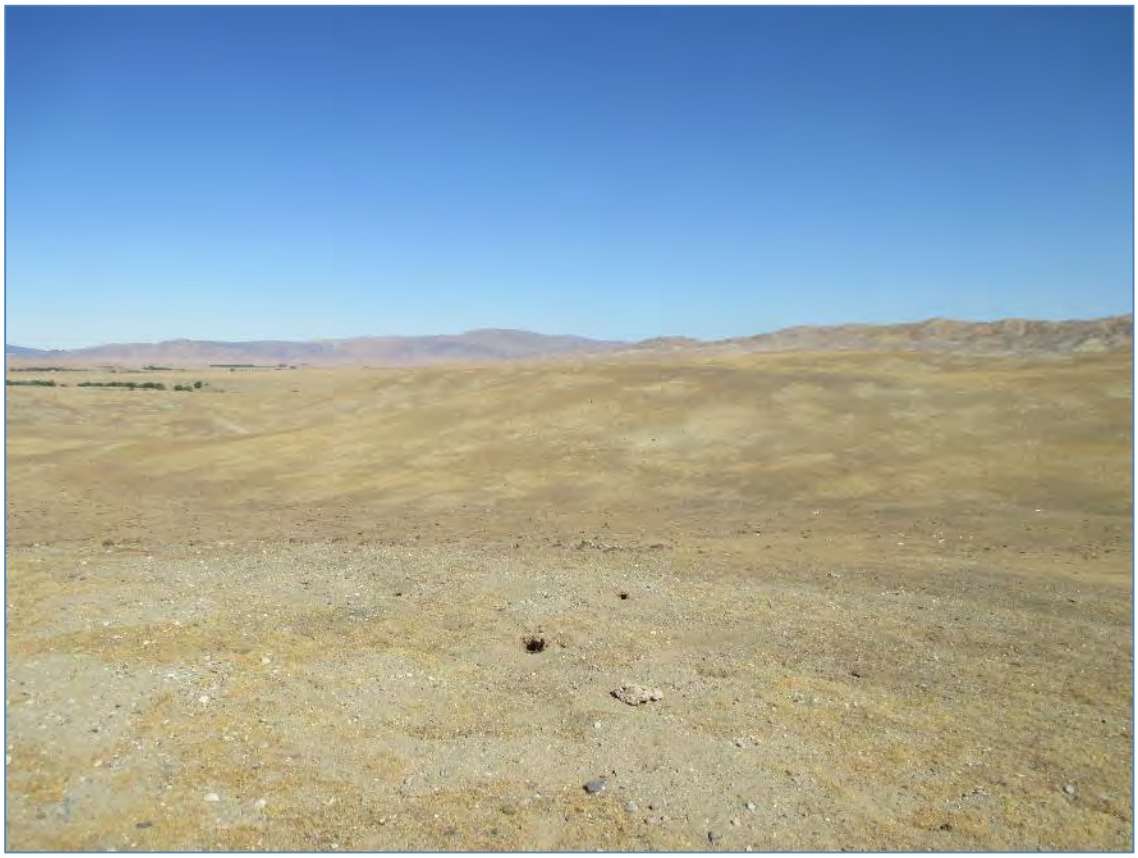

Photo 13. Additional habitat view of the Silver Creek Ranch property near S-02.

**Appendix C**

Panoche Valley Solar Facility - 2014 Final Golden Eagle Nesting Survey Report

DRAFT

# Panoche Valley Solar Facility

## 2014 Final Golden Eagle Nesting Survey Report

**Prepared for:**

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## ABOUT BLOOM BIOLOGICAL, INC.

For more than 35 years, Bloom Biological, Inc. (BBI) has provided biological consulting services for large and small clients. Our resume of services includes raptor and endangered species research, biological monitoring, impact assessment, permitting, conservation planning and geospatial analysis. Our innovative approach has provided solutions to complex problems for clients and projects throughout a range of industries including alternative energy, residential development and the public sector. Collectively, the management and staff of BBI hold permits or memoranda of understanding for participating in the conservation and recovery of more than a dozen endangered or threatened species, as well as a number of other special-status species, in California and the western United States. Over the years, BBI has established an impeccable relationship with the resource agencies, project proponents, and environmental organizations by skillfully balancing the needs and objectives of land planning, resource conservation, and the public interest. In addition to our work in California and the western United States, BBI biologists have worked in Alaska, Central and South America, Europe, Southern Asia, and the western Pacific. BBI is a certified Small Business Enterprise.

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# 1.0 INTRODUCTION

Bloom Biological, Inc. (BBI) was retained by Duke Energy for Panoche Valley Solar, LLC (the Applicants) to conduct nesting surveys for Golden Eagle (*Aquila chrysateos*) associated with the Panoche Valley Solar Facility (Project), an approximately 399 megawatt solar photovoltaic energy generating facility proposed for construction in San Benito County, California. BBI previously conducted surveys for the proposed Project, documenting 15 potential Golden Eagle nests within ten miles of the proposed Project, 8 of which were designated as having been active in the 2010 breeding season (BBI 2010). The report authors noted however, that the survey was conducted late in the season and that a more complete survey should be conducted during the breeding season and prior to leaf-on of deciduous trees, when nests would be easier to detect. To augment the 2010 nest survey effort, the U.S. Fish and Wildlife Service (Service) recommended that the Applicants conduct "Stage 2" aerial surveys of the Project area nesting population during a January-February time frame before leaf-on. BBI conducted aerial surveys for Golden Eagle with ten miles of the proposed project in January and April 2014, resulting in the documentation of 46 Golden Eagle nests and an estimated 30 Golden Eagle territories, with nine of them active, though none were located within three miles of the limits of the proposed Project. This report presents BBI's detailed survey methods and results, identifying the location and status of all nests, and the distance from each nest to the Project.

# 2.0 NATURAL HISTORY

The Golden Eagle is found throughout most of the north Temperate Zone. In North America it ranges from arctic Canada and Alaska south through the western United States to central Mexico. Northern populations are migratory; however, most populations south of Canada are residents or short-distant migrants.

Kochert et al. (2002) provided a thorough description of the natural history of the Golden Eagle, noting that the species is found in a variety of habitats located in a wide range of latitudes throughout the Northern Hemisphere. In North America, Golden Eagles are most common in the western half of the continent near open spaces that provide habitat for foraging, and generally with cliffs present for nesting sites. While northern populations of the species are migratory, often making trips of thousands of miles to the wintering grounds; southern populations (including those in southern California) tend to be resident year-round.

While Golden Eagles are capable of killing large prey such as cranes, wild ungulates, and domestic livestock, they primarily subsist on rabbits, hares, ground squirrels, and prairie dogs (Bloom and Hawks 1982, Olendorff 1976). Golden Eagles are thought to typically reach sexual maturity, form territories and begin nesting at four years of age. Pairs are generally thought to stay within the limits of their territory, which can measure well over 20 square kilometers and may contain as many as 14 nests (Kochert et al. 2012, Bloom pers. obs.). The pair maintains and repairs one or more of these nests as part of its courtship. Over the course of a decade several of these nests will be used and will produce young, while others may only receive occasional fresh sticks. Most alternate nests are important in the successful reproduction of a pair of eagles. Kochert et al. (2002) also noted that the nesting season is prolonged, extending more than 6 months from the time the 1-3 eggs are laid until the young reach independence. A typical Golden Eagle raises an average of only 1 young per year and up to 15 young over its lifetime. Pairs commonly refrain from laying eggs in some years, particularly when prey is scarce. The number of young that Golden Eagles produce each year depends on a combination of weather and prey conditions.

# 3.0 REGULATORY STATUS

Regulatory protections for Golden Eagles include thorough surveys to determine the status of Golden Eagles for projects occurring within their range and habitat. The intent is to determine the extent of potential direct, indirect and cumulative effects projects may have on eagles, avoid and or minimize these effects, assess the potential for incidental take during project operation, and monitor eagle populations. These measures are predominantly driven by the Bald and Golden Eagle Protection Act.

The Bald and Golden Eagle Protection Act (16 U.S.C. 668-668c), enacted in 1940, and amended several times since then, prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" eagles, including their parts, nests, or eggs. The Act provides criminal penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle ... [or any golden eagle], alive or dead, or any part, nest, or egg thereof." The Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb."

For purposes of the guidelines, "disturb" means: "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."

In addition to immediate impacts, this definition also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death or nest abandonment.

## 4.0 STUDY AREA DESCRIPTION

The Study Area includes all areas inside of, and within a 10-mile (16-kilometer) radius of the Project boundary (Figure 1, Exhibit 1), and encompasses approximately 305,004 acres (123,431 hectares). The Study Area is southeast of the City of Los Banos, California, and portions lie within San Benito, Fresno, and Merced Counties.

Terrain is variable throughout the Study Area, and includes relatively flat, largely agricultural fields in the extreme east, bordered by rolling arid grasslands that occupy the central portion. Most of the western half of the Study Area lies within the Diablo Range and includes more rugged hills and mountains with rocky outcroppings and cliff faces. The predominant land-use within the Study Area is ranching. Vegetative cover includes grasslands and agriculture in the east, chaparral at low elevations in the mountains, with Gray Pine (*Pinus sabineana*) occurring at higher elevations in the mountains, and various oak species, including the deciduous Blue Oak (*Quercus douglasii*), and evergreen Valley Oak (*Quercus lobata*) and Canyon Live Oak (*Quercus chrysolepis*). Elevation within the Study Area ranges from approximately 600 feet above mean sea level (amsl) in the southeast to approximately 4,000 feet amsl in the west.

*Figure 1. Study area location*

# 5.0 METHODS

As per guidance provided by the Service, an initial round of helicopter surveys was performed over a 10-day period during the early breeding season, from January 15-24, 2014. A second round of surveys was conducted over a 7-day period from April 2-8, 2014, when active nests were expected to contain eggs or young nestlings. The first round of surveys was conducted early enough that deciduous trees such as California Sycamore (*Platanus racemosa*), Valley Oak and particularly Blue Oak, which were very abundant in parts of the study area, had not yet leafed out, making it easier to detect large nests within their canopies.

All surveys were conducted by BBI biologist Peter H. Bloom, Ph.D. (lead observer), who was accompanied by one of three assistant observers, including Scott Thomas, Karyn Sernka and Michael J. Kuehn, Ph.D. The helicopter (Bell Jet Ranger 206) was owned and operated by a pilot experienced in conducting aerial Golden Eagle nesting surveys. Survey methodology described in Section VII.b of Aerial Surveys of Pagel et al. (2010) was followed to the extent possible. The biologists conducted an aerial examination of all appropriate nesting habitat inside the pre-defined Study Area described above (Section 4.0). During aerial surveys, BBI biologists searched for large stick nests of Golden Eagles and other raptors on cliff faces, rocky outcrops, trees, transmission towers, and other suitable nesting substrates.

GPS units (one primary and one backup) were used to mark locations of nest sites. The following information was recorded for each raptor or Common Raven (*Corvus corax*) nest found during surveys:

- Name of observer(s)
- Date/Time/Weather conditions
- Species of nest owner
- Location (GPS coordinates)
- Nest status (active, inactive, or unknown)
- Nest contents (empty, eggs, nestlings)
- Nest condition
- Nest substrate
- Nest description (or other indications of breeding behavior)
- Other pertinent descriptive information

Photographs were taken of Golden Eagle nests when feasible, and are presented in Appendix A of this report. Survey dates, times, and weather conditions are summarized in Table 1.

*Table 1. Field Survey Dates, Times, and Weather Conditions*

| Date | Time | Weather | Biologists |
|---|---|---|---|
| 1/15/2014 | 1300-1545h | Start: 62°F, 0% Cloud Cover, Breeze out of the SW<br>End: 56°F, 0% Cloud Cover, Breeze out of the SW<br>No Rain, No Fog, No Snow | Peter Bloom<br>Scott Thomas |
| 1/16/2014 | 0830-1700h | Start: 45°F, 0% Cloud Cover, Calm out of the SW<br>End: 63°F, 0% Cloud Cover, Breeze out of the SW<br>No Rain, No Fog, No Snow | Peter Bloom<br>Scott Thomas |
| 1/17/2014 | 0800-1630h | Start: 38°F, 0% Cloud Cover, Calm out of the N<br>End: 58°F, 0% Cloud Cover, Light Wind out of the NW<br>No Rain, No Fog, No Snow | Peter Bloom<br>Karyn Sernka |
| 1/18/2014 | 0830-1645h | Start: 41°F, 0% Cloud Cover, Calm out of the N<br>End: 62°F, 0% Cloud Cover, Calm out of the N<br>No Rain, No Fog, No Snow | Peter Bloom<br>Karyn Sernka |
| 1/19/2014 | 0830-1645h | Start: 40°F, 0% Cloud Cover, Light Wind out of the NE<br>End: 65°F, 0% Cloud Cover, Calm out of the N<br>No Rain, No Fog, No Snow | Peter Bloom<br>Karyn Sernka |

| Date | Time | Weather | Biologists |
|---|---|---|---|
| 1/20/2014 | 0800-1630h | Start: 39°F, 0% Cloud Cover, Calm out of the N<br>End: 61°F, 0% Cloud Cover, Calm out of the N<br>No Rain, No Fog, No Snow | Peter Bloom<br>Karyn Sernka |
| 1/21/2014 | 0800-1645h | Start: 38°F, 50% Cloud Cover, Light Wind out of the NW<br>End: 60°F, 0% Cloud Cover, Light Wind out of the NE<br>No Rain, No Fog, No Snow | Peter Bloom<br>Karyn Sernka |
| 1/22/2014 | 0840-1700h | Start: 41°F, 0% Cloud Cover, Calm out of the N<br>End: 63°F, 0% Cloud Cover, Calm out of the N<br>No Rain, No Fog, No Snow | Peter Bloom<br>Michael Kuehn |
| 1/23/2014 | 0900-1700h | Start: 46°F, 0% Cloud Cover, Calm out of the N<br>End: 64°F, 0% Cloud Cover, Calm out of the N<br>No Rain, No Fog, No Snow | Peter Bloom<br>Michael Kuehn |
| 1/24/2014 | 0850-1200h | Start: 51°F, 40% Cloud Cover, Calm out of the N<br>End: 60°F, 100% Cloud Cover, Calm out of the N<br>No Rain, No Fog, No Snow | Peter Bloom<br>Michael Kuehn |
| 4/2/2014 | 1200-1800h | Start: 62°F, 50% Cloud Cover, Light Wind out of the NE<br>End: 60°F, 40% Cloud Cover, Light Wind out of the NE<br>No Rain, No Fog, No Snow | Peter Bloom<br>Michael Kuehn |
| 4/3/2014 | 0730-1715h | Start: 43°F, 0% Cloud Cover, Calm out of the N<br>End: 58°F, 0% Cloud Cover, Light Wind out of the NW<br>No Rain, No Fog, No Snow | Peter Bloom<br>Michael Kuehn |
| 4/4/2014 | 0745-1730h | Start: 50°F, 0% Cloud Cover, Calm out of the N<br>End: 58°F, 0% Cloud Cover, Breeze out of the W<br>No Rain, No Fog, No Snow | Peter Bloom<br>Michael Kuehn |
| 4/5/2014 | 0730-1730h | Start: 48°F, 0% Cloud Cover, Breeze out of the W<br>End: 67°F, 0% Cloud Cover, Light Wind out of the NW<br>No Rain, No Fog, No Snow | Peter Bloom<br>Michael Kuehn |
| 4/6/2014 | 0730-1715h | Start: 46°F, 30% Cloud Cover, Calm out of the N<br>End: 71°F, 20% Cloud Cover, Light Wind out of the N<br>No Rain, No Fog, No Snow | Peter Bloom<br>Michael Kuehn |
| 4/7/2014 | 0715-1730h | Start: 51°F, 20% Cloud Cover, Calm out of the N<br>End: 78°F, 0% Cloud Cover, Breeze out of the NW<br>No Rain, No Fog, No Snow | Peter Bloom<br>Michael Kuehn |
| 4/8/2014 | 0700-1245h | Start: 54°F, 10% Cloud Cover, Calm out of the N<br>End: 81°F, 30% Cloud Cover, Calm out of the N<br>No Rain, No Fog, No Snow | Peter Bloom<br>Michael Kuehn |

## 5.1 Nest Determination

### 5.1.1 Species Identification

Biologists determined the species that built or occupied all large stick nests discovered during surveys by observing defending or incubating adults, the size of the nest, stick size, eggs and chicks, volume and height of excrement, and anthropogenic material if present. These distinctions were based upon the experience of the principal investigator (Dr. Bloom), which includes the entry and inspection of thousands of California raptor nests of 22 raptorial species including Golden Eagle, and the four raptor species that might utilize Golden Eagle nests in this region; Red-tailed Hawk (*Buteo jamaicensis*), Peregrine Falcon (*Falco peregrinus*), Prairie Falcon (*Falco mexicanus*) and Great Horned Owl (*Bubo virginianus*).

Within the Study Area, the Red-tailed Hawk is the predominant raptor species that builds large nests constructed of sticks, which may overlap in size with Golden Eagle nests. Common Ravens are non-raptors

that also construct reasonably large stick nests in this region. Of these three species, Red-tailed Hawk and Common Raven nests are the most abundant by a large factor. Fortunately, there are often predictable cues that can be used to differentiate among the nests of these species, beyond the direct observation of adults, young or eggs in the nest.

Common Ravens tend to have the smallest nests of the three species, followed by Red-tailed Hawks and finally, Golden Eagles, which may build nests 15 feet tall and 6 feet wide.

Though Red-tailed Hawk and Common Raven nests are sometimes difficult to distinguish from one another, Common Ravens are unique in that they often bring trash to their nest sites situated near civilization, and their nests tend to be very tightly structured. However, many Common Raven nests, and particularly those in very remote locations, do not incorporate anthropogenic materials into their nests.

Golden Eagle and Red-tailed Hawk nests can also be difficult to separate from each other without ample experience. The two species often use each other's nests for reproduction, though Red-tailed Hawks more commonly usurp Golden Eagle nests than the other way around. This may be because Golden Eagles often have more alternate nests than do Red-tailed Hawks and because the larger Golden Eagle nests tend to survive longer. Newly created, first year Golden Eagle nests are typically 6-10 inches thick and as small as 4 feet wide and may overlap in size with Red-tailed Hawk nests. At the other end of the size spectrum, Golden Eagles may build large tower nests that exceed 15 feet in thickness and 4-6 feet in width.

We considered nests greater than 5 feet wide and 3 feet thick to be definitive eagle nests. The size of the sticks, both in diameter and length also provides clues as to what species carried them and added them to the nest, with eagle nests containing much larger sticks than Red-tailed Hawks would generally bring to their nests.

### 5.1.2 Nest Status

A nest was considered *active* if any of the following three conditions was met: (1) fresh (live or dead) sticks had been added during the current nesting season, (2) the nest was found to contain eggs or young (dead or alive), or (3) an adult was observed on the nest in an incubating (or brooding) posture. Nests without any of these signs were considered *inactive*. A *failed* nest was an active nest that did not successfully fledge young. The newness (fresh sticks) of nest sticks can often be determined by their color and condition if they were recently collected from live plants and trees, however bleaching by the desert sun can sometimes make new sticks appear old quickly. The placement, compaction or lack of compaction of sticks can be a more accurate determination of the newness, such as the fresh sticks seen on the top of a recently active Golden Eagle nest compared with the compacted old sticks in the inactive nest. A *successful* nest was one that fledged at least one young (typically assumed if young were greater than eight weeks old during an observation). Active nests found at the end of the nesting cycle with considerable excrement in and around the nest, surrounding boulders or alternate nests were considered to have fledged.

Determining the activity status of nests during the breeding season is often unequivocal because in some instances there will be an adult eagle incubating eggs or brooding nestlings and/or visible eggs or nestlings. However, nest status can often be inferred even if a nest is visited outside of the actual nesting period (e.g., prior to egg laying or after fledging). Under these circumstances, more emphasis is placed on the condition of the nest and presence or absence of sign. Prior to egg laying, a typical active Golden Eagle nest will be relatively level on top, will have visibly newer sticks several inches thick arranged on the top of the nest, may have fresh greenery, and may have fresh feathers. Following fledging, the biologists primarily consider the condition of the nest and the amount (or lack of) and relative age of white-wash, which in the case of Golden Eagles should occur in significant amounts forming a broad splatter pattern composed of long, large broken streaks often referred to as slices. At some locations with recently fledged multiple young, it may appear as if it snowed below the nest edge.

Although there may be no definitive determination of whether nestling(s) fledged there will be strong indicators if the nest was active and at least contained chicks of more than a few weeks old. White wash sprays and slices behind the nest are not commonly deposited by adults. Significant accumulation of fresh white wash behind, around, directly below, and approximately level with the nest are indicators that nestling(s) were present.

Other factors considered include the nearby presence or absence of adult and/or fledgling eagles, active nearby perch sites with fresh sign and active alternative nests within close proximity to the nest in question.

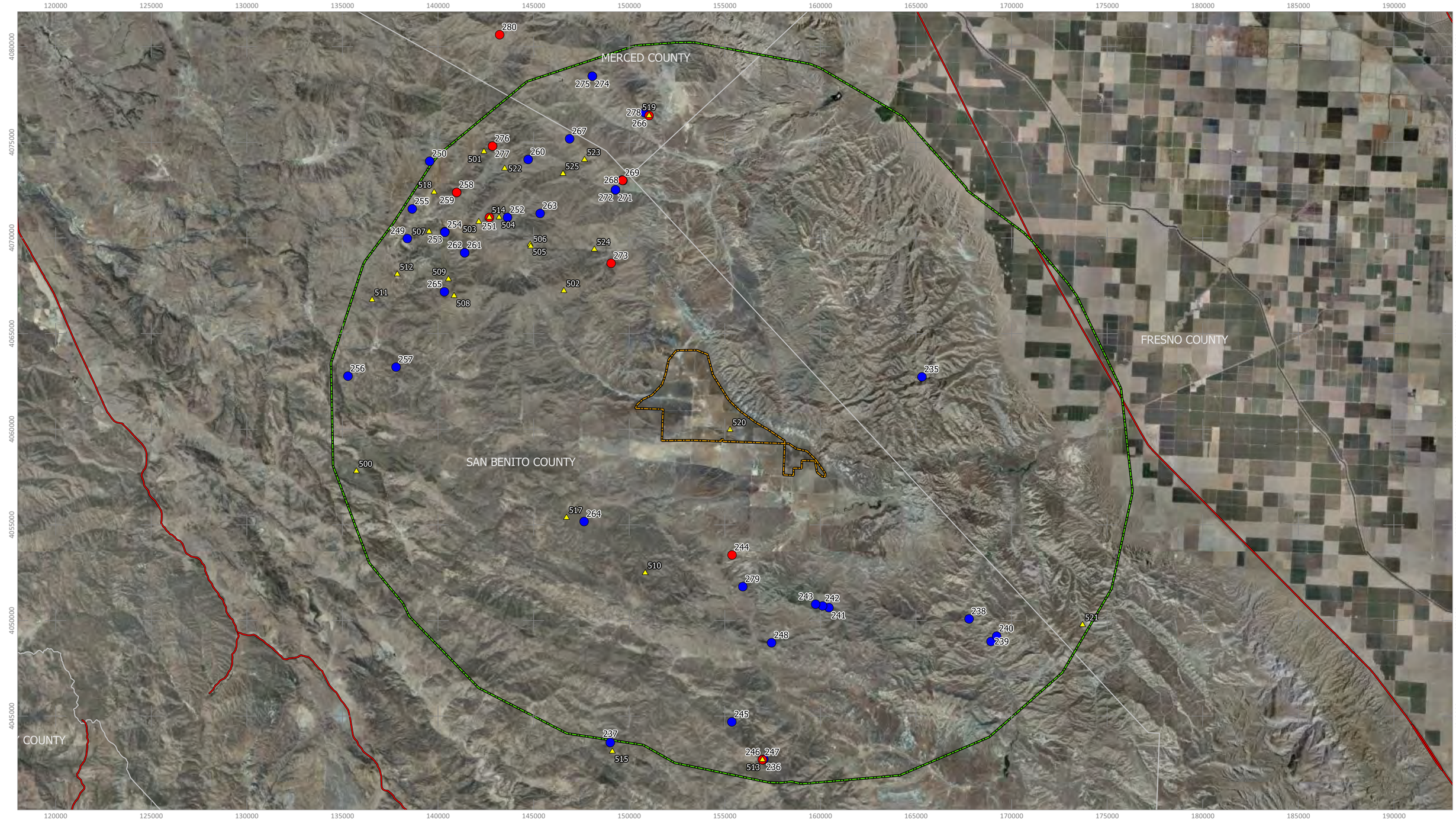
# 6.0 RESULTS & DISCUSSION

A total of 492 nests was documented by BBI within the Study Area, including 46 Golden Eagle nests. All Golden Eagle nests are listed in Table 2 below, and their locations are mapped in Exhibit 1. Photographs of all Golden Eagle nests that could safely be photographed are presented in Appendix A. All nests classified as belonging to species other than Golden Eagles are listed in Appendix B, including nests of 226 Common Ravens, 146 Red-tailed Hawks, 62 Prairie Falcons, 8 Barn Owls (*Tyto alba)*, 3 Great Horned Owls, and 1 Turkey Vulture (*Cathartes aura*).

Dr. Bloom estimates that the 46 Golden Eagle nests discovered during this survey effort comprise approximately 30 breeding territories, some of which contain one or more alternate nests. The actual number of territories could be slightly higher or lower than 30, and the exact number of territories depends, in part, on how alternate nests of a single territory are defined. In most cases, nests that were on the same cliff faces, or at least very close together could be safely designated as alternate nests within the same breeding territory. For example, nest IDs 266 and 278 were separated by less than 330 yards (300 meters) and were in the same watershed, and were attributed to the same breeding territory. In other cases, it was less clear if different nests were part of a single territory or not. Golden Eagle nesting density (and territory size) is driven primarily by habitat quality, with higher nesting density in better quality habitat. Given that habitat quality in the Study Area varies from quite high (in the northwestern quadrant, where most nests were located), to quite low, in extreme eastern portions, it would not be surprising for nests in some areas to be located as close together as 1 mile (1.6 kilometers), or even rarely 0.5 miles (0.8 kilometers), particularly in the areas of better quality habitat. Golden Eagle nests 251 and 252, in the northwestern quadrant, were separated by only 0.6 miles (1 kilometer), and this is a prime example of two nests that could comprise two breeding territories, but likely represent one.

In total, nine Golden Eagle nests were classified as active in the 2014 season, each representing a separate territory. Thus, active nesting occurred in almost one-third (9 of about 30) of the territories identified in this survey. Of these nine nests, eggs are presumed to have been laid in at least four. Adults were observed on nests in incubating posture, in April, at nest IDs 246 and 251, and two un-incubated eggs were observed in (presumed failed) nest ID 276 in April. Finally, two chicks were observed being tended to by a female Golden Eagle at nest ID 266 in early April. Of the remaining five Golden Eagle nests that were identified as active in 2014, none was known to contain eggs or nestlings as of April 8$^{th}$. Given that Golden Eagles in this region normally lay eggs on or before this date, it is very unlikely that any of these nests went on to successfully fledge young during the 2014 nesting season.

No Golden Eagle nests were identified within 3 miles (5 kilometers) of the Project (Table 2), though four nests (IDs 244, 264, 273 and 279), comprising four breeding territories were located within four miles of the Project boundary. Two of these four nests (IDs 244 and 273) were active in 2014, though neither nest was ever found to contain eggs or nestlings. The next closest active Golden Eagle nest to the Project in 2014 was nest ID 269, located 5.79 miles (9.34 kilometers) north-northwest of the Project.




County Border
Major Road
Proposed Project Boundary
Study Area

Observation Type
Active Golden Eagle Nest
Inactive Golden Eagle Nest
Golden Eagle Observation

10000 0 10000 20000 30000 40000 ft
1:184,877

UTM NAD83 Zone 11 Coordinate Grid
Map Date: 5/10/2014
Author: Michael J. Kuehn
Background Source: US Department of Agriculture

EXHIBIT 1. 2014 Golden Eagle Nesting Survey Results
Panoche Valley Solar Project | Merced, Fresno and San Benito Counties, California

BBI

Although it cannot be ruled out that some Golden Eagle nests within the Study Area could have gone undetected, the 10-day effort in late January represented a massive and comprehensive survey, during a period when deciduous trees such as Blue and Valley Oaks had not yet leafed out. This effort was followed by an 8-day effort in April, when special attention was paid to surveying areas where adult Golden Eagles had been observed, but no nests had been found; or where only inactive nests had been found and additional effort was dedicated to surveying for active nests that may have been missed.

*Table 2. Golden Eagle Nests Discovered During Surveys*

*The following table lists the identification number (ID) of all 46 Golden Eagle nests discovered during surveys conducted in January and April of 2014. Each nest ID number is accompanied by the following information: (1) substrate supporting nest (Substrate), (2) estimated nest height in feet (Est. Height [ft.], (3) nest contents (Contents), (4) quantity of nest contents (Quan.), (5) nest status (Status), (6) distance in miles from nest to the proposed Project (Project Dist. [mi.]), and (7) relevant notes (Notes).*

| ID | Substrate | Est. Height (ft.) | Contents | Quan. | Status | Project Dist. (mi.) | Notes |
|---|---|---|---|---|---|---|---|
| 235 | Cliff | 50 | Empty | 0 | Inactive | 4.37 | |
| 236 | Cliff | 50 | Empty | 0 | Inactive | 9.24 | Fledged young in 2013 |
| 237 | Cliff | 50 | Empty | 0 | Inactive | 9.93 | |
| 238 | Cliff | 150 | Empty | 0 | Inactive | 6.56 | |
| 239 | Cliff | 85 | Empty | 0 | Inactive | 7.58 | Two nests on east face, one nest on west face |
| 240 | Cliff | 85 | Empty | 0 | Inactive | 7.59 | |
| 241 | Cliff | 75 | Empty | 0 | Inactive | 4.25 | Very old |
| 242 | Cliff | 100 | Empty | 0 | Inactive | 4.19 | Fledged young in 2013 |
| 243 | Cliff | 60 | Empty | 0 | Inactive | 4.14 | Sticks below nest |
| 244 | Cliff | 70 | Empty | 0 | Active | 3.09 | Nest freshly rebuilt in January, but unattended, empty, and looked worn and inactive in April |
| 245 | Cliff | 50 | Empty | 0 | Inactive | 8.18 | On same cliff face as two inactive Common Raven nests |
| 246 | Cliff | 50 | Unknown | N.A. | Active | 9.26 | Nest with fresh greenery on Jan. 21. adult sitting tight, presumably on eggs, on nest on Apr. 2 |
| 247 | Cliff | 50 | Empty | 0 | Inactive | 9.26 | Old nests near active Golden Eagle nest |
| 248 | Gray Pine | 50 | Empty | 0 | Inactive | 5.46 | |
| 249 | Valley Oak | 80 | Empty | 0 | Inactive | 9.20 | |
| 250 | Valley Oak | 60 | Empty | 0 | Inactive | 10.07 | Nest on mistletoe |
| 251 | Blue Oak | 55 | Unknown | N.A. | Active | 7.42 | Active and empty on Jan. 19. Adult sitting on nest in incubation posture Apr. 3. |
| 252 | Blue Oak | 65 | Empty | 0 | Inactive | 6.97 | Falling, only remnants remain in tree. Some whitewash. Not photographed |
| 253 | Blue Oak | 70 | Empty | 0 | Inactive | 8.36 | Near another nest in tree with bare branches |
| 254 | Blue Oak | 70 | Empty | 0 | Inactive | 8.35 | near another nest in tree with live (leaved) branches |

| ID | Substrate | Est. Height (ft.) | Contents | Quan. | Status | Project Dist. (mi.) | Notes |
|---|---|---|---|---|---|---|---|
| 255 | Valley Oak | 70 | Empty | 0 | Inactive | 9.65 | |
| 256 | Gray Pine | 65 | Empty | 0 | Inactive | 9.38 | Smaller nest above main nest in same tree |
| 257 | Gray Pine | 55 | Empty | 0 | Inactive | 7.87 | |
| 258 | Blue Oak | 60 | Empty | 0 | Active | 8.76 | Adults present near nest on Jan. 19 and Apr. 3, fresh greenery in bowl. Eggs never observed. Second, inactive nest 50 meters away. |
| 259 | Blue Oak | 60 | Empty | 0 | Inactive | 8.76 | 50 meters from second, active Golden Eagle nest |
| 260 | Blue Oak | 55 | Empty | 0 | Inactive | 7.84 | |
| 261 | Blue Oak | 55 | Empty | 0 | Inactive | 7.45 | Two nests in same tree. Lower nest is smaller, older. Pair of adult Golden Eagles near |
| 262 | Blue Oak | 60 | Empty | 0 | Inactive | 7.45 | Two nests in same tree. Higher nest is larger, newer. Pair of adult Golden Eagles near |
| 263 | Blue Oak | 65 | Empty | 0 | Inactive | 6.27 | Very large nest; two adults and one 2nd-year bird nearby |
| 264 | Gray Pine | 60 | Empty | 0 | Inactive | 3.64 | |
| 265 | Blue Oak | 55 | Empty | 0 | Inactive | 7.24 | Yellow-billed Magpie nest in top of tree |
| 266 | Cliff | 100 | Nestlings | 2 | Active | 7.67 | Nest inactive on Jan. 15. An adult and 2 nestlings in nest on Apr. 4 |
| 267 | Cliff | 50 | Empty | 0 | Inactive | 7.69 | |
| 268 | Cliff | 150 | Empty | 0 | Inactive | 5.80 | |
| 269 | Cliff | 80 | Empty | 0 | Active | 5.79 | Built on this season. |
| 270 | Cliff | 50 | Empty | 0 | Inactive | 5.78 | Used recently in a previous season |
| 271 | Cliff | 60 | Empty | 0 | Inactive | 5.57 | Old nest located above Red-tailed Hawk nest |
| 272 | Cliff | 35 | Empty | 0 | Inactive | 5.57 | Very old, located below and west of another old eagle nest |
| 273 | Cliff | 50 | Empty | 0 | Active | 3.53 | Two nests next to each other on same rock face; Inactive on Jan. 20, but significantly built on by Apr. 4. No eggs ever observed. |
| 274 | Cliff | 50 | Empty | 0 | Inactive | 9.30 | On west face |
| 275 | Cliff | 60 | Empty | 0 | Inactive | 9.30 | On east face |
| 276 | Blue Oak | 40 | Eggs | 2 | Active | 8.91 | Lower of two nests in same tree. Adult near on Jan. 23, but nest inactive. On Apr. 3, contained two un-incubated eggs, though two adult eagles were nearby. Eggs still not being incubated on Apr. 4. |
| 277 | Blue Oak | 45 | Empty | 0 | Inactive | 8.91 | Upper of two nests in same tree. |
| 278 | Cliff | 70 | Empty | 0 | Inactive | 7.79 | Inactive. More than 100 yards of ribbon with colored flagging strewn across vegetation above cliff with nest |

| ID | Substrate | Est. Height (ft.) | Contents | Quan. | Status | Project Dist. (mi.) | Notes |
|---|---|---|---|---|---|---|---|
| 279 | Cliff | 60 | Empty | 0 | Inactive | 3.85 | Good condition but no whitewash. Not active in last 5 years |
| 280 | Cliff | 55 | Empty | 0 | Active | 11.73 | Newly built nest this year. |

*Table 3. Golden Eagle and California Condor Observations Made During Surveys*

*The following table lists the identification number (ID) of all Golden Eagle and California Condor observations made during surveys conducted in January and April of 2014. Each nest ID number is accompanied by the following information: (1) common name of species observed (Species), (2) number of individuals observed (Quan.), (3) age of individuals observed (Age), (4) sex of individuals observed (Sex), and (5) relevant notes (Notes).*

| ID | Species | Quan. | Age | Sex | Notes |
|---|---|---|---|---|---|
| 500 | Golden Eagle | 1 | Adult | Unknown | |
| 501 | Golden Eagle | 1 | Adult | Unknown | |
| 502 | Golden Eagle | 2 | Adult | Pair | |
| 503 | Golden Eagle | 1 | Adult | Unknown | |
| 504 | Golden Eagle | 1 | Adult | Unknown | |
| 505 | Golden Eagle | 1 | Subadult | Unknown | 2nd year bird |
| 506 | Golden Eagle | 2 | Adult | Pair | Not aggressive toward 2nd year bird in area |
| 507 | Golden Eagle | 1 | Unknown | Unknown | Perched |
| 508 | Golden Eagle | 2 | Adult | Pair | Perched at top of ridge |
| 509 | Golden Eagle | 1 | Adult | Unknown | Perched |
| 510 | Golden Eagle | 1 | Unknown | Unknown | Soaring over peak |
| 511 | Golden Eagle | 4 | Mixed | Mixed | One group of three Golden Eagles (two adults, one subadult) and a fourth, lone adult in the distance |
| 512 | Golden Eagle | 2 | Adult | Pair | |
| 513 | Golden Eagle | 1 | Adult | Unknown | Adult on nest in incubation posture |
| 514 | Golden Eagle | 1 | Adult | Female | Adult on nest in incubation posture |
| 515 | Golden Eagle | 1 | Adult | Unknown | In flight |
| 516 | California Condor | 2 | Adult | Pair | Emerged from crevice in cliff |
| 517 | Golden Eagle | 1 | Adult | Unknown | Flying to south |
| 518 | Golden Eagle | 1 | Adult | Female | Flying over field |
| 519 | Golden Eagle | 1 | Adult | Female | Adult on nest in incubation posture |
| 520 | Golden Eagle | 1 | Adult | Unknown | Flying about 600 feet above ground |
| 521 | Golden Eagle | 1 | Adult | Unknown | In flight |
| 522 | Golden Eagle | 1 | Adult | Unknown | |
| 523 | Golden Eagle | 1 | Subadult | Unknown | |
| 524 | Golden Eagle | 1 | Adult | Unknown | Flying. One of two adults detected in territory |
| 525 | Golden Eagle | 1 | Adult | Female | Perched. One of two adults detected in territory |

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# APPENDIX A. PHOTOGRAPHS OF GOLDEN EAGLE NESTS

Nest ID 235

Nest ID 237

Nest ID 238

Nest ID 239

Nest ID 240

Nest ID 241

Nest ID 242

Nest ID 243

Nest ID 244

Nest ID 245

Nest ID 246

Nest ID 247

Nest ID 248

Nest ID 249

Nest ID 251

Nest ID 253

Nest ID 254

Nest ID 255

Nest ID 256

Nest ID 257

Nest ID 258

Nest ID 259

Nest ID 260

Nest ID 262

Nest ID 263

Nest ID 264

Nest ID 265

Nest ID 266

Nest ID 267

Nest ID 268

Nest ID 269

Nest ID 270

Nest ID 271

Nest ID 272

Nest ID 273

Nest ID 274

Nest ID 275

Nest ID 276

Nest ID 277

Nest ID 278

Nest ID 279

Nest ID 280

# APPENDIX B. NON-GOLDEN EAGLE SURVEY RESULTS

*The following table lists the identification number (ID) of all non-Golden Eagle nests discovered during surveys conducted in January and April of 2014. Each nest ID number is accompanied by the following information: (1) species of nest-owner (Species), (2) substrate supporting nest (Substrate), (3) nest contents (Contents), (4) quantity of nest contents (Quan.), (5) nest status (Status), (6) distance in miles from nest to the proposed Project (Project Dist. [mi.]), and (7) relevant notes (Notes).*

| ID | Species | Substrate | Contents | Quan. | Status | Project Dist. (mi.) | Notes |
|---|---|---|---|---|---|---|---|
| 1 | Barn Owl | Cliff | Empty | 0 | Inactive | 8.56 | Possible Prairie Falcon eyrie |
| 2 | Barn Owl | Cliff | Empty | 0 | Inactive | 8.45 | Possible Prairie Falcon eyrie |
| 3 | Barn Owl | Cliff | Empty | 0 | Inactive | 8.27 | Possible Prairie Falcon eyrie |
| 4 | Barn Owl | Cliff | Empty | 0 | Inactive | 1.31 | |
| 5 | Barn Owl | Cliff | Empty | 0 | Inactive | 1.73 | |
| 6 | Barn Owl | Cliff | Empty | 0 | Inactive | 1.94 | |
| 7 | Barn Owl | Cliff | Empty | 0 | Inactive | 2.16 | |
| 8 | Barn Owl | Cliff | Empty | 0 | Inactive | 2.85 | |
| 9 | Common Raven | Cliff | Empty | 0 | Inactive | 7.96 | Fallen nest |
| 10 | Common Raven | Cliff | Empty | 0 | Inactive | 8.18 | |
| 11 | Common Raven | Windmill | Empty | 0 | Inactive | 5.71 | |
| 12 | Common Raven | Cliff | Empty | 0 | Inactive | 5.12 | |
| 13 | Common Raven | Cliff | Empty | 0 | Inactive | 5.06 | |
| 14 | Common Raven | Cliff | Empty | 0 | Inactive | 9.33 | |
| 15 | Common Raven | Cliff | Empty | 0 | Inactive | 7.99 | |
| 16 | Common Raven | Cliff | Empty | 0 | Inactive | 5.64 | |
| 17 | Common Raven | Cliff | Empty | 0 | Inactive | 7.28 | |
| 18 | Common Raven | Cliff | Empty | 0 | Inactive | 7.31 | |
| 19 | Common Raven | Cliff | Empty | 0 | Inactive | 8.22 | |
| 20 | Common Raven | Cliff | Empty | 0 | Inactive | 8.49 | |
| 21 | Common Raven | Cliff | Empty | 0 | Inactive | 6.05 | |
| 22 | Common Raven | Rock | Empty | 0 | Inactive | 7.04 | |
| 23 | Common Raven | Cliff | Empty | 0 | Inactive | 4.47 | |
| 24 | Common Raven | Cliff | Empty | 0 | Inactive | 4.88 | |

| ID | Species | Substrate | Contents | Quan. | Status | Project Dist. (mi.) | Notes |
|---|---|---|---|---|---|---|---|
| 25 | Common Raven | Cliff | Empty | 0 | Inactive | 9.57 | |
| 26 | Common Raven | Cliff | Empty | 0 | Inactive | 10.52 | |
| 27 | Common Raven | Cliff | Empty | 0 | Inactive | 10.53 | Three Common Raven nests, same cliff |
| 28 | Common Raven | Cliff | Empty | 0 | Inactive | 11.22 | |
| 29 | Common Raven | Cliff | Empty | 0 | Inactive | 10.23 | |
| 30 | Common Raven | Cliff | Empty | 0 | Inactive | 10.30 | |
| 31 | Common Raven | Cliff | Empty | 0 | Inactive | 9.50 | |
| 32 | Common Raven | Cliff | Empty | 0 | Inactive | 6.86 | |
| 33 | Common Raven | Cliff | Empty | 0 | Inactive | 5.89 | |
| 34 | Common Raven | Cliff | Empty | 0 | Inactive | 5.77 | |
| 35 | Common Raven | Cliff | Empty | 0 | Inactive | 6.35 | |
| 36 | Common Raven | Cliff | Empty | 0 | Inactive | 6.53 | |
| 37 | Common Raven | Cliff | Empty | 0 | Inactive | 6.57 | |
| 38 | Common Raven | Cliff | Empty | 0 | Inactive | 6.71 | |
| 39 | Common Raven | Cliff | Empty | 0 | Inactive | 7.37 | |
| 40 | Common Raven | Cliff | Empty | 0 | Inactive | 6.33 | |
| 41 | Common Raven | Cliff | Empty | 0 | Inactive | 4.55 | |
| 42 | Common Raven | Cliff | Empty | 0 | Inactive | 4.60 | |
| 43 | Common Raven | Cliff | Empty | 0 | Inactive | 4.10 | |
| 44 | Common Raven | Cliff | Empty | 0 | Inactive | 6.13 | |
| 45 | Common Raven | Cliff | Empty | 0 | Inactive | 5.99 | |
| 46 | Common Raven | Cliff | Empty | 0 | Inactive | 7.14 | |
| 47 | Common Raven | Cliff | Empty | 0 | Inactive | 9.49 | |
| 48 | Common Raven | Cliff | Empty | 0 | Inactive | 10.11 | |
| 49 | Common Raven | Cliff | Empty | 0 | Inactive | 10.12 | |
| 50 | Common Raven | Cliff | Empty | 0 | Inactive | 7.29 | |

| ID | Species | Substrate | Contents | Quan. | Status | Project Dist. (mi.) | Notes |
|---|---|---|---|---|---|---|---|
| 51 | Common Raven | Cliff | Empty | 0 | Inactive | 6.17 | |
| 52 | Common Raven | Cliff | Empty | 0 | Inactive | 4.25 | |
| 53 | Common Raven | Cliff | Empty | 0 | Inactive | 4.82 | |
| 54 | Common Raven | Cliff | Empty | 0 | Inactive | 5.88 | |
| 55 | Common Raven | Cliff | Empty | 0 | Inactive | 4.56 | |
| 56 | Common Raven | Cliff | Empty | 0 | Inactive | 4.58 | |
| 57 | Common Raven | Cliff | Empty | 0 | Inactive | 4.22 | |
| 58 | Common Raven | Cliff | Empty | 0 | Inactive | 3.72 | |
| 59 | Common Raven | Cliff | Empty | 0 | Inactive | 4.36 | |
| 60 | Common Raven | Cliff | Empty | 0 | Inactive | 1.27 | |
| 61 | Common Raven | Cliff | Empty | 0 | Inactive | 2.77 | |
| 62 | Common Raven | Cliff | Empty | 0 | Inactive | 2.30 | |
| 63 | Common Raven | Cliff | Empty | 0 | Inactive | 10.22 | |
| 64 | Common Raven | Cliff | Empty | 0 | Inactive | 2.89 | |
| 65 | Common Raven | Cliff | Empty | 0 | Inactive | 3.14 | |
| 66 | Common Raven | Cliff | Empty | 0 | Inactive | 2.78 | Near Red-tailed Hawk nest |
| 67 | Common Raven | Cliff | Empty | 0 | Inactive | 0.64 | |
| 68 | Common Raven | Cliff | Empty | 0 | Inactive | 2.98 | |
| 69 | Common Raven | Cliff | Empty | 0 | Active | 2.09 | |
| 70 | Common Raven | Cliff | Empty | 0 | Inactive | 2.43 | |
| 71 | Common Raven | Cliff | Empty | 0 | Inactive | 2.41 | |
| 72 | Common Raven | Cliff | Empty | 0 | Inactive | 3.40 | |
| 73 | Common Raven | Cliff | Empty | 0 | Active | 3.32 | |
| 74 | Common Raven | Cliff | Empty | 0 | Inactive | 3.06 | |
| 75 | Common Raven | Cliff | Empty | 0 | Inactive | 3.62 | |
| 76 | Common Raven | Cliff | Empty | 0 | Inactive | 5.07 | |

| ID | Species | Substrate | Contents | Quan. | Status | Project Dist. (mi.) | Notes |
|---|---|---|---|---|---|---|---|
| 77 | Common Raven | Cliff | Empty | 0 | Inactive | 5.04 | |
| 78 | Common Raven | Cliff | Empty | 0 | Inactive | 5.07 | |
| 79 | Common Raven | Cliff | Empty | 0 | Inactive | 10.04 | |
| 80 | Common Raven | Cliff | Empty | 0 | Inactive | 9.97 | |
| 81 | Common Raven | Cliff | Empty | 0 | Inactive | 9.65 | Two nests next to each other |
| 82 | Common Raven | Cliff | Empty | 0 | Inactive | 9.65 | |
| 83 | Common Raven | Cliff | Empty | 0 | Inactive | 6.37 | Two old nests nearby |
| 84 | Common Raven | Cliff | Empty | 0 | Active | 4.22 | |
| 85 | Common Raven | Cliff | Empty | 0 | Inactive | 4.99 | |
| 86 | Common Raven | Cliff | Empty | 0 | Inactive | 3.90 | |
| 87 | Common Raven | Cliff | Empty | 0 | Inactive | 3.04 | |
| 88 | Common Raven | Cliff | Empty | 0 | Inactive | 3.03 | |
| 89 | Common Raven | Cliff | Empty | 0 | Inactive | 3.16 | |
| 90 | Common Raven | Cliff | Empty | 0 | Inactive | 2.85 | |
| 91 | Common Raven | Valley Oak | Empty | 0 | Inactive | 3.24 | |
| 92 | Common Raven | Cliff | Empty | 0 | Inactive | 2.56 | |
| 93 | Common Raven | Cliff | Empty | 0 | Inactive | 2.29 | |
| 94 | Common Raven | Tower | Empty | 0 | Inactive | 0.82 | |
| 95 | Common Raven | Tower | Empty | 0 | Inactive | 0.36 | |
| 96 | Common Raven | Tower | Empty | 0 | Inactive | 0.23 | |
| 97 | Common Raven | Tower | Empty | 0 | Inactive | 0.41 | |
| 98 | Common Raven | Tower | Empty | 0 | Inactive | 0.00 | |
| 99 | Common Raven | Tower | Empty | 0 | Inactive | 0.00 | Nest in a transformer pole |
| 100 | Common Raven | Tower | Empty | 0 | Inactive | 0.00 | |
| 101 | Common Raven | Tower | Empty | 0 | Inactive | 0.00 | |
| 102 | Common Raven | Tower | Empty | 0 | Inactive | 0.21 | |

| ID | Species | Substrate | Contents | Quan. | Status | Project Dist. (mi.) | Notes |
|---|---|---|---|---|---|---|---|
| 103 | Common Raven | Tower | Empty | 0 | Inactive | 0.55 | |
| 104 | Common Raven | Tower | Empty | 0 | Inactive | 0.87 | |
| 105 | Common Raven | Tower | Empty | 0 | Inactive | 1.01 | |
| 106 | Common Raven | Tower | Empty | 0 | Inactive | 5.49 | |
| 107 | Common Raven | Tower | Empty | 0 | Inactive | 5.70 | Two nests on one tower |
| 108 | Common Raven | Tower | Empty | 0 | Inactive | 9.96 | |
| 109 | Common Raven | Valley Oak | Empty | 0 | Inactive | 9.11 | |
| 110 | Common Raven | Blue Oak | Empty | 0 | Inactive | 9.13 | |
| 111 | Common Raven | Digger Pine | Empty | 0 | Inactive | 7.48 | |
| 112 | Common Raven | Blue Oak | Empty | 0 | Inactive | 0.66 | |
| 113 | Common Raven | Blue Oak | Empty | 0 | Inactive | 2.87 | |
| 114 | Common Raven | Blue Oak | Empty | 0 | Inactive | 2.95 | |
| 115 | Common Raven | Cliff | Empty | 0 | Inactive | 3.77 | |
| 116 | Common Raven | Blue Oak | Empty | 0 | Inactive | 5.29 | |
| 117 | Common Raven | Cliff | Empty | 0 | Inactive | 9.23 | |
| 118 | Common Raven | Cliff | Empty | 0 | Inactive | 9.17 | |
| 119 | Common Raven | Tower | Empty | 0 | Inactive | 10.07 | |
| 120 | Common Raven | Tower | Empty | 0 | Inactive | 10.03 | |
| 121 | Common Raven | Tower | Empty | 0 | Inactive | 9.99 | Two nests in two adjacent towers |
| 122 | Common Raven | Tower | Empty | 0 | Inactive | 9.92 | |
| 123 | Common Raven | Tower | Empty | 0 | Inactive | 9.88 | Two nests in one tower |
| 124 | Common Raven | Tower | Empty | 0 | Inactive | 9.85 | |
| 125 | Common Raven | Tower | Empty | 0 | Inactive | 9.87 | |
| 126 | Common Raven | Tower | Empty | 0 | Inactive | 10.06 | |
| 127 | Common Raven | Cliff | Empty | 0 | Inactive | 4.72 | |
| 128 | Common Raven | Cliff | Empty | 0 | Inactive | 7.22 | |

| ID | Species | Substrate | Contents | Quan. | Status | Project Dist. (mi.) | Notes |
|---|---|---|---|---|---|---|---|
| 129 | Common Raven | Cliff | Empty | 0 | Inactive | 7.41 | |
| 130 | Common Raven | Cliff | Empty | 0 | Inactive | 7.42 | |
| 131 | Common Raven | Cliff | Empty | 0 | Inactive | 7.71 | |
| 132 | Common Raven | Digger Pine | Empty | 0 | Inactive | 8.36 | |
| 133 | Common Raven | Cliff | Empty | 0 | Inactive | 10.15 | |
| 134 | Common Raven | Digger Pine | Empty | 0 | Inactive | 9.72 | |
| 135 | Common Raven | Digger Pine | Empty | 0 | Inactive | 8.66 | |
| 136 | Common Raven | Cliff | Empty | 0 | Inactive | 5.39 | |
| 137 | Common Raven | Digger Pine | Empty | 0 | Inactive | 5.37 | |
| 138 | Common Raven | Cliff | Empty | 0 | Inactive | 4.67 | |
| 139 | Common Raven | Cliff | Empty | 0 | Inactive | 5.43 | |
| 140 | Common Raven | Cliff | Empty | 0 | Inactive | 5.59 | |
| 141 | Common Raven | Cliff | Empty | 0 | Inactive | 5.36 | Next to Prairie Falcon |
| 142 | Common Raven | Cliff | Empty | 0 | Inactive | 5.48 | |
| 143 | Common Raven | Cliff | Empty | 0 | Inactive | 4.43 | |
| 144 | Common Raven | Cliff | Empty | 0 | Inactive | 5.75 | |
| 145 | Common Raven | Tower | Empty | 0 | Inactive | 9.90 | |
| 146 | Common Raven | Tower | Empty | 0 | Inactive | 10.00 | |
| 147 | Common Raven | Tower | Empty | 0 | Inactive | 9.67 | |
| 148 | Common Raven | Tower | Empty | 0 | Inactive | 9.58 | Two nests in one tower; old |
| 149 | Common Raven | Tower | Empty | 0 | Inactive | 9.58 | Two nests in one tower; old |
| 150 | Common Raven | Tower | Empty | 0 | Inactive | 9.45 | |
| 151 | Common Raven | Tower | Empty | 0 | Inactive | 9.28 | |
| 152 | Common Raven | Tower | Empty | 0 | Inactive | 9.30 | |
| 153 | Common Raven | Tower | Empty | 0 | Inactive | 9.36 | |
| 154 | Common Raven | Tower | Empty | 0 | Inactive | 9.44 | |

| ID | Species | Substrate | Contents | Quan. | Status | Project Dist. (mi.) | Notes |
|---|---|---|---|---|---|---|---|
| 155 | Common Raven | Tower | Empty | 0 | Inactive | 9.49 | |
| 156 | Common Raven | Tower | Empty | 0 | Inactive | 9.56 | |
| 157 | Common Raven | Tower | Empty | 0 | Inactive | 9.62 | |
| 158 | Common Raven | Tower | Empty | 0 | Inactive | 9.67 | Two nests in one tower |
| 159 | Common Raven | Tower | Empty | 0 | Inactive | 9.67 | Two nests in one tower |
| 160 | Common Raven | Tower | Empty | 0 | Inactive | 9.23 | |
| 161 | Common Raven | Tower | Empty | 0 | Inactive | 8.70 | |
| 162 | Common Raven | Tower | Empty | 0 | Inactive | 8.54 | |
| 163 | Common Raven | Tower | Empty | 0 | Inactive | 8.41 | |
| 164 | Common Raven | Tower | Empty | 0 | Inactive | 8.26 | Two nests in one tower |
| 165 | Common Raven | Tower | Empty | 0 | Inactive | 8.26 | Two nests in one tower |
| 166 | Common Raven | Tower | Empty | 0 | Inactive | 8.18 | Three nests in one tower |
| 167 | Common Raven | Tower | Empty | 0 | Inactive | 8.18 | Three nests in one tower |
| 168 | Common Raven | Tower | Empty | 0 | Inactive | 8.18 | Three nests in one tower |
| 169 | Common Raven | Tower | Empty | 0 | Inactive | 8.12 | |
| 170 | Common Raven | Tower | Empty | 0 | Inactive | 8.06 | |
| 171 | Common Raven | Tower | Empty | 0 | Inactive | 7.85 | Two nests in one tower |
| 172 | Common Raven | Tower | Empty | 0 | Inactive | 7.85 | Two nests in one tower |
| 173 | Common Raven | Tower | Empty | 0 | Inactive | 7.66 | |
| 174 | Common Raven | Tower | Empty | 0 | Inactive | 7.66 | |
| 175 | Common Raven | Tower | Empty | 0 | Inactive | 7.70 | Two nests in one tower |
| 176 | Common Raven | Tower | Empty | 0 | Inactive | 7.70 | Two nests in one tower |
| 177 | Common Raven | Tower | Empty | 0 | Inactive | 7.93 | |
| 178 | Common Raven | Tower | Empty | 0 | Inactive | 8.04 | |
| 179 | Common Raven | Tower | Empty | 0 | Inactive | 8.38 | |
| 180 | Common Raven | Tower | Empty | 0 | Inactive | 8.51 | |

| ID | Species | Substrate | Contents | Quan. | Status | Project Dist. (mi.) | Notes |
|---|---|---|---|---|---|---|---|
| 181 | Common Raven | Tower | Empty | 0 | Inactive | 8.64 | |
| 182 | Common Raven | Tower | Empty | 0 | Inactive | 9.17 | |
| 183 | Common Raven | Tower | Empty | 0 | Inactive | 9.89 | |
| 184 | Common Raven | Cliff | Empty | 0 | Inactive | 6.38 | |
| 185 | Common Raven | Digger Pine | Empty | 0 | Inactive | 6.63 | Bowl is deep |
| 186 | Common Raven | Digger Pine | Empty | 0 | Inactive | 9.25 | |
| 187 | Common Raven | Cliff | Empty | 0 | Inactive | 6.91 | Pair of Common Ravens near |
| 188 | Common Raven | Cliff | Empty | 0 | Inactive | 5.97 | |
| 189 | Common Raven | Cliff | Empty | 0 | Inactive | 10.10 | |
| 190 | Common Raven | Cliff | Empty | 0 | Inactive | 10.12 | |
| 191 | Common Raven | Cliff | Empty | 0 | Inactive | 10.22 | |
| 192 | Common Raven | Cliff | Empty | 0 | Inactive | 7.29 | |
| 193 | Common Raven | Blue Oak | Empty | 0 | Inactive | 7.25 | deep bowl |
| 194 | Common Raven | Blue Oak | Empty | 0 | Inactive | 9.12 | deep bowl |
| 195 | Common Raven | Cliff | Empty | 0 | Inactive | 5.78 | |
| 196 | Common Raven | Cottonwood | Empty | 0 | Inactive | 0.00 | |
| 197 | Common Raven | Blue Oak | Empty | 0 | Inactive | 6.72 | |
| 198 | Common Raven | Cliff | Empty | 0 | Inactive | 7.88 | |
| 199 | Common Raven | Digger Pine | Empty | 0 | Inactive | 7.99 | Fledged young in 2013 |
| 200 | Common Raven | Cliff | Empty | 0 | Inactive | 7.53 | |
| 201 | Common Raven | Cliff | Unknown | N.A. | Active | 4.57 | Adult on nest in incubation posture. Near two inactive Common Raven Nests |
| 202 | Common Raven | Cliff | Empty | 0 | Inactive | 8.31 | |
| 203 | Common Raven | Cliff | Empty | 0 | Inactive | 8.32 | Active in 2013 |
| 204 | Common Raven | Cliff | Empty | 0 | Inactive | 8.18 | Two Common Raven nests above and to right of inactive Golden Eagle nest |
| 205 | Common Raven | Cliff | Empty | 0 | Inactive | 9.70 | |

| ID | Species | Substrate | Contents | Quan. | Status | Project Dist. (mi.) | Notes |
|---|---|---|---|---|---|---|---|
| 206 | Common Raven | Cliff | Empty | 0 | Inactive | 9.66 | |
| 207 | Common Raven | Cottonwood | Unknown | N.A. | Active | 8.80 | Adult on nest |
| 208 | Common Raven | Cliff | Empty | 0 | Inactive | 3.33 | Lower of two nests on same cliff face |
| 209 | Common Raven | Cliff | Unknown | N.A. | Active | 7.56 | Adult on nest in incubation posture |
| 210 | Common Raven | Cliff | Empty | 0 | Active | 7.60 | Nest is freshly built on |
| 211 | Common Raven | Cliff | Empty | 0 | Active | 4.81 | |
| 212 | Common Raven | Cliff | Empty | 0 | Active | 4.37 | Upper and smaller of two nests on face |
| 213 | Common Raven | Cliff | Empty | 0 | Inactive | 4.37 | Lower and larger of two nests on face |
| 214 | Common Raven | Cliff | Empty | 0 | Inactive | 9.56 | |
| 215 | Common Raven | Cliff | Empty | 0 | Inactive | 9.63 | Large nest |
| 216 | Common Raven | Digger Pine | Empty | 0 | Inactive | 9.65 | |
| 217 | Common Raven | Digger Pine | Empty | 0 | Inactive | 9.92 | Lower of two nests in same tree |
| 218 | Common Raven | Digger Pine | Empty | 0 | Inactive | 9.85 | Upper of two nests in same tree; pine cones in bowl |
| 219 | Common Raven | Cliff | Empty | 0 | Active | 5.63 | |
| 220 | Common Raven | Cliff | Empty | 0 | Inactive | 5.97 | |
| 221 | Common Raven | Cliff | Unknown | N.A. | Unknown | 4.16 | Two nests close together. Difficult to fly, so hiked in to confirm status. Lower part of canyon used heavily as firing range, possibly used by Golden Eagles in the distant past |
| 222 | Common Raven | Cliff | Empty | 0 | Inactive | 5.69 | Near active Prairie Falcon nest |
| 223 | Common Raven | Cliff | Empty | 0 | Active | 2.32 | Likely failed |
| 224 | Common Raven | Cliff | Empty | 0 | Inactive | 7.91 | Directly below another Common Raven nest on same cliff |
| 225 | Common Raven | Cliff | Empty | 0 | Inactive | 7.91 | Directly above another Common Raven nest on same cliff |
| 226 | Common Raven | Cliff | Empty | 0 | Active | 5.95 | Below an older nest. Likely failed |
| 227 | Common Raven | Cliff | Unknown | N.A. | Active | 5.78 | Above a newer nest. Adult on nest |
| 228 | Common Raven | Cliff | Empty | 0 | Active | 5.60 | Rebuilt in 2014. Likely failed |

| ID | Species | Substrate | Contents | Quan. | Status | Project Dist. (mi.) | Notes |
|---|---|---|---|---|---|---|---|
| 229 | Common Raven | Cliff | Empty | 0 | Active | 8.26 | Rebuilt in 2014. Likely failed |
| 230 | Common Raven | Valley Oak | Eggs | 1 | Unknown | 7.91 | One Common Raven egg in an old Red-tailed Hawk nest. No Common Ravens observed |
| 231 | Common Raven | Cliff | Unknown | N.A. | Active | 8.74 | Adult on nest in incubation posture |
| 232 | Common Raven | Cliff | Unknown | N.A. | Active | 10.68 | Adult on nest in incubation posture |
| 233 | Common Raven | Cliff | Unknown | N.A. | Active | 11.38 | Adult on nest in incubation posture |
| 234 | Common Raven | Cliff | Unknown | N.A. | Unknown | 3.37 | Adult near, could not see contents clearly |
| 281 | Great Horned Owl | Cliff | Empty | 0 | Inactive | 6.81 | |
| 282 | Great Horned Owl | Cliff | Empty | 0 | Inactive | 2.78 | |
| 283 | Great Horned Owl | Cliff | Empty | 0 | Inactive | 2.79 | |
| 284 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 8.98 | On top of old Common Raven nest; same cliff as Golden Eagle and Red-tailed Hawk nests |
| 285 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 7.28 | Lots of whitewash |
| 286 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 7.85 | |
| 287 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 4.40 | |
| 288 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 10.01 | |
| 289 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 10.33 | |
| 290 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 10.33 | |
| 291 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 8.57 | |
| 292 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 9.53 | |
| 293 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 9.52 | |
| 294 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 7.22 | |
| 295 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 6.58 | |
| 296 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 6.27 | On old Common Raven nest |
| 297 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 6.58 | |
| 298 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 6.59 | |
| 299 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 7.03 | |
| 300 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 6.93 | |
| 301 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 4.20 | |
| 302 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 6.31 | |
| 303 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 6.13 | |
| 304 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 9.54 | |

| ID | Species | Substrate | Contents | Quan. | Status | Project Dist. (mi.) | Notes |
|---|---|---|---|---|---|---|---|
| 305 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 10.14 | |
| 306 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 10.20 | |
| 307 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 10.14 | |
| 308 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 5.19 | Prairie Falcon observed near nest |
| 309 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 4.97 | |
| 310 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 4.48 | |
| 311 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 4.66 | |
| 312 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 4.38 | |
| 313 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 3.59 | |
| 314 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 2.85 | |
| 315 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 2.78 | |
| 316 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 10.22 | |
| 317 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 3.86 | |
| 318 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 4.22 | |
| 319 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 4.21 | |
| 320 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 3.79 | |
| 321 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 3.13 | Three nests within 50 feet of each other. One on top and two below |
| 322 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 2.76 | |
| 323 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 2.54 | |
| 324 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 2.75 | |
| 325 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 2.86 | |
| 326 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 2.78 | |
| 327 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 2.88 | Over old Common Raven nest |
| 328 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 3.30 | Priarie Falcon pair observed |
| 329 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 3.94 | |
| 330 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 3.09 | |
| 331 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 2.40 | |
| 332 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 7.24 | |
| 333 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 2.75 | |
| 334 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 4.95 | Another Prairie Falcon eyrie located on same rock |
| 335 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 4.95 | Another Prairie Falcon eyrie located on same rock |
| 336 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 4.68 | |
| 337 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 8.18 | |
| 338 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 8.18 | |
| 339 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 7.56 | |

| ID | Species | Substrate | Contents | Quan. | Status | Project Dist. (mi.) | Notes |
|---|---|---|---|---|---|---|---|
| 340 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 4.82 | |
| 341 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 5.45 | |
| 342 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 5.36 | Nest to Common Raven |
| 343 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 10.12 | |
| 344 | Prairie Falcon | Cliff | Empty | 0 | Inactive | 5.43 | |
| 345 | Prairie Falcon | Cliff | Unknown | N.A. | Active | 5.68 | Adult sitting in nest in incubation posture. Nesting in old Common Raven nest. Abundant whitewash above and in nest. |
| 346 | Red-tailed Hawk | Eucalyptus | Empty | 0 | Inactive | 8.07 | |
| 347 | Red-tailed Hawk | Eucalyptus | Empty | 0 | Inactive | 8.07 | |
| 348 | Red-tailed Hawk | Eucalyptus | Empty | 0 | Inactive | 6.43 | |
| 349 | Red-tailed Hawk | Cottonwood | Empty | 0 | Inactive | 5.07 | |
| 350 | Red-tailed Hawk | Cottonwood | Empty | 0 | Inactive | 5.33 | |
| 351 | Red-tailed Hawk | Cottonwood | Empty | 0 | Inactive | 5.41 | |
| 352 | Red-tailed Hawk | Eucalyptus | Empty | 0 | Inactive | 6.31 | |
| 353 | Red-tailed Hawk | Cliff | Empty | 0 | Inactive | 7.33 | |
| 354 | Red-tailed Hawk | Cliff | Empty | 0 | Inactive | 7.95 | |
| 355 | Red-tailed Hawk | Cliff | Empty | 0 | Inactive | 7.38 | |
| 356 | Red-tailed Hawk | Cliff | Empty | 0 | Inactive | 6.93 | |
| 357 | Red-tailed Hawk | Cliff | Empty | 0 | Inactive | 4.25 | |
| 358 | Red-tailed Hawk | Cliff | Empty | 0 | Inactive | 3.33 | |
| 359 | Red-tailed Hawk | Cliff | Empty | 0 | Inactive | 3.45 | |
| 360 | Red-tailed Hawk | Cliff | Empty | 0 | Inactive | 4.65 | |
| 361 | Red-tailed Hawk | Unknown Oak | Empty | 0 | Inactive | 8.53 | |
| 362 | Red-tailed Hawk | Unknown Oak | Empty | 0 | Inactive | 8.41 | |
| 363 | Red-tailed Hawk | Unknown Oak | Empty | 0 | Inactive | 8.20 | Two nests in same tree |
| 364 | Red-tailed Hawk | Unknown Oak | Empty | 0 | Inactive | 8.20 | Two nests in same tree |
| 365 | Red-tailed Hawk | Unknown Oak | Empty | 0 | Inactive | 8.08 | |

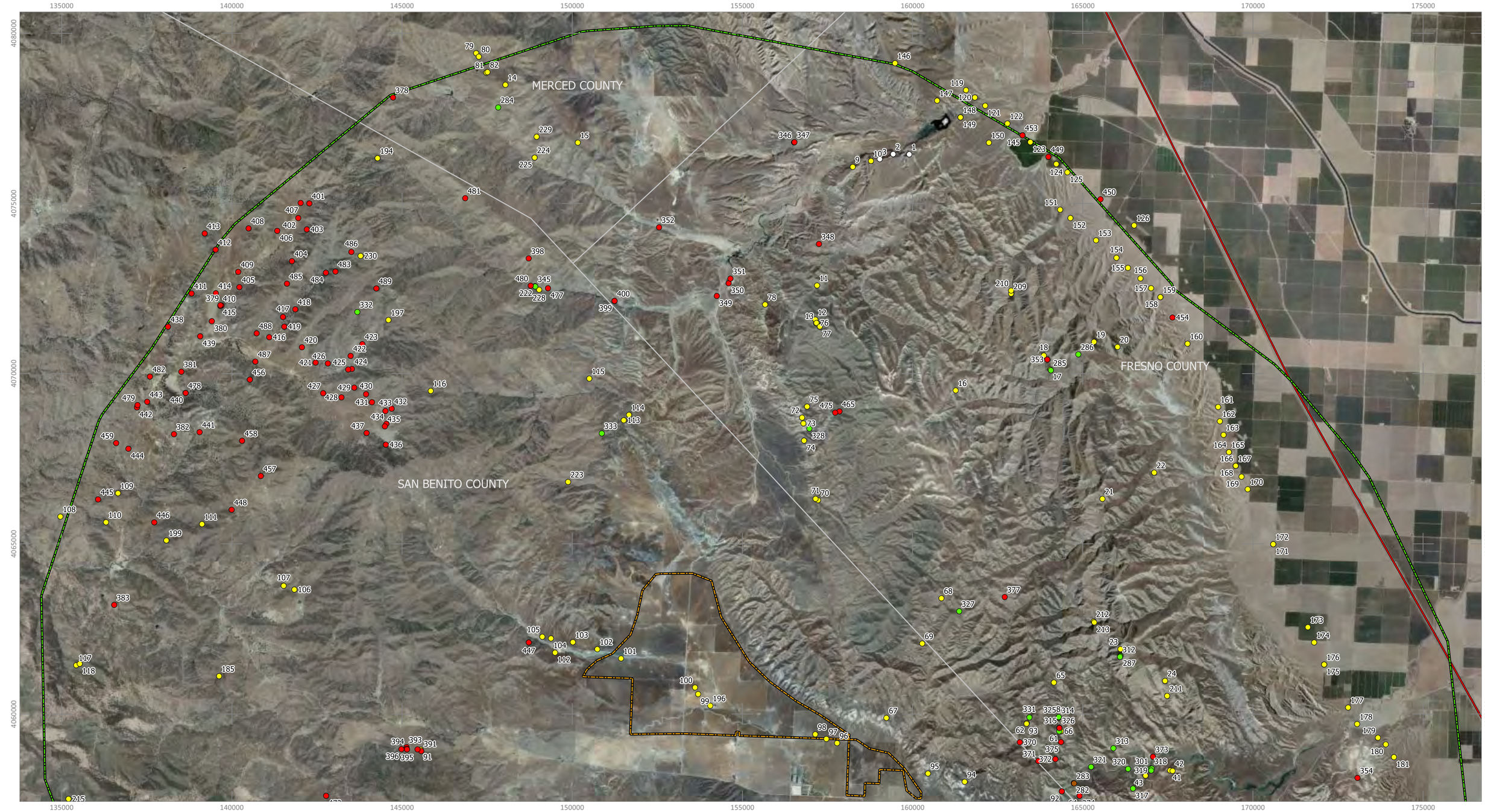
| ID | Species | Substrate | Contents | Quan. | Status | Project Dist. (mi.) | Notes |
|---|---|---|---|---|---|---|---|
| 366 | Red-tailed Hawk | Unknown Oak | Empty | 0 | Inactive | 8.07 | |
| 367 | Red-tailed Hawk | Unknown Oak | Empty | 0 | Inactive | 6.42 | |
| 368 | Red-tailed Hawk | Cottonwood | Empty | 0 | Inactive | 1.26 | |
| 369 | Red-tailed Hawk | Cliff | Empty | 0 | Inactive | 1.85 | |
| 370 | Red-tailed Hawk | Cliff | Empty | 0 | Inactive | 2.02 | |
| 371 | Red-tailed Hawk | Cliff | Empty | 0 | Inactive | 2.21 | |
| 372 | Red-tailed Hawk | Cliff | Empty | 0 | Inactive | 2.52 | |
| 373 | Red-tailed Hawk | Cliff | Empty | 0 | Inactive | 4.27 | |
| 374 | Red-tailed Hawk | Cliff | Empty | 0 | Inactive | 2.89 | |
| 375 | Red-tailed Hawk | Cliff | Empty | 0 | Inactive | 2.71 | |
| 376 | Red-tailed Hawk | Cliff | Empty | 0 | Inactive | 2.78 | Near Common Raven nest |
| 377 | Red-tailed Hawk | Cliff | Empty | 0 | Inactive | 3.54 | |
| 378 | Red-tailed Hawk | Cliff | Empty | 0 | Inactive | 9.92 | |
| 379 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 9.26 | |
| 380 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 9.25 | |
| 381 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 9.17 | |
| 382 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 8.66 | |
| 383 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 8.64 | |
| 384 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 7.49 | Near another Red-tailed Hawk nest in adjacent tree |
| 385 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 7.51 | Near another Red-tailed Hawk nest in adjacent tree |
| 386 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 4.91 | Same territory as nearby nest |
| 387 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 4.97 | Same territory as nearby nest |
| 388 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 4.94 | |
| 389 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 5.01 | |
| 390 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 1.75 | |
| 391 | Red-tailed Hawk | Digger Pine | Empty | 0 | Inactive | 3.24 | |

| ID | Species | Substrate | Contents | Quan. | Status | Project Dist. (mi.) | Notes |
|---|---|---|---|---|---|---|---|
| 392 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 3.29 | |
| 393 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 3.46 | |
| 394 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 3.47 | |
| 395 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 3.47 | Nest falling apart |
| 396 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 3.56 | |
| 397 | Red-tailed Hawk | Cliff | Empty | 0 | Inactive | 2.56 | |
| 398 | Red-tailed Hawk | Cliff | Empty | 0 | Active | 6.20 | |
| 399 | Red-tailed Hawk | Cottonwood | Empty | 0 | Inactive | 5.04 | |
| 400 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 5.04 | |
| 401 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 9.25 | |
| 402 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 9.19 | |
| 403 | Red-tailed Hawk | Blue Oak | Empty | 0 | Inactive | 8.94 | |
| 404 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 8.75 | |
| 405 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 9.19 | |
| 406 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 9.31 | |
| 407 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 9.36 | |
| 408 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 9.73 | |
| 409 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 9.37 | |
| 410 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 9.27 | |
| 411 | Red-tailed Hawk | Blue Oak | Empty | 0 | Inactive | 9.83 | |
| 412 | Red-tailed Hawk | Blue Oak | Empty | 0 | Inactive | 9.95 | |
| 413 | Red-tailed Hawk | Blue Oak | Empty | 0 | Inactive | 10.29 | |
| 414 | Red-tailed Hawk | Windmill | Empty | 0 | Inactive | 9.47 | |
| 415 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 9.28 | |
| 416 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 8.21 | |
| 417 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 8.23 | |

| ID | Species | Substrate | Contents | Quan. | Status | Project Dist. (mi.) | Notes |
|---|---|---|---|---|---|---|---|
| 418 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 8.14 | |
| 419 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 8.10 | |
| 420 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 7.62 | |
| 421 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 7.26 | |
| 422 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 6.82 | |
| 423 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 6.79 | |
| 424 | Red-tailed Hawk | Blue Oak | Empty | 0 | Inactive | 6.65 | |
| 425 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 6.70 | Two nests near each other |
| 426 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 7.07 | |
| 427 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 6.84 | |
| 428 | Red-tailed Hawk | Blue Oak | Empty | 0 | Inactive | 6.51 | |
| 429 | Red-tailed Hawk | Blue Oak | Empty | 0 | Inactive | 6.42 | |
| 430 | Red-tailed Hawk | Blue Oak | Empty | 0 | Inactive | 6.17 | |
| 431 | Red-tailed Hawk | Blue Oak | Empty | 0 | Inactive | 6.00 | |
| 432 | Red-tailed Hawk | Blue Oak | Empty | 0 | Inactive | 5.64 | |
| 433 | Red-tailed Hawk | Blue Oak | Empty | 0 | Inactive | 5.71 | |
| 434 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 5.56 | |
| 435 | Red-tailed Hawk | Blue Oak | Empty | 0 | Inactive | 5.56 | |
| 436 | Red-tailed Hawk | Blue Oak | Empty | 0 | Inactive | 5.37 | |
| 437 | Red-tailed Hawk | Blue Oak | Empty | 0 | Inactive | 5.78 | |
| 438 | Red-tailed Hawk | Blue Oak | Empty | 0 | Inactive | 9.86 | |
| 439 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 9.29 | |
| 440 | Red-tailed Hawk | Valley Oak | Empty | 0 | Active | 8.88 | |
| 441 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 8.27 | |
| 442 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 9.49 | |
| 443 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 9.38 | |

| ID | Species | Substrate | Contents | Quan. | Status | Project Dist. (mi.) | Notes |
|---|---|---|---|---|---|---|---|
| 444 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 9.27 | |
| 445 | Red-tailed Hawk | Blue Oak | Empty | 0 | Inactive | 9.41 | |
| 446 | Red-tailed Hawk | Digger Pine | Empty | 0 | Inactive | 8.30 | |
| 447 | Red-tailed Hawk | Blue Oak | Empty | 0 | Inactive | 1.17 | |
| 448 | Red-tailed Hawk | Blue Oak | Empty | 0 | Inactive | 7.09 | |
| 449 | Red-tailed Hawk | Tower | Empty | 0 | Inactive | 9.87 | Red-tailed Hawk perched nearby |
| 450 | Red-tailed Hawk | Tower | Empty | 0 | Inactive | 9.93 | Red-tailed Hawk perched nearby |
| 451 | Red-tailed Hawk | Cliff | Empty | 0 | Inactive | 4.82 | |
| 452 | Red-tailed Hawk | Cliff | Empty | 0 | Inactive | 7.19 | |
| 453 | Red-tailed Hawk | Tower | Empty | 0 | Inactive | 9.90 | Red-tailed Hawk perched nearby |
| 454 | Red-tailed Hawk | Tower | Empty | 0 | Inactive | 9.47 | |
| 455 | Red-tailed Hawk | Digger Pine | Empty | 0 | Active | 8.14 | New nest bowl. Two adults near |
| 456 | Red-tailed Hawk | Blue Oak | Empty | 0 | Inactive | 8.10 | Two adults near |
| 457 | Red-tailed Hawk | Blue Oak | Empty | 0 | Inactive | 6.91 | Old nest |
| 458 | Red-tailed Hawk | Blue Oak | Empty | 0 | Inactive | 7.54 | |
| 459 | Red-tailed Hawk | Blue Oak | Empty | 0 | Inactive | 9.51 | |
| 460 | Red-tailed Hawk | Cliff | Empty | 0 | Inactive | 6.74 | |
| 461 | Red-tailed Hawk | Cliff | Empty | 0 | Inactive | 4.51 | |
| 462 | Red-tailed Hawk | Cliff | Empty | 0 | Inactive | 4.43 | |
| 463 | Red-tailed Hawk | Cliff | Eggs | 2 | Incubating | 4.50 | Newly built nest this year. |
| 464 | Red-tailed Hawk | Cliff | Empty | 0 | Inactive | 3.33 | Upper of two nests on same cliff face |
| 465 | Red-tailed Hawk | Cliff | Empty | 0 | Inactive | 3.87 | |
| 466 | Red-tailed Hawk | Digger Pine | Empty | 0 | Inactive | 7.22 | Fledged young in 2013 |
| 467 | Red-tailed Hawk | Cliff | Empty | 0 | Inactive | 10.19 | Old nest, only remnants or possibly never built completely |
| 468 | Red-tailed Hawk | Digger Pine | Empty | 0 | Inactive | 8.64 | Adult Red-tailed Hawk near nest acting territorial, but nest not built on |

| ID | Species | Substrate | Contents | Quan. | Status | Project Dist. (mi.) | Notes |
|---|---|---|---|---|---|---|---|
| 469 | Red-tailed Hawk | Digger Pine | Empty | 0 | Inactive | 5.68 | |
| 470 | Red-tailed Hawk | Digger Pine | Empty | 0 | Inactive | 4.34 | |
| 471 | Red-tailed Hawk | Digger Pine | Empty | 0 | Inactive | 5.11 | |
| 472 | Red-tailed Hawk | Digger Pine | Empty | 0 | Inactive | 5.16 | Old nest |
| 473 | Red-tailed Hawk | Digger Pine | Unknown | N.A. | Active | 8.25 | Adult on nest |
| 474 | Red-tailed Hawk | Digger Pine | Empty | 0 | Inactive | 9.24 | |
| 475 | Red-tailed Hawk | Cliff | Empty | 0 | Active | 3.80 | Fresh, built this year. No grasses. |
| 476 | Red-tailed Hawk | Digger Pine | Empty | 0 | Inactive | 9.55 | |
| 477 | Red-tailed Hawk | Cliff | Empty | 0 | Inactive | 5.57 | Located below old Golden Eagle nest |
| 478 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 8.88 | |
| 479 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 9.50 | |
| 480 | Red-tailed Hawk | Cliff | Empty | 0 | Inactive | 5.73 | |
| 481 | Red-tailed Hawk | Cliff | Empty | 0 | Inactive | 7.68 | |
| 482 | Red-tailed Hawk | Valley Oak | Eggs | 2 | Active | 9.58 | Adult observed incubating |
| 483 | Red-tailed Hawk | Blue Oak | Empty | 0 | Inactive | 8.03 | |
| 484 | Red-tailed Hawk | Blue Oak | Empty | 0 | Inactive | 8.14 | |
| 485 | Red-tailed Hawk | Blue Oak | Empty | 0 | Inactive | 8.55 | |
| 486 | Red-tailed Hawk | Blue Oak | Empty | 0 | Inactive | 8.08 | |
| 487 | Red-tailed Hawk | Valley Oak | Empty | 0 | Active | 8.19 | Freshly lined with lichens on Jan. 23. Empty and no activity on Apr. 5. |
| 488 | Red-tailed Hawk | Blue Oak | Empty | 0 | Inactive | 8.44 | Large bowl |
| 489 | Red-tailed Hawk | Valley Oak | Empty | 0 | Inactive | 7.28 | Old, remnants of a large stick nest |
| 490 | Red-tailed Hawk | Digger Pine | Empty | 0 | Inactive | 4.26 | |
| 491 | Red-tailed Hawk | Cliff | Unknown | N.A. | Active | 3.43 | Adult on nest in incubation posture |
| 492 | Turkey Vulture | Cliff | Empty | 0 | Inactive | 6.91 | |




County Border
Major Road
Proposed Project Boundary
Study Area

Nest Locations

- Barn Owl
- Common Raven
- Prairie Falcon
- Great Horned Owl
- Red-tailed Hawk
- Turkey Vulture

5000 0 5000 10000 15000 20000 ft

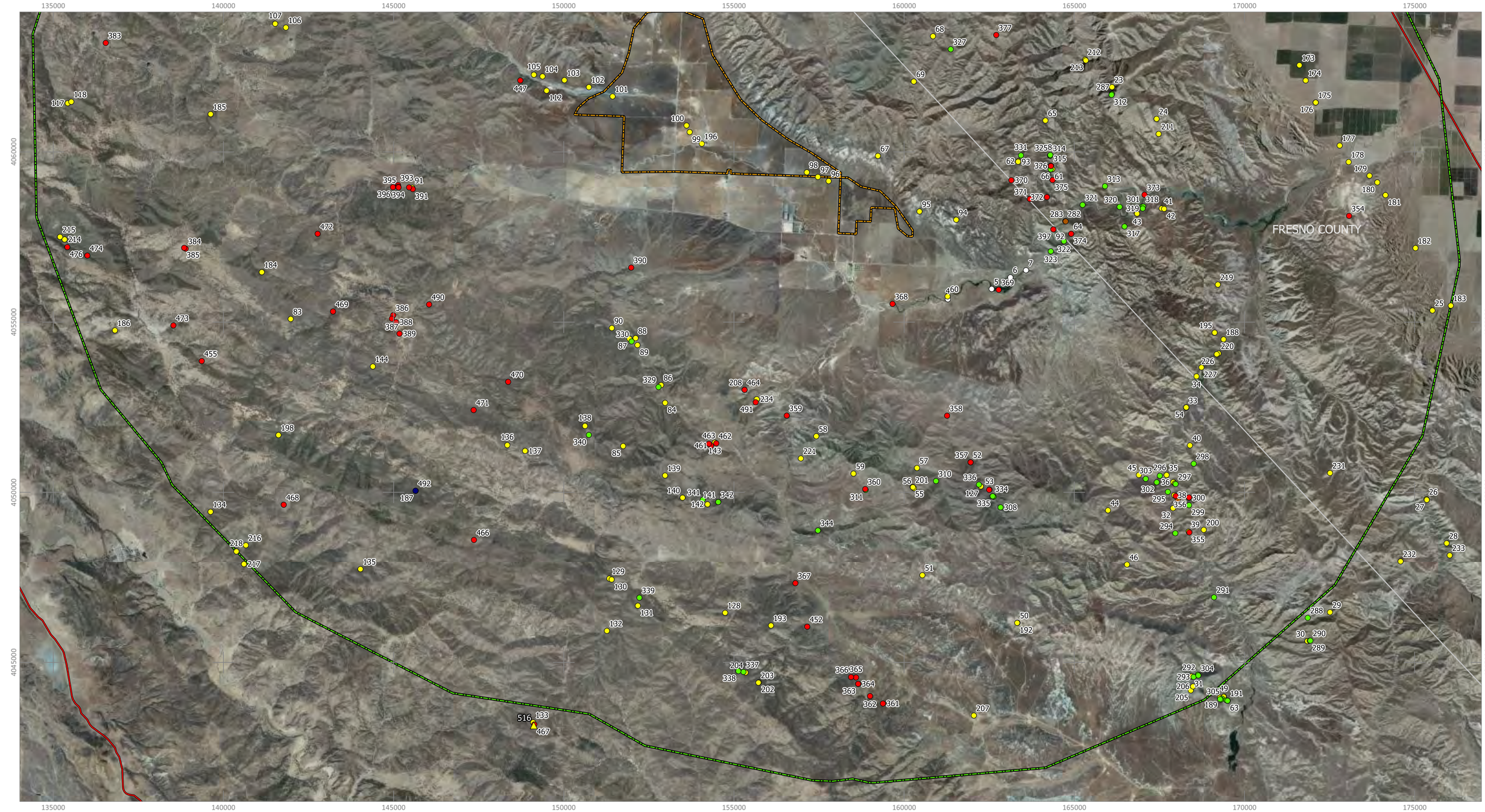
1:105,791

UTM NAD83 Zone 11 Coordinate Grid
Map Date: 5/8/2014
Author: Michael J. Kuehn
Background Source: US Department of Agriculture

# EXHIBIT 2. 2014 Nesting Survey: Non-Golden Eagle Results (Northern Study Area)

Panoche Valley Solar Project | Merced, Fresno and San Benito Counties, California

BBI




County Border
Major Road
Proposed Project Boundary
Study Area

Special Status Species Observations

California Condor

Nest Locations

Barn Owl
Common Raven
Prairie Falcon
Great Horned Owl
Red-tailed Hawk
Turkey Vulture

5000 0 5000 10000 15000 20000 ft

1:105,791

UTM NAD83 Zone 11 Coordinate Grid
Map Date: 5/8/2014
Author: Michael J. Kuehn
Background Source: US Department of Agriculture

# EXHIBIT 3. 2014 Nesting Survey: Non-Golden Eagle Results (Southern Study Area)

Panoche Valley Solar Project | Merced, Fresno and San Benito Counties, California

BBI

# APPENDIX C. SPECIES LIST

*The following list of 36 bird and 10 mammal species represents a complete compendium of vertebrate species detected during surveys by BBI biologists in January and April, 2014. Sensitive status designations are derived directly from the California Department of Fish and Wildlife's California Wildlife Habitats Relationship Database. Sensitive statuses in this database may pertain only to a subspecies or genetically distinct population of the species, and are included here only if the sensitive population has the potential to occur in the Study Area.*

## Birds

| Common Name | Scientific Name | FE | FT | CE | CT | CFP | SSC |
|---|---|---|---|---|---|---|---|
| Mallard | Anas platyrhynchos | | | | | | |
| California Quail | Callipepla californica | | | | | | |
| Chukar | Alectoris chukar | | | | | | |
| Wild Turkey | Meleagris gallopavo | | | | | | |
| Cattle Egret | Bubulcus ibis | | | | | | |
| White-faced Ibis | Plegadis chihi | | | | | | |
| Turkey Vulture | Cathartes aura | | | | | | |
| Bald Eagle | Haliaeetus leucocephalus | | | X | | X | |
| Northern Harrier | Circus cyaneus | | | | | | |
| Cooper's Hawk | Accipiter cooperii | | | | | | |
| Red-tailed Hawk | Buteo jamaicensis | | | | | | |
| Ferruginous Hawk | Buteo regalis | | | | | | |
| Golden Eagle | Aquila chrysaetos | | | | | X | |
| Killdeer | Charadrius vociferus | | | | | | |
| Rock Pigeon | Columba livia | | | | | | |
| Greater Roadrunner | Geococcyx californianus | | | | | | |
| Barn Owl | Tyto alba | | | | | | |
| Great Horned Owl | Bubo virginianus | | | | | | |
| Acorn Woodpecker | Melanerpes formicivorus | | | | | | |
| Northern Flicker | Colaptes auratus | | | | | | |
| American Kestrel | Falco sparverius | | | | | | |
| Merlin | Falco columbarius | | | | | | |
| Prairie Falcon | Falco mexicanus | | | | | | |
| Loggerhead Shrike | Lanius ludovicianus | X | | | | | |
| Western Scrub-Jay | Aphelocoma californica | | | | | | |
| Yellow-billed Magpie | Pica nuttalli | | | | | | |
| American Crow | Corvus brachyrhynchos | | | | | | |
| Common Raven | Corvus corax | | | | | | |
| Canyon Wren | Catherpes mexicanus | | | | | | |
| Western Bluebird | Sialia mexicana | | | | | | |
| California Thrasher | Toxostoma redivivum | | | | | | |
| European Starling | Sturnus vulgaris | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| California Towhee | Melozone crissalis | | | | | | |
| Western Meadowlark | Sturnella neglecta | | | | | | |
| House Finch | Haemorhous mexicanus | | | | | | |

## Mammals

| **Common Name** | **Scientific Name** | **FE** | **FT** | **CE** | **CT** | **CP** | **SSC** |
|---|---|---|---|---|---|---|---|
| Desert Cottontail | Sylvilagus audubonii | | | | | | |
| Black-tailed Jackrabbit | Lepus californicus | | | | | | X |
| California Ground Squirrel | Spermophilus beecheyi | | | | | | |
| Coyote | Canis latrans | | | | | | |
| Gray Fox | Urocyon cinereoargenteus | | | | | | |
| American Badger | Taxidea taxus | | | | | | X |
| Bobcat | Lynx rufus | | | | | | |
| Wild Pig | Sus scrofa | | | | | | |
| Elk | Cervus elaphus | | | | | | |
| Mule Deer | Odocoileus hemionus | | | | | | |

# APPENDIX D. RESUMES

# Peter H. Bloom, Ph.D. | President

## Qualifications

Peter Bloom has been a professional environmental consultant for more than 35 years, principally in California. He specializes in the environmental sciences, is an internationally recognized expert in raptor biology and conservation and is considered one of the best all-around field biologists in California with his extensive knowledge and experience with all terrestrial vertebrate groups (amphibians, reptiles, birds, and mammals) and the vascular plants. Corporate clients for whom he has prepared or contributed to the production of numerous biological assessments and environmental impact reports include The Irvine Company, Rancho Mission Viejo, Tejon Ranch, Newhall Ranch, Ahmanson Ranch, Metropolitan Water District, and Los Angeles Department of Water and Power. He has also worked extensively with the Department of Defense, U.S. Fish and Wildlife Service, National Park Service, Bureau of Land Management, U.S. Forest Service, California Department of Fish and Game, and various non-profit conservation groups providing valuable research and advice, primarily on raptor ecology and conservation. He has conducted avian and herpetological research in the western United States, Alaska, Peru, Ecuador, and India and has been responsible for a wide variety of biological, ecological, and conservation studies ranging from local biological assessments to regional conservation planning. Dr. Bloom has published more than 30 peer-reviewed scientific papers and technical reports and taught California natural history at a local junior college for more than 12 years.

## Professional Experience

As founder and President of Bloom Biological, Inc., Dr. Bloom has prepared numerous biological assessments and worked on an array of avian research projects in the western United States, Alaska, Peru, Ecuador, and India, spending over 600 hours conducting helicopter and fixed-wing nest survey work and aerial radio-tracking of eagles, California condors, hawks, and herons. He has also been responsible for conducting or supervising:

- fiber-optics and electrical powerline installation surveys and construction monitoring;
- surveys of nesting and wintering birds of prey for the California Department of Fish and Game (CDFG), BLM, U.S. Forest Service, Department of Defense, and numerous private land owners;
- transponder and radio-tagging of adult California red-legged frogs in Ventura County;
- focused surveys for California gnatcatcher, southwestern willow flycatcher, least Bell's vireo, yellow-billed cuckoo, Swainson's hawks, golden eagles, arroyo toad, California red-legged frog, desert tortoise, Pacific pond turtle (including trapping and surveying habitat), coast horned lizard, flat-tailed horned lizard, Belding's orange-throated whiptail, coastal whiptail, southern rubber boa, coastal patch-nosed snake, California glossy snake, two-striped garter snake (including trapping and surveying habitat), red-diamond rattlesnake, southern flying squirrel, and Pacific pocket mouse;
- general herpetological, small mammal, breeding and winter bird surveys in southern California;
- translocation of several hundred arroyo toads at Camp Pendleton Marine Corps Base;
- sensitive herpetological, mammal, and raptor surveys for the Transportation Corridor Agency in Orange County; and
- a raptor status and management plan for Naval Weapons Station, Seal Beach and Fallbrook Detachment.

As a research biologist at the Western Foundation of Vertebrate Zoology, served on the Science Advisory Board of the South Orange County Natural Communities Conservation Program. During his tenure there he:

- provided herpetological input into the Orange County environmental GIS and Cleveland National Forest environmental inventory.
- managed a long-term (30 yr.) raptor ecology study in California;
- managed a successful Great Blue Heron mitigation project designed to increase numbers of nesting herons through placement of artificial nest platforms;
- supervised and performed predator management activities for USFWS related to protection of California least terns, snowy plovers, and light-footed clapper rails in southwestern California from avian and other vertebrate predators (locations included Vandenberg Air Force Base, Naval Weapons Station Seal Beach, Batiquitos Lagoon, Port of Long Beach, Port of San Diego, and Tijuana Slough National Wildlife Refuge);
- supervised a two year CalTrans radio-telemetry study of nesting peregrine falcons and their relationship to California least terns in southwestern California; and
- organized and finished seven years of a MAPS passerine monitoring station.
- Together with sub-permittees, banded ~ 45,000 birds, mostly nestlings (1970 – 2013).

While serving as a research biologist and advisor in India, responsibilities included educating local biologists in the various techniques needed to capture birds, and conducting radio-telemetry research.

Served as thesis advisor to seven students at CSU Long Beach, one student at CSU Humboldt, and one student at CSU Fullerton.

As research biologist for the National Audubon Society, was responsible for writing the grant proposal and ultimately the successful award of two grants totaling $300,000 for six years of fulltime research on the ecology of southern California raptor populations. Responsibilities included project management, personnel selection, supervision of 12 volunteers, proposal and budget preparation, method design, data analysis, report writing, and publication of results. Directed the effort to capture all wild free-flying California condors for transmitter placement or captive breeding. Radio-tracked condors and conducted contaminant studies involving condors and 180 golden eagles.

As a research biologist at the University of California, Santa Cruz, was principal investigator on a three year study designed to determine the status of northern goshawk populations in California for CDFG.

Trapped and placed transmitters on great gray owls for the National Park Service , prairie falcons for CDFG, and peregrine falcons in Peru for the Bodega Bay Institute of Pollution Ecology.

As a wildlife biologist for BLM, was principal investigator of a study designed to determine the status of the Swainson's hawk in California. Surveyed all semi-arid and desert regions, reviewed literature and museum records, assessed reproduction, banded adults and young, and prepared the final report. His efforts contributed to the state-listing of Swainson's hawk as threatened.

Surveyed and reported on the ecology and distribution of raptors inhabiting the 200-square-mile Camp Pendleton Marine Corps Base.

While serving as a biological technician for BLM, conducted reptile, amphibian, small mammal, and avian surveys of 3.25 million acres of public land as part of a grazing EIS.

## Education

Ph.D., Natural Resources, College of Natural Resources, University of Idaho, Moscow
M.S., Biology, California State University, Long Beach
B.S., Zoology, California State University, Long Beach

## Awards

Graduation with Honors – Best Thesis Award School of Natural Sciences 1979
The Wildlife Society Western Section: Professional of the Year, 2005

Association of Field Ornithologists: Bergstrom Award, 1981
The Nature Conservancy: $27,000 for satellite transmitters, 2004 and 2006

## Permits & Certifications

Federal endangered species recovery permit (TE-787376) for red-legged frog (including placement of transmitters and transponders), arroyo toad, California gnatcatcher (including banding), least Bell's vireo (including banding), southwestern willow flycatcher (including banding), California least tern, snowy plover, peregrine falcon (banding), bald eagle (banding), and Swainson's hawk (banding).

California scientific collecting permit and memorandum of understanding for all raptors, including state-threatened Swainson's hawk, reptiles, amphibians, small mammals, and many additional species of birds, including state-threatened western yellow-billed cuckoo, California least tern, snowy plover, peregrine falcon, and bald eagle
Federal Master Banding Permit No. 20431
- Federal Bird Marking and Salvage Permit
- Predator Management Permit
- Migratory Bird Relocation Permit (burrowing owl and other species)

Brown-headed cowbird trapping authorization

Desert Tortoise Council-approved for conducting desert tortoise monitoring surveys

## Selected Publications

Home range and habitat use of Cooper's Hawks in urban and natural areas. C.A. Lepczyk and P.S. Warren (eds). Studies in Avian Biology No. 45. www.ucpress.edu/go/sab. 2012. (with Chiang, S.N., P.H. Bloom, A.M.Bartuszevige and S. E. Thomas)

Impact of the lead ammunition ban on reducing lead exposure in golden eagles and turkey vultures in California. PloS One. 18 pgs. 2011. (with Kelly, T.R., S. Torres, Y. Hernandez, R. Poppenga, W.M. Boyce, and C.K. Johnson)

Vagrant western Red-shouldered Hawks: Origins, natal dispersal patterns and survival. The Condor. 113:538-546. 2011. (with J.M. Scott, J.M. Papp, J.W. Kidd, S. Thomas)

Capture techniques. Pgs. 193 – 219. In Bird and Bildstein (eds). Raptor research and management techniques. Hancock House, Blaine, WA. 2007. (with W.S. Clark and J.W. Kidd)

Status of Burrowing Owls in southwestern California. In Proceedings of the California burrowing owl symposium, November 2003. Bird populations monographs No. 1. Institute for Bird Populations and Albion Environmental, Inc. 2007. (with Kidd, J.W., P.H. Bloom, C.W. Barrows and C.T. Collins)

Turkey vulture marking history: the switch from leg bands to patagial tags. *North American Bird Bander* 30:59-64. 2005. (with C. S. Houston)

Basic II and basic III plumages of rough-legged hawks. *Journal of Field Ornithology* 76:83-89. 2005. (with William Clark)

Molt and sequence of plumages of golden eagles, and a technique for in-hand ageing. *North American Bird Bander* 26:97-116. 2001. (with William Clark)

The status of Harlan's hawk in southern California. *Western Birds* 31:200-202. 2000. (with Charles Collins)

Post-migration weight gain of Swainson's hawks in Argentina. *Wilson Bulletin* 111:428-432. 1999. (with M. I. Goldstein, J. H. Sarasola, and T. E. Lacher)

Characteristics of red-tailed hawk nest sites in oak woodlands of central California. Proceedings of a Symposium on Oak Woodlands: Ecology, Management, and Urban Interface Issues. Pgs. 365-372. 1998. (with W. D. Tietje, and J. K. Vreeland)

The urban buteo: red-shouldered hawks in southern California. Pgs 31-39 in: Raptors in Human Landscapes, Adaptations to Built and Cultivated Environments. 1996. D. M. Bird, D. E. Varland,, and J. J. Negro, eds. Academic Press. (with M. D. McCrary)

Reproductive performance, age structure, and natal dispersal of Swainson's hawks in the Butte Valley, California. Journal of Raptor Research 29:187-192. 1995. 1995. (with B. Woodbridge and K. K. Finley)

The biology and current status of the long-eared owl in coastal southern California. Bulletin of the Southern California Academy of Sciences 93:1-12. 1994.

Red-shouldered hawk home range and habitat use in southern California. Journal of Wildlife Management 57:258-265. 1993. (with M. D. McCrary and M. J. Gibson)

The dho-gaza with great horned owl lure: an analysis of its effectiveness in capturing raptors. Journal of Raptor Research 26:167-178. 1992. (with J. L. Henckel, E. H. Henckel, J. K. Schmutz, B. Woodbridge, J. R. Bryan, R. L. Anderson, P. J. Detrich, T. L. Maechtle, J. O. McKinley, M. D. McCrary, K. Titus, and P. F. Schempf [Bloom senior author])

Lead hazards within the range of the California condor. The Condor 92:931-937. 1990. (with O. H. Pattee, J. M. Scott, and M. R. Smith)

Investigations of the decline of Swainson's hawk populations in California. Journal of Raptor Research 23:63-71. 1990. (with R. W. Risebrough, R. W. Schlorff, and E. E. Littrell)

Importance of riparian systems to nesting Swainson's hawks in the Central Valley of California. Pgs. 612-618 in Warner, R.E. and K.M. Hendrix eds., California Riparian Systems, Ecology, Conservation, and Productive Management. University of California Press. 1984. (with R. D. Schlorff)

# Michael Kuehn, Ph.D. | Senior Biologist & Statistical Analyst

## Qualifications

Dr. Kuehn is an avian ecologist with experience conducting field research throughout the Americas from Ecuador to Alaska. He also has a solid working knowledge of the other terrestrial vertebrate groups (amphibians, reptiles, and mammals), and has taught courses about their ecology and identification at UC-Santa Barbara. He is familiar with the fauna and flora of coastal California and the Mojave/Sonoran Desert regions. He has studied nesting birds for 15 years, principally in California, Nevada, Arizona, Montana, Idaho and Alaska, but also in Ecuador. Dr. Kuehn has been responsible for a wide variety of biological, ecological, and conservation studies ranging from local biological assessments to studies aimed at understanding specific stressors on regional avian communities. He has designed and conducted numerous avian field studies, and supervised field crews during the implementation of these studies in addition to performing statistical analysis and interpretation of data for report preparation.

## Professional Experience

As a biologist at Bloom Biological, Dr. Kuehn has worked for three years in a variety of capacities to help design and conduct ecological assessments and prepare permitting documents, including the following:

Development of statistically valid pre-construction and post-construction avian survey protocols that meet federal and state permit requirements for alternative energy projects.

Managed multiple environmental assessments at alternative energy projects, involving survey design and site selection, training biologists to follow specific survey methods and protocols, scheduling and data management, as well as GIS management, data synthesis, statistical analysis and report preparation.

Contributed to the drafting of multiple Eagle Conservation Plans for wind energy projects seeking to apply for USFWS programmatic incidental eagle take permits.

Experienced with the application of field survey data to generate eagle fatality estimates for wind energy projects using the USFWS-developed Bayesian fatality prediction model using R Statistical software.

Conducted field surveys for a variety of passerine birds, owls, and other raptors.

Trained in raptor trapping (including Golden Eagles) and radio telemetry tracking of tagged birds.

Worked as an avian specialist, conducting nest searching and monitoring for the Sunrise Powerlink Project in San Diego and Imperial counties in California.

Assisted in creating burrows and conducting surveys for Burrowing Owls.

Dr. Kuehn also has the following experience:

As a research assistant at the Western Foundation of Vertebrate Zoology, conducted surveys for Loggerhead Shrikes on Santa Cruz Island and for all bird species along the Santa Clara River (Ventura County).

As a research associate at the University of California, Santa Barbara, designed and directed a two-year study investigating the effects of a tamarisk biocontrol agent on avian communities using riparian habitat in southern Nevada.

Served on a Technical Advisory Committee for a Walton Family Foundation funded initiative to restore habitat for Southwestern Willow Flycatchers in the Colorado Basin in the wake of Tamarisk biocontrol beetle introduction during 2011 and 2012.

Conducted independent research on reproductive strategies of birds breeding at high latitudes in central Alaska.

As a graduate student at UC Santa Barbara, conducted seven years of field research in Alaska, Idaho and Montana to investigate the behavioral defenses of hosts against Brown-headed Cowbird parasitism.

Participated for four years in a long-term ecological investigation of landscape effects on nesting success of riparian birds in Western Montana

Participated in a study of nesting birds in the cloud-forests of central and southern Ecuador.

## Education

Ph.D., University of California, Department of Ecology, Evolution and Marine Biology, Santa Barbara

B.S., Fisheries and Wildlife Management, Lake Superior State University, Sault Ste. Marie, Michigan

## Awards

Worster Award for Graduate/Undergraduate Collaborative Research, Department Ecology, Evolution and Marine Biology, University of California, Santa Barbara ($6000). 2007

Frank M. Chapman Memorial Grant, American Museum of Natural History ($2500). 2007
Student Research Award, Animal Behavior Society ($1000). 2007

Exploration Fund Award, Explorer's Club ($1200). 2007

Paul A. Stewart Research Award, Wilson Ornithological Society ($500). 2007

Ralph Schreiber Ornithology Research Award, Los Angeles Audubon Society ($2500). 2006

Student Research Award, American Ornithologist's Union ($1800). 2003

## Permits & Certifications

USFWS Sci. Collector's Permit (MB085567-0)

USGS Bird Banding Subpermitee (22905-F )

## Selected Publications

Kuehn, M. J., B. D. Peer, and S. I. Rothstein. (*Submitted Dec. 25, 2013*). Expression of Nest Defense Behaviors by a Brood Parasite Host is Experience-Dependent and Retained in the Absence of Parasitism. Evolution.

Kuehn, M. J., B. D. Peer, and S. I. Rothstein. 2014. Variation in host response to brood parasitism reflects evolutionary differences and not phenotypic plasticity. Anim. Behav. 88:21-28.

Peer, B. D., M. J. Kuehn, S. I. Rothstein and R. C. Fleischer. 2011. Persistence of host defence behavior in the absence of avian brood parasitism. Biology Letters. 7(5): 670-673.

Peer, B. D., C. E. McIntosh, M. J. Kuehn, S. I. Rothstein and R.C. Fleischer. 2011. Complex biogeographic history of lanius spp. shrikes and its implications for the evolution of defenses against avian brood parasitism. Condor. 113(2): 385-394.

Bateman, H.L., T.L. Dudley, D.W. Bean, S.M. Ostoja, K.R. Hultine, and M.J.Kuehn. 2010. A river system to watch: documenting the effects of saltcedar (Tamarix spp.) biocontrol in the Virgin River Valley. Ecological Restoration. 28:405-410.

Rivers, J. W., and M. J. Kuehn. Predation of eared grebe by great blue heron. 2007. Wilson Journal of Ornithology. 118(1): 112-113.

Peer, B. D., S. I. Rothstein, M. J. Kuehn and R. C. Fleischer. 2005. Host defenses against cowbird Molothrus spp. parasitism: implications for cowbird management. Pp. 84-97 in C. P. Ortega, J. F. Chace and B. D. Peer eds., Management of cowbirds and their hosts: balancing science, ethics and mandates. Ornithological Monographs. No. 57.

Tewksbury, J. J., T. E. Martin, S. J. Hejl, M. J. Kuehn and W. J. Jenkins. 2002. Parental care of a cowbird host: caught between the costs of egg-removal and nest predation. Proc. R. Soc. Lond. B. 269: 423-429.

Dobbs, R.C., P.R. Martin, and M. J. Kuehn. 2001. On the nest, eggs, nestlings, and parental care in the Scaled Antpitta (Grallaria guatimalensis). Ornithologia Neotropical 2:225-233